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2011–2012 Catalog

Anatrace® products.
The difference is crystal clear.

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Please Note: Anatrace detergents have been shown to be stable under normal shipping conditions and will NOT be shipped with either an ice pack or dry ice.

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Unless otherwise specified, the package will contain at least the indicated amount and usually slightly more. The user is cautioned to always measure the required amount from the container.

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Inquiries can also be sent by fax: 419-740-6630 or e-mail: anatracesupport@affymetrix.com.

Definitions

All concentrations listed as percent are weight/volume unless specifically stated.

AGGREGATION NUMBER is the molecular weight of the micelle divided by the molecular weight of the detergent.

BSA is bovine serum albumin.

CMC is the critical micelle concentration.

[ ] is the Chemical Abstracts Registry Number (CAS).

FW is the formula weight.

PERCENT ALPHA is the percent alpha isomer measured by an HPLC method developed at Affymetrix, Inc.

µS is micro Siemens.

FW avg. is the approximate, estimated FW for commercial detergents.

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Introductory Information

Detergents and their uses
Detergent properties
Detergent analysis
Books

Protein studies need clarity.
Clarity starts with us.

Detergents and Their Uses in Membrane Protein Science

Membrane protein studies have advanced significantly over the past few years. This is partly due to advances in tools and reagents used to manipulate this class of proteins. Detergents play an essential role in the extraction, purification, and manipulation of membrane proteins; their amphiphilic nature allows them to interact with hydrophobic membrane proteins to keep them water-soluble outside of their native bilayer environment. Unfortunately, solubility does not always translate to native structure and stability; a detergent that is useful for extraction may not be compatible with purification and/or biochemical studies. Furthermore, a detergent that works for one membrane protein may not be suitable for a different membrane protein. While there is not a set of "golden rules" for the uses of detergents for membrane protein applications, understanding the physical-chemical properties associated with different classes of detergents may be useful for deciding which detergent may work best for a particular application. For example, the ionic charge or degree of hydrophobicity of a detergent molecule will dictate how it will function in solution and thus how it will interact with membrane proteins. The purpose of this guide is to introduce the researcher to the physical and chemical properties of detergents and describe how these properties relate to detergent function.

Structure and behavior of detergents

Detergents are amphiphilic compounds with well-segregated polar and apolar domains that have measurable aqueous solubility as both aggregates and as monomers. Detergents belong to a class of compounds called surfactants, which are surface active agents that reduce interfacial surface tension in mixtures (*i.e.*, oil and water) by adsorbing to interfaces[1]. Detergents are useful in a wide variety of applications including: polyacrylamide gel electrophoresis (PAGE), membrane permiabilization, membrane dissolution, inclusion body solubilization, lipid raft preparation, and membrane protein solubilization, biochemistry, crystallization, and manipulation. Detergents are also useful as model membranes for *in vitro* studies and as vehicles for protein/DNA/drug delivery.

The ability of a detergent to participate in a specific biological/biochemical function is related to its structure; the polar hydrophilic portion of the detergent molecule is referred to as the "hydrophilic head group" while the nonpolar hydrophobic, portion is referred to as the "tail" (Figure 1A).

There are, however, a few detergents that have a bean-like molecular shape in the sense that they contain both polar and nonpolar "faces"; these include the bile acid derivatives such as CHAPS and CHAPSO (Figure 1B).

Figure of a Detergent Monomer

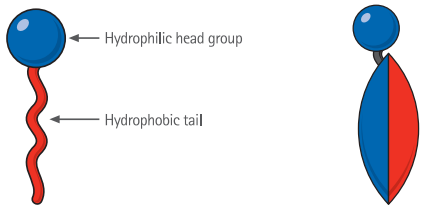


Figure 1A **Figure 1B**

Traditional detergent monomers are generally cone shaped; the hydrophilic head groups tend to occupy more molecular space than the linear alkyl chains (Figure 2A). Detergents tend to aggregate into spherical or elliptoid micelles that are water soluble (Figure 2B). While lipids also have the same general structure as detergents—a polar hydrophilic head group and a nonpolar hydrophobic tail—lipids differ from detergents in the shape of the monomers, in the type of aggregates formed in solution, and in the concentration range required for aggregation. Lipids are generally cylindrical; the area occupied by the two alkyl chains is similar to the area occupied by the polar head group (Figure 2C). Lipids have low solubility as monomers and tend to aggregate into planar bilayers that are water insoluble (Figure 2D).

Molecular Shapes of Detergents and Lipids

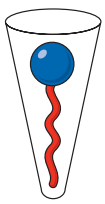


Figure 2A

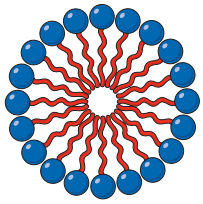


Figure 2B

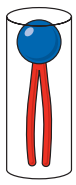


Figure 2C

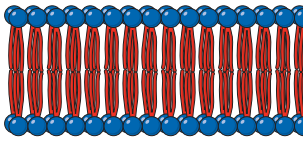


Figure 2D

Effects of the hydrophilic group on detergent function

Water solubility is provided by the hydrophilic portion of a detergent molecule. Hydrophilic groups can be categorized as ionic (cationic or anionic), nonionic, or zwitterionic. Ionic detergents, including sodium dodecyl sulfate (SDS), N-lauryl sarcosine, cetyltrimethylammoniumbromide (CTAB), and sodium cholate are effective at extracting proteins from the membrane. However, these detergents are harsh and tend to be denaturing because they efficiently disrupt both inter- and intra-molecular protein-protein interactions. SDS, for example, is commonly used as a membrane protein denaturant in quantitative protein unfolding/folding studies[2-6]. Bile acid salts (*i.e.*, sodium cholate, deoxycholic acid) are also ionic detergents; however, they tend to be more mild than straight chain ionic detergents[7].

Nonionic detergents, including maltosides, glucosides, and polyoxyethylene glycols are characterized by uncharged hydrophilic head groups. These detergents are mild and nondenaturing because they disrupt protein-lipid and lipid-lipid interactions rather than protein-protein interactions. Short chain (*i.e.*, C7-C10) nonionic detergents are typically more deactivating than longer chain (*i.e.*, C12-C14) nonionic detergents[7, 8]. A majority of the detergents used in the purification and structural determination of membrane proteins (*i.e.*, lauryl maltoside, octyl glucoside) are nonionic detergents[9-11] as well as the new Neopentyl Glycol (NG) class detergents[115].

Zwitterionic detergents, including the Zwittergents®, Fos-Cholines, CHAPS/CHAPSO, and amine oxides contain both a positive and negative charge in their hydrophilic head group. These compounds are electrically neutral like the nonionic detergents, but can often disrupt protein-protein interactions like the ionic detergents; therefore, they tend to be intermediate in their mildness. The zwitterionic detergent lauryldimethyl amine oxide (LDAO) has been used to study the KcsA potassium channel[12] as well as the outer membrane BtuB:TonB complex[13]. Most successful NMR-based structural studies of membrane proteins have been carried out in zwitterionic detergent solutions such as dodecylphosphocholine (*i.e.*, Fos-Choline 12)[14-16].

Effects of the hydrophobic group on detergent function

The hydrophobic portion of a detergent allows the molecule to partition into the apolar lipid bilayer during the solubilization of membrane proteins. It also masks the hydrophobic portions of the membrane proteins once they have been solubilized and thus prevents protein aggregation. The size of the hydrophobic tail is determined by the length of the alkyl chain, the degree of unsaturation within the chain, and whether one or two alkyl chains are present[1]. The physical characteristics of the hydrophobic group (*i.e.*, the length of the alkyl chain, the degree of branching within the chain, the presence of an aromatic nucleus, the number of polyloxyethylene units present, and the presence of fluoroalkyl units) affect the chemical properties of the detergent monomers as well as the aggregates that they form in

solution. For example, increasing the hydrophobic chain length decreases the water solubility of the detergent monomer and causes close packing of the monomers within micelles. Branching and unsaturation cause loose packing of detergent monomers in micelles. Polyoxyethylene units tend to decrease the hydrophobicity of the detergent monomer while fluoroalkyl groups increase the hydrophobic character of the detergent monomer[1].

Hydrophilic-Lipophilic Balance (HLB)

Although the hydrophilic head group and hydrophobic tail each affect the properties of the detergent molecule differently, together their total effect is known as the Hydrophilic-Lipophilic Balance (HLB). The HLB is defined by a number that ranges from 0 to 40. In general, an HLB number <10 indicates that a detergent has low solubility in water while an HLB number between 10 and 20 indicates that the detergent is readily soluble in water[17]. Examples of detergents with HLB values between 10 and 40 include: SDS (40), sodium cholate (18), Brij®-35 (16.9), Tween® 20 (16.7), Tween 80 (15), Triton® X-100 (13.5), and Triton X-114 (12.4)[18, 19]. For simple, single-chain detergents, HLB can be determined by the following equation[20, 21]:

$$HLB = \Sigma H - \Sigma L + 7 \quad \text{(i)}$$

Where H is the contribution from the hydrophilic group and L is the contribution from the lipophilic group

In studies with the human adenosine A_3 receptor, a member of the GPCR superfamily, Berger *et al.* showed that detergents with an HLB number of 15 correlated with selective extraction of A_3 from the membrane and high activity upon purification[22]. Specifically, A_3 was successfully purified in decyl maltoside (DM), dodecyl maltoside (DDM) and HEGA®-10. Detergents with HLB numbers ranging from 12.4 to 13.5 (*i.e.*, Triton X-100) were previously shown to efficiently solubilize and maintain the stability of *B. subtilis* D-alanine carboxypeptidase and *M. luteus* phosphoacetylmuramyl pentapeptide translocase and succinate dehydrogenase[19]. Several other studies have also shown that HLB values may be useful in selecting detergents for membrane protein extraction and purification[23, 24].

The HLB has also been correlated to the detergent packing parameter which can be expressed as:

$$P = v / al \quad \text{(ii)}$$

Where v is the volume of the detergent chain, l is the length of the chain, and a is the cross-sectional area of the head group.

Packing parameters are assigned to detergent monomers and are useful for predicting the shape of the aggregate (*i.e.*, spherical or lamellar) formed by those monomers. For example, P<1/3 indicates that the detergent will likely form spherical micelles while 1/3<P<1/2 indicates that the detergent will likely form cylindrical micelles[25]. Berger *et al.* showed that as the HLB value of a detergent decreases, the packing parameter increases[22]. For example, as the hydrophobicity of a detergent increases, there is a tendency for the monomers to assemble into a more lamellar aggregate. These shapes may also influence the effects of a detergent upon a solubilized protein.

Micellization

Detergents interact with proteins and membranes as micelles. Micellization occurs when surface active compounds form non-covalent clusters in solution; this process is driven by the hydrophobic effect[1]. When a nonpolar group is introduced into an aqueous solution, the hydrogen bonding network formed by the existing water molecules is disrupted and the water molecules order themselves around the nonpolar entity to satisfy hydrogen bonds (Figure 3A). This results in an unfavorable decrease in entropy in the bulk water phase. As additional nonpolar groups are added to the solution, they self-associate thus reducing the total water-accessible surface of the complex relative to the monodisperse state. (Figure 3B) Now, fewer water molecules are required to re-arrange around the collection of nonpolar groups. Therefore, the entropy associated with the complex is less unfavorable than for the monodisperse detergents. In short, hydrophobic association and the formation of micelles is driven by the favorable thermodynamic effect on the bulk water phase[26].

Hydrophobic Effect and Micellization

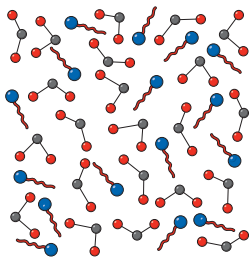


Figure 3A

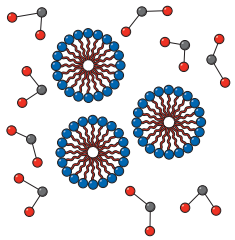


Figure 3B

Solubilization of proteins is dependant upon the formation of micelles in solution. Micelles are colloquially thought to be spherical in shape. However, it is now appreciated that they are asymmetrical and have "rough" surfaces where the alkyl tails are disorganized and transiently poke into the bulk solution (Figure 4A)[27-29].

Micelles are typically a few nanometers in diameter and have a molecular weight of less than 100 kDa. Detergent micelles are dynamic structures; detergent monomers within the micelle are in constant, rapid exchange with free detergent monomers in solution. Although the molecular details of how detergent micelles extract proteins from a membrane are still not completely understood, it is generally accepted that once a protein has been solubilized, the detergent molecules form a torus around the hydrophobic transmembrane domains (Figure 4B)[8].

Micelles and Membrane Protein Extraction

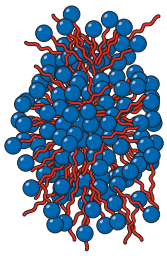


Figure 4A

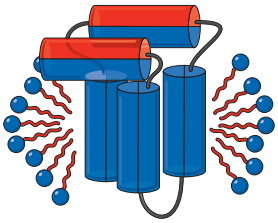


Figure 4B

The critical micelle concentration

Micellization is a critical phenomenon when considering detergent applications. Each detergent can be characterized by its critical micelle concentration (CMC); the concentration of detergent above which monomers self-assemble into non-covalent aggregates (called micelles)[1, 30, 31]. The CMC actually does not occur at a single concentration, but rather, over a narrow concentration range. When the total detergent concentration is below the CMC, detergent monomers are free in bulk solution. However, as more detergent is added above the CMC, all additional detergent monomers will go into micelles. It is important to note that when the total detergent concentration is greater than the CMC, there is a monomeric detergent concentration equal to the CMC and a micellar detergent concentration equal to: [total detergent concentration] – CMC. The CMC can be determined by a variety of methods including surface tension measurements[32] and dye (*i.e.*, anilino-1-naphthalene sulfonic acid [ANS]) binding experiments[33]. When working with membrane proteins, a general rule of thumb is to work at a detergent concentration of at least 2X CMC and at a detergent:protein weight-to-weight ratio of at least 4:1. Moreover, when solubilizing proteins from native membranes, it is advisable to work at a detergent concentration well above the CMC as well as at a 10:1 detergent:lipid mol:mol ratio. Therefore, the CMC dictates how much detergent needs to be added to various protein and membrane preparations.

There are several physical-chemical factors that can affect the CMC of a given detergent. Generally, the CMC decreases as the hydrophobicity of the detergent increases. Other properties that directly affect the CMC are the characteristics of the hydrophobic and hydrophilic groups and solution additives such as electrolytes.

Effects of the hydrophilic group on CMC

Variations in the hydrophilic head group affect the detergent CMC. In general, detergents containing ionic head groups have a higher CMC than those containing nonionic head groups[1]. This is due to electronic repulsion between the head groups of neighboring detergent monomers within the micelles. Detergents containing zwitterionic head groups tend to have smaller CMCs than those containing ionic head groups.

Effects of the hydrophobic group on CMC

The physical characteristics of the hydrophobic group can also have varying effects on the CMC of a particular detergent. In general, the CMC decreases as the number of carbon atoms in the alkyl chain increases up to approximately 16 to 18 carbons (for straight chain alkyls)[1]. Above this point, detergents become lipid-like and do not form discrete micelles. As a rule of thumb, for ionic detergents, the addition of a single methylene group to the hydrophobic tail halves the CMC. For nonionic and zwitterionic detergents, the addition of a methylene group reduces the CMC by approximately 80% relative to the parent CMC. In general, carbon atoms on branched hydrophobic chains have about half the effect on the CMC as carbon atoms on straight chains. The addition of a phenyl ring to the hydrocarbon chain is equivalent to approximately 3.5 methylenes. A carbon-carbon double bond increases the CMC compared to the corresponding saturated compound; compounds with cis double bonds have a higher CMC than compounds with trans double bonds. When an oxygen or hydroxyl group is added to the hydrophobic group, the CMC increases. Methylene groups between these polar groups and the hydrophilic head group have approximately half the effect on the CMC as they would in the absence of the polar group. Fluorocarbons tend to have a lower CMC than hydrogenated carbons[1].

Effects of electrolytes on CMC

Electrolytes tend to reduce the CMC of detergent solutions. For example, the CMC for the anionic detergent SDS is approximately 6 mM; however, in the presence of 150 mM NaCl, the CMC is reduced to 1.4 mM[34]. A further reduction in the CMC to 0.9 mM was found upon the addition of 350 mM NaCl. Similar effects have been shown for other anionic detergents including potassium laurate and sodium decyl sulfate[34]. Reductions in CMC upon salt addition have also been shown for cationic detergents including dodecylammonium chloride, decyltrimethylammoinum bromide, and cetyltrimethylammonium sulfate[34, 35]. The reduction in the CMC in the presence of electrolytes for ionic detergents is likely due to a reduction in the electronic environment surrounding the ionic head groups. Addition of electrolytes decreases the repulsion between similarly charged ionic head groups within a micelle and therefore, the detergent monomers can pack tightly and the CMC is reduced[1].

Addition of salts to solutions containing nonionic detergents also reduces CMC values. For example, the CMC of Triton X-100 in aqueous solution is 0.24 mM. In the presence of 0.5 M or 1.0 M NaCl the CMC is reduced to 0.14 mM and 0.08 mM respectively[36]. For nonyl glucoside, the CMC is reduced from 6.9 mM in aqueous solution to 2.6 mM in 1.5 M NaCl[37]. The decrease in the CMC for these uncharged detergents is likely due to the effects of electrolytes on the hydrophobic moieties. Electrolytes that are highly hydrated, (*i.e.*, Cl-) are water structure-makers; they will "salt out" hydrophobic groups and therefore, they tend to decrease the CMC. Electrolytes that have a small charge:radius ratio (*i.e.*, SCN- and I-), are water structure breakers; they tend to "salt in" hydrophobic groups. Thus ions may either increase or decrease the CMC of a nonionic detergent[1, 36-38].

Cloud point

The cloud point is the temperature above which a nonionic surfactant solution separates into a detergent rich phase and a detergent poor phase[1, 25, 27]. The separation is visualized as turbidity within the solution. An increase in temperature favors micelle formation; the rapid growth of micelles along with intermicellar attraction likely results in the formation of large particles that can precipitate out of solution, thus causing turbidity. This phase separation is reversible upon cooling. Nonpolar additives (*i.e.*, hydrocarbons) tend to increase the cloud point whereas polar compounds (*i.e.*, alcohols) and salts tend to decrease the cloud point[1]. A low cloud point may be useful in membrane protein purification[39-41]. For example, Triton X-114 has a cloud point that is near room temperature. This property makes it possible to carry out two-phase water/detergent extractions to separate water soluble proteins from membrane proteins[39, 42]. However only a very limited number of nonionic detergents have cloud points below 50ºC.

Aggregation numbers

Another physical property of the micelle is the aggregation number; the number of detergent monomers present within a micelle[1, 25, 30]. Most detergents used for biochemical applications have aggregation numbers that range from 50 to 100[8]. Exceptions are some bile acid derivatives like CHAPS, CHAPSO, and Big CHAP which have aggregation numbers of approximately 10. Detergents with smaller aggregation numbers tend to form more spherical micelles while detergents with larger aggregation numbers tend to form elliptoid micelles. In general, aggregation numbers increase as the length of the hydrocarbon chain increases. Aggregation numbers tend to decrease as the size of the hydrophilic group increases and upon the addition of hydrocarbons and polar compounds to the detergent solution[1]. Increasing the temperature of solutions of ionic detergents also causes an increase in the aggregation number. Aggregation numbers can be determined by a variety of methods including light scattering[43], small angle neutron scattering[44], and fluorescent dye binding[45].

With knowledge of the detergent CMC and aggregation number, one can determine several important parameters including the concentration of micelles present in solution and the aggregate molecular weight of the micelle. In ideal, protein-free conditions, the concentration of micelles can be calculated as follows:

$$[\text{micelles}] = [\text{total detergent}] - [\text{CMC}] / \text{AN} \qquad \text{(iii)}$$

where CMC is the critical micelle concentration and
AN is the micelle aggregation number

The aggregate molecular weight (AMW) of a protein-free micelle can be calculated as follows:

$$\text{AMW} = \text{AN} \times \text{monomer molecular weight} \qquad \text{(iv)}$$

where AN is the micelle aggregation number

Typical micelle aggregate molecular weights range from 20 to 100 kDa. It should be noted that determination of the aggregate molecular weight of a protein-detergent complex is more involved and is addressed in Section V.

Detergent removal

The CMC is also important in determining which method should be used to remove excess or unwanted detergent. Detergents may interfere with certain applications and must be removed when reconstituting into liposomes[46, 47]. Detergents with high CMCs are easily removed by dialysis; detergent solutions can be diluted below their CMC so that micelles disintegrate into monomers which can easily pass through dialysis tubing over time[7]. Typically, detergent solutions are dialyzed against a large excess (*i.e.*, 200-fold) of detergent-free buffer for days with several changes of the detergent-free buffer over this time. Detergents with low CMCs are typically removed by adsorption to hydrophobic beads[48]. Detergent bound beads can then be removed by filtration or centrifugation. Detergents can also be removed by various types of column chromatography. Gel filtration can be used to separate detergent micelles from protein-detergent complexes and free protein based on size differences. Detergents can also be removed or exchanged while Histidine-tagged proteins are bound to Nickel resin[7].

Detergents and biological membranes

Biological membranes are bilayers of phospholipid molecules; the general architecture of the bilayer is depicted below (Figure 5).

Architecture of the Lipid Bilayer

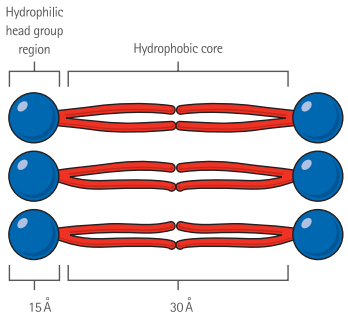


Figure 5

The tails of the lipid acyl chains orient towards each other (creating a non-polar, hydrophobic core) while the polar, phosphoester head groups contact the surrounding bulk water phase. Thus, the bilayer is divided into two distinct regions: the hydrophobic core and the hydrophilic head group region. Each "compartment" has unique properties that differentially affect the proteins that reside within the bilayer. The hydrophobic core of the bilayer, composed of phospholipid acyl chains, is approximately 30 Å thick, and provides the low dielectric environment for the solvation of hydrophobic regions of integral membrane proteins[49, 50]. This region is generally quite fluid at biologically relevant temperatures; bilayer fluidity is often necessary for protein function and lateral diffusion of proteins. The hydrophilic head group region is generally polar and charged. This region interacts with membrane proteins through Columbic forces which stabilize extra-membrane loops and int eract with the polar ends of α-helices[49, 50].

Biological membranes are asymmetric with respect to lipids and proteins. For example, the composition of lipids in the different leaflets of red blood cell membranes contributes to the pliability of these cells, permitting their passage through the vasculature (outer leaflet: 76% phosphatidylcholine (PC), 82% sphingomyelin (SP), 20% phosphatidylethanolamine (PE), 0% phosphatidylserine (PS); inner leaflet: 24% PC, 18% SP, 80% PE, 100% PS. Percentages are of total lipid content.)[51]. Additionally, proteins may be preferentially located either on the inner or outer leaflet of the membrane, and in a preferred orientation. This asymmetry can be important when deciding how best to extract a membrane protein and what conditions (*i.e.*, detergents and/or lipids) are best for reconstitution for biochemical studies.

Extracting proteins from the membrane

To study membrane proteins, they must first be extracted from the membrane and maintained in a soluble, native, functional form. During the extraction process, it has been proposed that detergent monomers first partition into the bilayer.

Cooperative detergent-detergent interactions destabilize the bilayer yielding mixed lipid-detergent fragments (Figure 6A). Eventually, further detergent addition leads to bilayer dissolution and protein solubilization (Figure 6B)[8, 52].

Solubilization of Membranes

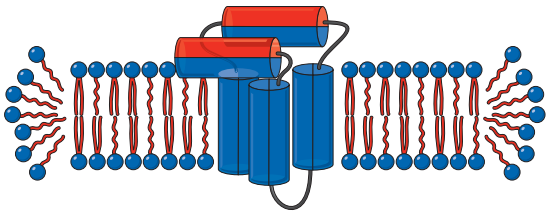


Figure 6A

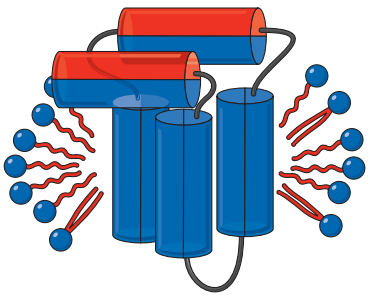


Figure 6B

There are several "degrees" to which a membrane protein can be extracted from the membrane for further study. The protein can be purified in such a way that some native lipids remain bound to the protein. This can be accomplished by using detergents that are not efficient lipid solubilizing agents and by minimizing the duration of detergent exposure during column chromatography. Alternatively, a protein can be completely stripped of native lipids by using stringent detergents. This may be important in applications where homogenous protein preparations are required. Lipids can then be added back to these preparations if necessary for protein activity and/or stability.

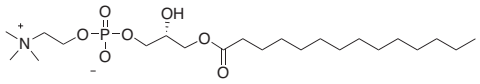
It should be noted that studying the membrane proteins within specialized membrane microdomains, known as lipid rafts, presents a unique problem. Lipid rafts are enriched in sphingolipids, glycerophospholipids, and cholesterol[53-55]. These domains, also called detergent-resistant membranes (DRMs), have been shown to play key roles in cell signaling and protein sorting. Historically, DRMs have been detected by their resistance to solubilization by cold Triton X-100. However, it has been shown that the characteristics of these DRMs are dependant upon the detergents used in their isolation. For example, Schuck *et al.* showed that the amounts and types of proteins and lipids associated with DRMs varied dramatically when different detergents were used to isolate the membrane domain[53]. Thus, caution should be exercised when choosing an appropriate detergent to isolate proteins from native membranes.

Working with solubilized membrane proteins

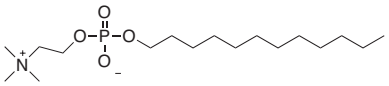
Some of the more common detergents that have been shown to be useful in membrane protein functional and structural studies are the alkyl glycosides[56-58]. For example, short chain alkyl maltosides and glucosides have been successful in the crystallization of membrane proteins[59-63] whereas longer-chain glycosides (*i.e.*, dodecyl maltoside, tetradecyl maltoside, and hexadecyl maltoside) have been shown to stabilize various oligomeric states of the G-protein coupled receptor (GPCR), rhodopsin[64]. Dodecyl maltoside, for example, has been used to crystallize the membrane protein cytochrome c oxidase from Rhodobacter sphaeroides[65], to study the unfolding of the 4-transmembrane helix protein DsbB from the inner membrane of *E. coli*[66], and to study the light-induced structural changes in mammalian rhodopsin by ^{19}F NMR[67].

Other detergents that are finding an increasing use in membrane protein biochemistry are the lysophospholipids, Fos-Choline detergents, and short chain phospholipids (Figure 7).

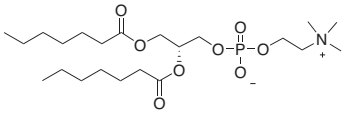
Phospholipid-like Detergents



Lysomyristoylphosphatidylcholine



Fos-Choline 12



Dihexanoylphosphatidylcholine

Figure 7

Lysophospholipids are similar to the native phospholipids in which membrane proteins are embedded; they have phospholipid-like head groups however their hydrophobic tails contain only a single acyl chain and they form water-soluble aggregates. Indeed, some GPCRs remain functional after extraction into lysophospholipid micelles[68-70]. Lysophospholipids have also been used in NMR structural studies of membrane proteins as well as in the purification of the cystic fibrosis transmembrane conductance regulator (CFTR)[71, 72]. As mentioned previously, the Fos-Choline detergents have been successfully used in membrane protein studies by NMR[14-16]. Short chain phospholipids such as dihexanoylphosphatidylcholine (DHPC), have been used to solubilize and reconstitute integral membrane proteins. These compounds form water-soluble micelles in solution and have been shown to maintain native protein structure and function when used in membrane protein purification protocols[73, 75]. For example, the NMR structure of the *E. coli* outer membrane protein X (OmpX) was determined in DHPC micelles[76].

Membrane proteins can also be reconstituted into detergent-lipid mixed micelles. This may be the closest representative bilayer-mimetic system. For example, bacteriorhodopsin has been refolded into several different detergent-lipid systems including CHAPS/DMPC and CHAPSO/SDS/DMPC micelles[77, 78].

Practical considerations

There are several practical issues to consider when working with detergents and membrane proteins. First, one must determine the degree of detergent purity and homogeneity required for specific applications. For example, when purifying and/or crystallizing proteins, one may choose a detergent that is both pure (*i.e.*, free of contaminating alcohols, amides, or other byproducts of synthesis) and homogeneous (*i.e.*, composed of a single species). Many industrial-grade detergents, including Triton and Tween, may be pure, but are heterogeneous in the composition of their polyoxyethylene chains. These detergents may be less suitable for crystallization screens, but may be sufficient for protein extraction.

Secondly, when determining the molecular weight of a solubilized membrane protein, one must consider the aggregate molecular weight of the detergent-protein complex (Figure 8). If it can be assumed that there is one protein molecule per micelle and if the protein is smaller than the micelle, then the aggregate weight of the complex is equal to the protein molecular weight plus the micelle aggregate weight. However, larger membrane proteins will tend to complex with a higher amount of detergent than is present in a free micelle alone. In this case, the detergent concentration must be sufficient to completely coat the exposed regions of the transmembrane domain.

Aggregate Molecular Weight of Protein/Detergent Complexes

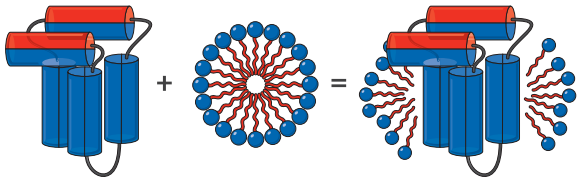


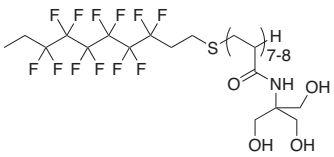
Figure 8

Similarly, it is important to note that when one is concentrating a solution of detergent-solubilized protein, the concentration of empty micelles may also increase as their molecular weight may be greater than the molecular weight cut off of a concentrator membrane. Several methods exist for determining the detergent concentration in solution including colorimetric assays[79], thin layer chromatography[80], refractive index measurements[81], light scattering measurements[81], and analytical ultracentrifugation[82, 83]. Some of these methods are useful for determining the concentration of free detergent in solution[79-81]. Others are useful for determining the amount of protein-bound detergent[79, 80, 83] or the size of a protein-detergent complex [81, 83].

Non-detergent surfactants and other novel detergents

As mentioned previously, membrane proteins can be destabilized or denatured by certain detergents including ionic detergents and short chain nonionic detergents. Hemifluorinated surfactants (Figure 9A) and amphipols (Figure 9B) are two very different non-detergent surfactants that have been used in membrane protein studies.

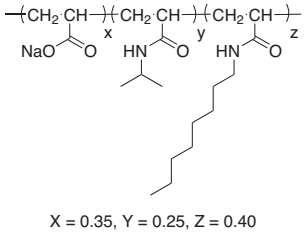
Non-Detergent Surfactants



HF-TAC

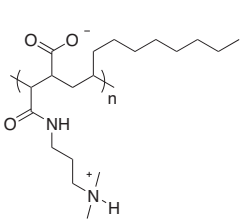
Figure 9A

Non-Detergent Surfactants



X = 0.35, Y = 0.25, Z = 0.40

A8-35



PMAL-C8

Figure 9B

Hemifluorinated surfactants contain a fluorinated hydrophobic tail and a polar head group[84-86]. Fluorinated chains are unique in that they are not miscible with hydrocarbons (*i.e.*, lipids). Therefore, these compounds cannot be used to solubilize membrane proteins. One compound, HF-TAC, has been shown to maintain the solubility and stability of bacteriorhodopsin and cytochrome b_6f complex[84]. It has been suggested that HF-TAC retains protein-bound lipids better than traditional detergents; this likely contributes to the stability of the cytochrome b_6f complex within these compounds. Other zwitterionic perfluorinated detergents are known to align in a magnetic field and may be useful as tools for NMR studies of membrane proteins[87].

Amphiphols are amphipathic polymers that wrap around membrane proteins to maintain their solubility[88]. Amphiphols are unique in that they bind proteins tightly and protein-amphipol complexes are stable for long periods of time[89]. Due to this tight binding, excess amphipol can often be removed from the bulk solution without affecting protein stability. Several membrane proteins have been studied in complexes with amphipols including the photosynthetic reaction center from Rhodobacter sphaeroides[90], the acetylcholine receptor[91], diacylglycerol kinase[92], OmpA, FomA, and bacteriorhodopsin[93].

Several additional novel detergent alternatives have been proposed over the past few years including lipopeptides (Figure 10A) and tripod amphiphiles (Figure 10B).

Novel Detergent Alternatives

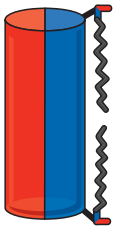


Figure 10A

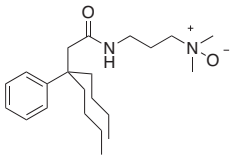


Figure 10B

Lipopeptides contain two hydrophobic alkyl chains separated by a short amphipathic peptide[94]. These compounds self assemble such that the alkyl chains effectively solubilize hydrophobic domains of membrane proteins while the small peptide forms a shell around the complex to render it water soluble. These compounds have been shown to maintain the solubility of bacteriorhodopsin, PagP, and a lac permease-cytochrome b562 fusion protein[94].

Tripod amphiphiles are unique amine oxides that have been used in the solubilization and crystallization of bacteriorhodopsin. These compounds contain three rigid chains that have been suggested to promote membrane protein crystallization[95, 96].

Model membrane systems

Several novel model membrane systems incorporating both detergents and lipids have also been used to study integral membrane proteins. Nanodiscs are self-assembling complexes that consist of a phospholipid bilayer core surrounded by an amphipathic membrane scaffold protein (MSP) (Figure 11)[97, 98]. The MSP is a 200-residue protein that is a series of linked amphipathic helices. A target protein can be incorporated into the self-assembly process and theoretically be reconstituted into a native-like environment. A single molecule of bacteriorhodopsin was successfully incorporated into these nanodiscs[97] as was heterologously expressed, functional Arabidopsis cytochrome P450 and P450 reductase[99].

Model Membrane Systems

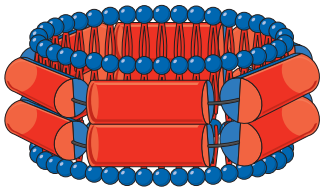


Figure 11

Bicelles are unique model membrane systems composed of both lipids and detergents that have found applications in solution and solid-state NMR[100-103] and more recently in membrane protein crystallography[104, 105]. Bicelles are prepared by mixing lipids such as dimyristoylphosphatidylcholine (DMPC) with edge-stabilizing detergents (*i.e.*, CHAPSO) or short chain lipids such as dihexanoylphosphatidylcholine (DHPC) in 4:1 to 1.5:1 lipid:detergent molar ratios. These edge stabilized planar bilayered assemblies present several advantages over traditional mixed micellar systems; (1) bicelles represent a more native-like environment for structural studies of membrane proteins, (2) the effects of membrane curvature may be less pronounced than seen in pure detergent micelles, (3) for NMR studies, bicelle aggregate sizes are sufficiently small and they can be aligned in a magnetic field, and (4) for crystallization trials, bicelles are easy to manipulate and the crystals produced from them can be easily isolated and mounted for diffraction.

Detergents are indispensable when working with integral membrane proteins. By nature of their amphiphilic character, detergents are able to partition into biological membranes, extract proteins, and maintain protein solubility in solution. Detergents are useful in a wide variety of other applications as well including PAGE, inclusion body solubilization, and lipid raft preparation. Unfortunately, there is not an easy method for choosing which detergent may be best for a particular application. However, several studies have been published comparing the effects of different detergents on membrane protein solubility, activity, and structure[106-114]. These studies can be used as guides for determining which detergents may be most suitable for a particular protein or application. Different detergents display unique physical-chemical properties; the ionic charge, degree of hydrophobicity, and molecular size each contribute to the function of a detergent in solution. These properties should guide the researcher in choosing an appropriate detergent for their particular application.

Table 1: Useful equations

Application	Equation
Total detergent concentration	[CMC] + [free micellar] + [protein-associated detergent]
Micelle concentration	([total detergent] - [CMC]) / AN
Micelle aggregate molecular weight	AN X monomer MW

CMC = Critical Micelle Concentration; AN = Aggregation number; MW = Molecular Weight.

Table 2: Reasons for detergent insolubility
Occasionally a detergent solution will precipitate upon cooling or after storage for several days or even weeks. Here are some possible reasons why this may occur:

Problem	Explanation	Solution
Microbial growth	Sugar derivatives are easily degraded by microorganisms and therefore are an excellent substrate for microbial growth.	Prepare solutions containing sugar-based detergents frequently, store at 4ºC, and filter to prevent precipitation. EDTA can also be included at 0.2% as long as the pH is >6.0.
Presence of alcohol	Occasionally a small amount of the alcohol used to prepare alkyl glycosides may be present in the purified detergent. At low temperatures the alcohol may precipitate out of solution. The presence of alcohol may also depress the cloud point of the detergent causing phase separation to occur at a lower temperature than expected.	Check the specifications of your detergent; Anagrade® detergents contain <0.005% starting alcohol.
Kinetic effect	A detergent may "dissolve" as an aggregate at room temperature. Therefore, when it is cooled to 4ºC, the aggregate precipitates out of solution; thus, the detergent was never truly dissolved.	Heat the solution to 50ºC during solubilization and then cool back to room temperature. This should prevent re-precipitation at 4ºC.
Super-saturation	A detergent solution that is supersaturated may appear to be fully solubilized for days. When cooled to 4ºC, the detergent may precipitate.	Reduce the detergent concentration to eliminate precipitate or store at room temperature.

Table 3: Factors affecting CMC and aggregation numbers

Factors that increase CMC	• Carbon-Carbon double bonds • Polar groups within the hydrophobic tail • Ionic head groups
Factors that decrease CMC	• Increasing number of methylene groups in the alkyl chain • Phenyl rings in the alkyl chain • Fluorocarbons within the hydrophobic tail • Addition of electrolytes to solutions of ionic detergents
Factors that increase aggregation number	• Increasing number of methylene groups in the alkyl chain • Addition of counterions (for ionic detergents)
Factors that decrease aggregation number	• Increasing size of hydrophilic head group • Polar organic additives • Addition of hydrocarbons to solution

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Detergent Properties Listed Alphabetically

The detergents are arranged in alphabetical order. The conditions used to measure CMC values and aggregation numbers are located in further sections of the catalog.

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
A110MT	136	2-Aminoethyl Methane Thiosulfonate Hydrobromide (MTSEA)	C	236.15	N/A	N/A
A835	85	Amphipol A8-35	C	~9000.0	N/A	N/A
A340	32	Anameg®-7	N	335.4	19.5 (0.65%)	92
APT020	75	Anapoe-20	N	1228	0.059 (0.0072%)	N/A
APB035	75	Anapoe-35	N	1198	0.091 (0.0010%)	40
APB058	75	Anapoe-58	N	1122	0.004 (0.00045%)	N/A
APT080	76	Anapoe-80	N	1310	0.012 (0.0016%)	58
APO106	76	Anapoe-$C_{10}E_6$	N	423	0.9 (0.0250%)	40
APO109	76	Anapoe-$C_{10}E_9$	N	555	1.3 (0.053%)	N/A
APO128	77	Anapoe-$C_{12}E_8$	N	539	0.09 (0.0048%)	123
APO129	77	Anapoe-$C_{12}E_9$	N	583	0.05 (0.003%)	N/A
AP1210	77	Anapoe-$C_{12}E_{10}$	N	627	0.2	N/A
APO138	78	Anapoe-$C_{13}E_8$	N	553	0.1 (0.0055%)	N/A
APND40	78	Anapoe-NID-P40	N	603	0.05-0.3	100-155
APX100	78	Anapoe-X-100	N	647	0.23 (0.015%)	75-165
APX114	79	Anapoe-X-114	N	536	0.2 (0.011%)	N/A
APX305	79	Anapoe-X-305	N	1526	N/A	N/A
APX405	79	Anapoe-X-405	N	1967	0.81 (0.16%)	N/A
AZ308	70	Anzergent® 3-8, Analytical Grade	Z	279.6	390 (10.9%)	N/A
AZ310	70	Anzergent 3-10, Analytical Grade	Z	307.6	39 (1.2%)	41
AZ312	70	Anzergent 3-12, Analytical Grade	Z	335.5	2.8 (0.094%)	55-87
AZ314	71	Anzergent 3-14, Analytical Grade	Z	363.6	0.2 (0.007%)	83-130
AZ316	71	Anzergent 3-16, Analytical Grade	Z	391.7	10-60	N/A
AZ318	71	Anzergent 3-18, Analytical Grade	Z	417.7	N/A	N/A
B300	136	Big Chap, Analytical Grade	N	878.1	2.9 (0.25%)	10
B310	136	Big Chap, Deoxy, Analytical Grade	N	862.1	1.4 (0.12%)	8, 16
B518	99	BisMalt-18	N	935.1	0.024	N/A
B520	99	BisMalt-20	N	963.1	0.0015	N/A
B522	99	BisMalt-22	N	991.2	0.0084	N/A
B524	100	BisMalt-24	N	1019.2	N/A	N/A
B528	100	BisMalt-28	N	1075.3	N/A	N/A
C316	137	CHAPS, Anagrade	Z	614.9	8 (0.49%)	10
C317	137	CHAPSO, Sol-Grade®	Z	630.9	8 (0.50%)	11
C408	54	C-HEGA®-8, Anagrade	N	349.5	277 (9.7%)	N/A
C409	54	C-HEGA-9, Anagrade	N	363.5	108 (3.9%)	N/A
C410	54	C-HEGA-10, Anagrade	N	377.5	35 (1.3%)	N/A
C411	55	C-HEGA-11, Anagrade	N	391.5	11.5 (0.45%)	N/A
CH220	113	Chobimalt, Anagrade	N	1035.2	0.004	200-228
CH210	113	Cholesteryl Hemisuccinate Tris Salt	C	607.9	N/A	N/A
C508	101	Cyclofos™-2, Anagrade	Z	293.8	256 (7.5%)	N/A
C510	101	Cyclofos-3, Anagrade	Z	306.9	43 (1.3%)	N/A
C512	101	Cyclofos-4, Anagrade	Z	320.9	8.45 (0.45%)	N/A
C514	102	Cyclofos-5, Anagrade	Z	335	4.5 (0.15%)	N/A
C516	102	Cyclofos-6, Anagrade	Z	349.2	2.68 (0.094%)	N/A
C518	102	Cyclofos-7, Anagrade	N	363.3	0.62 (0.022%)	N/A
C323G	32	CYGLU®-3, Anagrade	N	304.4	28 (0.86%)	N/A
C324G	32	CYGLU-4, Anagrade	N	318.4	1.8 (0.058%)	N/A
C321	48	CYMAL®-1, Anagrade	N	438.5	340 (15%)	360
C322	48	CYMAL-2, Anagrade	N	452.5	120 (5.4%)	104

The types of detergents: A = Anionic / C = Cationic / N = Nonionic / Z = Zwitterionic

Detergent Properties, continued

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
C323	48	CYMAL-3, Anagrade	N	466.5	34.5 (1.6%)	N/A
C324	49	CYMAL-4, Anagrade	N	480.5	7.6 (0.37%)	25
C325	49	CYMAL-5, Anagrade	N	494.5	2.4 (0.12%)	47
C326	50	CYMAL-6, Anagrade	N	508.5	0.56 (0.028%)	91
C327	51	CYMAL-7, Anagrade	N	522.5	0.19 (0.0099%)	150
NG322	52, 122	Decyl Maltose Neopentyl Glycol	N	949.1	0.036	N/A
D322HA	37	n-Decyl–α–D-Maltopyranoside, Anagrade	N	482.6	1.66 (0.08%)	N/A
D321	33	n-Decyl–β–D-Glucopyranoside, Anagrade	N	320.4	2.2 (0.070%)	N/A
D322	37	n-Decyl–β–D-Maltopyranoside, Anagrade	N	482.6	1.8 (0.087%)	69
D322LA	37	n-Decyl–β–D-Maltopyranoside, Anagrade, Low Alpha	N	482.6	1.8 (0.087%)	69
D910	131	Decyl–β–D-Selenomaltoside	N	545.5	0.7	N/A
D323	61	n-Decyl–β–D-Thioglucopyranoside, Anagrade	N	336.4	0.9 (0.30%)	N/A
D335	63	n-Decyl–β–D-Thiomaltopyranoside, Anagrade	N	498.6	0.9 (0.045%)	75
D365	67	n-Decyl-N,N-Dimethylamine-N-Oxide, Anagrade	Z	201.4	10.48 (0.211%)	N/A
D352	69	n-Decyl-N,N-Dimethylglycine, Anagrade	Z	243.4	19 (0.46%)	N/A
D380	65	Deoxycholic Acid, Sodium Salt, Anagrade	A	414.6	6 (0.24%)	22
D607	97	1,2-Diheptanoyl-sn-Glycero-3-Phosphocholine	Z	481.6	1.4	N/A
D606	97	1,2-Dihexanoyl-sn-Glycero-3-Phosphocholine	Z	453.5	15	35-40
DH325	38	2,6-Dimethyl-4-Heptyl–β–D-Maltoside	N	468.5	27.5 (1.2%)	N/A
D614	98	1,2-Dimyristoyl-sn-Glycero-3-[Phospho-rac-(1-Glycerol)], Sodium Salt	C	688.8	0.011	N/A
D514	98	1,2-Dimyristoyl-sn-Glycero-3-Phosphocholine	Z	677.9	0.006	N/A
D608	98	1,2-Dioctanoyl-sn-Glycero-3-Phosphocholine	Z	509.3	0.27	N/A
D310HA	38	n-Dodecyl–α–D-Maltopyranoside, Anagrade	N	510.6	0.152 (0.0076%)	90
D318	33	n-Dodecyl–β–D-Glucopyranoside, Anagrade	N	348.5	0.19 (0.0066%)	N/A
D310	39	n-Dodecyl–β–D-Maltopyranoside, Anagrade	N	510.6	0.17 (0.0087%)	78-149
D342	63	n-Dodecyl–β–D-Thiomaltopyranoside, Anagrade	N	526.6	0.05 (0.0026%)	126
D350	69	n-Dodecyl-N,N-Dimethylglycine, Anagrade	Z	271.4	1.5 (0.041%)	N/A
D360	67	n-Dodecyl-N,N-Dimethylamine-N-Oxide, Anagrade	Z	229.4	1 (0.023%)	76
D912	131	Dodecyl–β–D-Selenomaltoside	N	573.6	N/A	N/A
F300	102	Fos-Choline-8, Anagrade	Z	295.4	114 (3.4%)	N/A
F300F	103	Fos-Choline-8, Fluorinated, Anagrade	Z	529.2	N/A	N/A
F302	103	Fos-Choline-9, Anagrade	Z	309.4	39.5 (1.2%)	N/A
F304	104	Fos-Choline-10, Anagrade	Z	323.4	11 (0.35%)	45-53
F304PDH	126	Fos-Choline-10, Per Deuterated Head	Z	336.5	N/A	N/A
F304SDH	127	Fos-Choline-10, Semi Deuterated Head	Z	332.5	N/A	N/A
F306	105	Fos-Choline-11, Anagrade	Z	337.4	1.85 (0.062%)	18
F306PDH	127	Fos-Choline-11, Per Deuterated Head	Z	350.5	N/A	N/A
F306SDH	127	Fos-Choline-11, Semi Deuterated Head	Z	346.5	N/A	N/A
F308	106	Fos-Choline-12, Anagrade	Z	351.5	1.5 (0.047%)	54
F308D	128	Fos-Choline-12, Deuterated	Z	389.8	N/A	N/A
F308PDH	128	Fos-Choline-12, Per Deuterated Head	Z	364.5	N/A	N/A
F308PDT	128	Fos-Choline-12, Per Deuterated Tail	Z	376.6	N/A	N/A
F308SDH	129	Fos-Choline-12, Semi Deuterated Head	Z	360.5	N/A	N/A
F310	107	Fos-Choline-13, Anagrade	Z	365.5	0.75 (0.027%)	87
F312	108	Fos-Choline-14, Anagrade	Z	379.5	0.12 (0.0046%)	108
F312D	129	Fos-Choline-14, Deuterated	Z	421.5	0.12 (0.0051%)	N/A
F312PDH	129	Fos-Choline-14, Per Deuterated Head	Z	392.6	N/A	N/A
F312SDH	130	Fos-Choline-14, Semi Deuterated Head	Z	388.6	N/A	N/A
F314	109	Fos-Choline-15, Anagrade	Z	393.5	0.07 (0.0027%)	131
F316	110	Fos-Choline-16, Anagrade	Z	407.5	0.013 (0.00053%)	178
FCI09	110	Fos-Choline-ISO-9, Anagrade	Z	309	32 (0.99%)	N/A
FCI11	111	Fos-Choline-ISO-11, Anagrade	Z	337.4	26.6 (0.9%)	N/A
FCU110	111	Fos-Choline-Unsat-11-10	Z	335.4	6.2 (0.21%)	N/A

The types of detergents: A = Anionic / C = Cationic / N = Nonionic / Z = Zwitterionic

Detergent Properties, continued

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
F208	112	Fos-Mea®-8, Anagrade	Z	267	22 (0.59%)	N/A
F210	112	Fos-Mea-10, Anagrade	Z	295	5.25 (0.15%)	N/A
F212	112	Fos-Mea-12, Anagrade	Z	323	0.43 (0.014%)	N/A
H108	55	HEGA-8, Anagrade	N	351.5	109 (3.8%)	N/A
H109	55	HEGA-9, Anagrade	N	365.5	39 (1.4%)	N/A
H110	56	HEGA-10, Anagrade	N	379.5	7 (0.26%)	N/A
H111	56	HEGA-11, Anagrade	N	393.5	1.4 (0.055%)	N/A
H907	131	Heptyl–β–D-Selenoglucoside	N	341.3	21.3	N/A
H300	33	n-Heptyl–β–D-Glucopyranoside, Anagrade	N	278.4	70 (1.9%)	N/A
H300LA	34	n-Heptyl–β–D-Glucopyranoside, Anagrade	N	278.4	70 (1.9%)	N/A
H301	61	n-Heptyl–β–D-Thioglucopyranoside, Anagrade	N	294.4	29 (0.85%)	N/A
H301LA	61	n-Heptyl–β–D-Thioglucopyranoside, Anagrade	N	294.4	29 (0.85%)	N/A
H320	41	n-Hexadecyl–β–D-Maltopyranoside, Anagrade	N	566.6	0.0006 (0.00003%)	N/A
H350	59	Hexaethylene Glycol Monooctyl Ether, Anagrade	N	394.5	10 (0.39%)	32
H360	59	Hexaethylene Glycol Monodecyl Ether, Analytical Grade	N	422.6	0.9	73
H305	34	n-Hexyl–β–D-Glucopyranoside, Anagrade	N	264.4	250(6.6%)	N/A
H310	41	n-Hexyl–β–D-Maltopyranoside, Anagrade	N	426.4	210 (8.9%)	N/A
L360S	68	LAPAO, Sol-Grade	Z	300.6	1.56 (0.052%)	126
NG310	52, 122	Lauryl Maltose Neopentyl Glycol	N	1005.2	0.01	N/A
L210	92	LysoFos® Choline 10, Anagrade	Z	411.5	4.7	N/A
L212	92	LysoFos Choline 12, Anagrade	Z	439.5	0.32	N/A
L214	92	LysoFos Choline 14, Anagrade	Z	467.6	0.036	N/A
L216	93	LysoFos Choline 16, Anagrade	Z	495.6	0.0032	N/A
L218	93	LysoFos Choline 18, Anagrade	Z	523.7	N/A	N/A
L410	93	LysoFos Choline Ether 10, Anagrade	Z	397.5	N/A	N/A
L412	94	LysoFos Choline Ether 12, Anagrade	Z	425.5	N/A	N/A
L414	94	LysoFos Choline Ether 14, Anagrade	Z	453.6	N/A	N/A
L416	94	LysoFos Choline Ether 16, Anagrade	Z	481.6	N/A	N/A
L418	95	LysoFos Choline Ether 18, Anagrade	Z	509.7	N/A	N/A
L310	95	LysoFos Glycerol 10, Anagrade	C	422.4	N/A	N/A
L312	95	LysoFos Glycerol 12, Anagrade	C	450.4	N/A	N/A
L314	96	LysoFos Glycerol 14, Anagrade	C	478.5	0.05	N/A
L316	96	LysoFos Glycerol 16, Anagrade	C	506.5	0.018	100-105
L318	96	LysoFos Glycerol 18, Anagrade	C	534.6	N/A	N/A
M319	57	Mega-8, Anagrade	N	321.4	79 (2.5%)	N/A
M325	57	Mega-9, Anagrade	N	335.5	25 (0.84%)	N/A
M320	57	Mega-10, Anagrade	N	349.5	6 (0.21%)	N/A
LCP18	123	MonoOlein	N	378.5	N/A	N/A
LCP16	123	MonoPalmitolein	N	328.4	N/A	N/A
ND195	138	NDSB-195	Z	195.3	do not form micelles	N/A
ND201	138	NDSB-201	Z	201.2	do not form micelles	N/A
ND211	138	NDSB-211	Z	211.3	do not form micelles	N/A
ND221	138	NDSB-221	Z	221.3	do not form micelles	N/A
ND256	138	NDSB-256	Z	257.4	do not form micelles	N/A
NIDP40	139	Nonidet P40 Substitute	N	603	50 (0.05-0.3%)	100-155
N324	34	n-Nonyl–β–D-Glucopyranoside, Anagrade	N	306.4	6.5 (0.20%)	N/A
N324LA	35	n-Nonyl–β–D-Glucopyranoside, Anagrade	N	306.4	6.5 (0.20%)	N/A
N330	41	n-Nonyl–β–D-Maltopyranoside, Anagrade	N	468.5	6 (0.28%)	55
N335	62	n-Nonyl–β–D-Thioglucopyranoside, Anagrade	N	322.4	2.9 (0.093%)	N/A
N350	63	n-Nonyl–β–D-Thiomaltopyranoside, Anagrade	N	484.6	3.2 (0.15%)	N/A
O330	59	Octaethylene Glycol Monododecyl Ether, Anagrade	N	538.8	0.09 (0.0048%)	90-120
NG311	52, 122	Octyl Glucose Neopentyl Glycol	N	568.7	1.02	N/A
O311HA	35	n-Octyl–α–D-Glucopyranoside, Anagrade	N	292.4	10-21 (0.3-0.6%)	N/A
O312	53	n-Octyl–β–D-Galactopyranoside, Anagrade	N	292.4	29.5 (0.86%)	N/A

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Detergent Properties, continued

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
O311	36	n-Octyl–β–D-Glucopyranoside, Anagrade	N	292.4	18 (0.53%)	78
O310	42	n-Octyl–β–D-Maltopyranoside, Anagrade	N	454.4	19.5 (0.89%)	47
O314	62	n-Octyl–β–D-Thioglucopyranoside, Anagrade	N	308.4	9 (0.28%)	N/A
O314LA	62	n-Octyl–β–D-Thioglucopyranoside, Anagrade	N	308.4	9 (0.28%)	N/A
O320	64	n-Octyl–β–D-Thiomaltopyranoside, Anagrade	N	470.6	8.5 (0.40%)	N/A
O310F	43	Octyl Maltoside, Fluorinated, Anagrade	N	676.4	23	N/A
O908	132	Octyl–β–D-Selenoglucoside	N	355.3	N/A	N/A
O918	132	Octyl–β–D-Selenomaltoside	N	517.5	1.3	N/A
P340	60	Pentaethylene Glycol Monodecyl Ether, Anagrade	N	378.6	0.81 (0.031%)	73
P350	60	Pentaethylene Glycol Monooctyl Ether, Anagrade	N	350.5	7.1 (0.25%)	N/A
P300	139	Pluronic F-68	N	~8400.0	0.04	N/A
P305	139	Pluronic F-127	N	~12600.0	0.43	N/A
P5008	85	PMAL®-C8	Z		N/A	N/A
P5012	85	PMAL-C12	Z		N/A	N/A
P5016	85	PMAL-C16	Z		N/A	N/A
P310	43	2-Propyl-1-Pentyl Maltopyranoside, Anagrade	N	455.5	42.5 (1.9%)	N/A
T908	133	12-Selenotetraethyleneglycol Mono Octyl Ether	N	369.4	3.5	N/A
S1010	65	Sodium Cholate, Anagrade	A	430.6	9.5 (0.41%)	2.0-4.8
S300	66	Sodium Dodecanoyl Sarcosine, Anagrade	A	293.4	14.4 (0.42%)	N/A
S110MT	139	Sodium (2-Sulfonatoethyl) Methanethiosulfonate (MTSES)	C	236.18	N/A	N/A
S2033	66	Sodium Taurocholate, Anagrade	A	537.7	3-11 (0.16-0.59%)	4
S350	53	Sucrose Monododecanoate, Anagrade	N	524.6	0.3 (0.016%)	N/A
T315	43	n-Tetradecyl–β–D-Maltopyranoside, Anagrade	N	538.6	0.01 (0.00054%)	N/A
T360	68	n-Tetradecyl-N,N-Dimethylamine-N-Oxide, Anagrade	Z	257.5	0.29 (0.0075%)	N/A
T305	69	n-Tetradecyl-N,N-Dimethylglycine, Anagrade	Z	299.4	0.034 (0.0010%)	N/A
T350	60	Tetraethylene Glycol Monooctyl Ether, Anagrade	N	306.5	8 (0.25%)	82
T323	44	n-Tridecyl–β–D-Maltopyranoside, Anagrade	N	524.6	0.033 (0.0017%)	186
T110MT	140	[2-(Trimethylammoniumethyl] Methane Thiosulfonate Bromide	Z	278.24	N/A	N/A
T370	123	Tripao	Z	362.5	4.5	N/A
T385	123	Cy-Tripglu	N	665.8	1.8 (0.12)	N/A
T380	123	Ph-Tripglu	N	659.8	3.6 (0.24)	N/A
T1001	140	Triton® X-100	N	647	0.23 (0.015%)	75-165
T1002	140	Triton X-114	N	536	0.2 (0.011%)	N/A
T1003	141	Tween® 20	N	1228	0.059 (0.0072%)	N/A
T1005	141	Tween 40	N	~1284.0	0.027	N/A
T1004	141	Tween 80	N	1310	0.012 (0.0016%)	58
U300HA	45	n-Undecyl–α–D-Maltopyranoside, Anagrade	N	496.6	0.58 (0.029%)	N/A
U300	46	n-Undecyl–β–D-Maltopyranoside, Anagrade	N	496.6	0.59 (0.029%)	71
U911	133	Undecyl–β–D-Selenomaltoside	N	559.5	0.17	N/A
U342	64	n-Undecyl–β–D-Thiomaltopyranoside, Anagrade	N	512.7	0.21 (0.011%)	106
U360	68	n-Undecyl-N,N-Dimethylamine-Oxide, Anagrade	Z	215.4	3.21 (0.069%)	N/A
U310	47	ω–Undecylenyl–β–D-Maltopyranoside	N	494.6	1.2 (0.059%)	N/A

The types of detergents: A = Anionic / C = Cationic / N = Nonionic / Z = Zwitterionic

Detergent Properties Listed by CMC Values

The detergents are arranged in the order of their CMC values. The conditions used to measure CMC values and aggregation numbers are located in further sections of the catalog.

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
A110MT	136	2-Aminoethyl Methane Thiosulfonate Hydrobromide (MTSEA)	C	236.15	N/A	N/A
A835	85	Amphipol A8-35	C	~9000.0	N/A	N/A
APX305	79	Anapoe-X-305	N	1526	N/A	N/A
AZ318	71	Anzergent 3-18, Analytical Grade	Z	417.7	N/A	N/A
B524	100	BisMalt-24	N	1019.2	N/A	N/A
B528	100	BisMalt-28	N	1075.3	N/A	N/A
CH210	113	Cholesteryl Hemisuccinate Tris Salt	C	607.9	N/A	N/A
D912	131	Dodecyl–β–D-Selenomaltoside	N	573.6	N/A	N/A
F304PDH	126	Fos-Choline-10, Per Deuterated Head	Z	336.5	N/A	N/A
F304SDH	127	Fos-Choline-10, Semi Deuterated Head	Z	332.5	N/A	N/A
F306PDH	127	Fos-Choline-11, Per Deuterated Head	Z	350.5	N/A	N/A
F306SDH	127	Fos-Choline-11, Semi Deuterated Head	Z	346.5	N/A	N/A
F308D	128	Fos-Choline-12, Deuterated	Z	389.8	N/A	N/A
F308PDH	128	Fos-Choline-12, Per Deuterated Head	Z	364.5	N/A	N/A
F308PDT	128	Fos-Choline-12, Per Deuterated Tail	Z	376.6	N/A	N/A
F308SDH	129	Fos-Choline-12, Semi Deuterated Head	Z	360.5	N/A	N/A
F312PDH	129	Fos-Choline-14, Per Deuterated Head	Z	392.6	N/A	N/A
F312SDH	130	Fos-Choline-14, Semi Deuterated Head	Z	388.6	N/A	N/A
L218	93	LysoFos Choline 18, Anagrade	Z	523.7	N/A	N/A
L410	93	LysoFos Choline Ether 10, Anagrade	Z	397.5	N/A	N/A
L412	94	LysoFos Choline Ether 12, Anagrade	Z	425.5	N/A	N/A
L414	94	LysoFos Choline Ether 14, Anagrade	Z	453.6	N/A	N/A
L416	94	LysoFos Choline Ether 16, Anagrade	Z	481.6	N/A	N/A
L418	95	LysoFos Choline Ether 18, Anagrade	Z	509.7	N/A	N/A
L310	95	LysoFos Glycerol 10, Anagrade	C	422.4	N/A	N/A
L312	95	LysoFos Glycerol 12, Anagrade	C	450.4	N/A	N/A
L318	96	LysoFos Glycerol 18, Anagrade	C	534.6	N/A	N/A
LCP18	123	MonoOlein	N	378.5	N/A	N/A
LCP16	123	MonoPalmitolein	N	328.4	N/A	N/A
O908	132	Octyl–β–D-Selenoglucoside	N	355.3	N/A	N/A
P5008	85	PMAL-C8	Z	N/A	N/A	N/A
P5012	85	PMAL-C12	Z	N/A	N/A	N/A
P5016	85	PMAL-C16	Z	N/A	N/A	N/A
S110MT	139	Sodium (2-Sulfonatoethyl) Methanethiosulfonate (MTSES)	C	236.18	N/A	N/A
T110MT	140	[2-(Trimethylammoniumethyl] Methane Thiosulfonate Bromide	Z	278.24	N/A	N/A
F300F	103	Fos-Choline-8, Fluorinated, Anagrade	Z	529.2	N/A	N/A
H320	41	n-Hexadecyl–β–D-Maltopyranoside, Anagrade	N	566.6	0.0006 (0.00003%)	N/A
B520	99	BisMalt-20	N	963.1	0.0015	N/A
L216	93	LysoFos Choline 16, Anagrade	Z	495.6	0.0032	N/A
CH220	113	Chobimalt, Anagrade	N	1035.2	0.004	200-228
APB058	75	Anapoe-58	N	1122	0.004 (0.00045%)	N/A
D514	98	1,2-Dimyristoyl-sn-Glycero-3-Phosphocholine	Z	677.9	0.006	N/A
B522	99	BisMalt-22	N	991.2	0.0084	N/A
NG310	52, 122	Lauryl Maltose Neopentyl Glycol	N	1005.2	0.01	N/A
T315	43	n-Tetradecyl–β–D-Maltopyranoside, Anagrade	N	538.6	0.01 (0.00054%)	N/A
D614	98	1,2-Dimyristoyl-sn-Glycero-3-[Phospho-rac-(1-Glycerol)] Sodium Salt	C	688.8	0.011	N/A
APT080	76	Anapoe-80	N	1310	0.012 (0.0016%)	58

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Detergent Properties, continued

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
T1004	141	Tween 80	N	1310	0.012 (0.0016%)	58
F316	110	Fos-Choline-16, Anagrade	Z	407.5	0.013 (0.00053%)	178
L316	96	LysoFos Glycerol 16, Anagrade	C	506.5	0.018	100-105
B518	99	BisMalt-18	N	935.1	0.024	N/A
T1005	141	Tween 40	N	~1284.0	0.027	N/A
T323	44	n-Tridecyl–β–D-Maltopyranoside, Anagrade	N	524.6	0.033 (0.0017%)	186
T305	69	n-Tetradecyl-N,N-Dimethylglycine, Anagrade	Z	299.4	0.034 (0.0010%)	N/A
NG322	52, 122	Decyl Maltose Neopentyl Glycol	N	949.1	0.036	N/A
L214	92	LysoFos Choline 14, Anagrade	Z	467.6	0.036	N/A
P300	139	Pluronic F-68	N	~8400.0	0.04	N/A
L314	96	LysoFos Glycerol 14, Anagrade	C	478.5	0.05	N/A
D342	63	n-Dodecyl–β–D-Thiomaltopyranoside, Anagrade	N	526.6	0.05 (0.0026%)	126
APO129	77	Anapoe-$C_{12}E_9$	N	583	0.05 (0.003%)	N/A
APND40	78	Anapoe-NID-P40	N	603	0.05-0.3	100-155
APT020	75	Anapoe-20	N	1228	0.059 (0.0072%)	N/A
T1003	141	Tween® 20	N	1228	0.059 (0.0072%)	N/A
F314	109	Fos-Choline-15, Anagrade	Z	393.5	0.07 (0.0027%)	131
APO128	77	Anapoe-$C_{12}E_8$	N	539	0.09 (0.0048%)	123
O330	59	Octaethylene Glycol Monododecyl Ether, Anagrade	N	538.8	0.09 (0.0048%)	90-120
APB035	75	Anapoe-35	N	1198	0.091 (0.0010%)	40
APO138	78	Anapoe-$C_{13}E_8$	N	553	0.1 (0.0055%)	N/A
F312	108	Fos-Choline-14, Anagrade	Z	379.5	0.12 (0.0046%)	108
F312D	129	Fos-Choline-14, Deuterated	Z	421.5	0.12 (0.0051%)	N/A
D310HA	38	n-Dodecyl–α–D-Maltopyranoside, Anagrade	N	510.6	0.152 (0.0076%)	90
U911	133	Undecyl–β–D–Selenomaltoside	N	559.5	0.17	N/A
D310	39	n-Dodecyl–β–D-Maltopyranoside, Anagrade	N	510.6	0.17 (0.0087%)	78-149
D318	33	n-Dodecyl–β–D-Glucopyranoside, Anagrade	N	348.5	0.19 (0.0066%)	N/A
C327	51	CYMAL-7, Anagrade	N	522.5	0.19 (0.0099%)	150
AP1210	77	Anapoe-$C_{12}E_{10}$	N	627	0.2	N/A
AZ314	71	Anzergent 3-14, Analytical Grade	Z	363.6	0.2 (0.007%)	83-130
APX114	79	Anapoe-X-114	N	536	0.2 (0.011%)	N/A
T1002	140	Triton X-114	N	536	0.2 (0.011%)	N/A
U342	64	n-Undecyl–β–D-Thiomaltopyranoside, Anagrade	N	512.7	0.21 (0.011%)	106
APX100	78	Anapoe-X-100	N	647	0.23 (0.015%)	75-165
T1001	140	Triton® X-100	N	647	0.23 (0.015%)	75-165
D608	98	1,2-Dioctanoyl-sn-Glycero-3-Phosphocholine	Z	509.3	0.27	N/A
T360	68	n-Tetradecyl-N,N-Dimethylamine-N-Oxide, Anagrade	Z	257.5	0.29 (0.0075%)	N/A
S350	53	Sucrose Monododecanoate, Anagrade	N	524.6	0.3 (0.016%)	N/A
L212	92	LysoFos Choline 12, Anagrade	Z	439.5	0.32	N/A
P305	139	Pluronic F-127	N	~12600.0	0.43	N/A
F212	112	Fos-Mea-12, Anagrade	Z	323	0.43 (0.014%)	N/A
C326	50	CYMAL-6, Anagrade	N	508.5	0.56 (0.028%)	91
U300HA	45	n-Undecyl–α–D-Maltopyranoside, Anagrade	N	496.6	0.58 (0.029%)	N/A
U300	46	n-Undecyl–β–D-Maltopyranoside, Anagrade	N	496.6	0.59 (0.029%)	71
C518	102	Cyclofos-7, Anagrade	N	363.3	0.62 (0.022%)	N/A
D910	131	Decyl–β–D-Selenomaltoside	N	545.5	0.7	N/A
F310	107	Fos-Choline-13, Anagrade	Z	365.5	0.75 (0.027%)	87
P340	60	Pentaethylene Glycol Monodecyl Ether, Anagrade	N	378.6	0.81 (0.031%)	73
APX405	79	Anapoe-X-405	N	1967	0.81 (0.16%)	N/A
H360	59	Hexaethylene Glycol Monodecyl Ether, Analytical Grade	N	422.6	0.9	73
APO106	76	Anapoe-$C_{10}E_6$	N	423	0.9 (0.0250%)	40
D335	63	n-Decyl–β–D-Thiomaltopyranoside, Anagrade	N	498.6	0.9 (0.045%)	75
D323	61	n-Decyl–β–D-Thioglucopyranoside, Anagrade	N	336.4	0.9 (0.30%)	N/A

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Detergent Properties, continued

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
D360	67	n-Dodecyl-N,N-Dimethylamine-N-Oxide, Anagrade	Z	229.4	1 (0.023%)	76
NG311	52, 122	Octyl Glucose Neopentyl Glycol	N	568.7	1.02	N/A
U310	47	ω–Undecylenyl–β–D-Maltopyranoside	N	494.6	1.2 (0.059%)	N/A
O918	132	Octyl–β–D-Selenomaltoside	N	517.5	1.3	N/A
APO109	76	Anapoe-$C_{10}E_9$	N	555	1.3 (0.053%)	N/A
D607	97	1,2-Diheptanoyl-sn-Glycero-3-Phosphocholine	Z	481.6	1.4	N/A
H111	56	HEGA-11, Anagrade	N	393.5	1.4 (0.055%)	N/A
B310	136	Big Chap, Deoxy, Analytical Grade	N	862.1	1.4 (0.12%)	8, 16
D350	69	n-Dodecyl-N,N-Dimethylglycine, Anagrade	Z	271.4	1.5 (0.041%)	N/A
F308	106	Fos-Choline-12, Anagrade	Z	351.5	1.5 (0.047%)	54
L360S	68	LAPAO, Sol-Grade	Z	300.6	1.56 (0.052%)	126
D322HA	37	n-Decyl–α–D-Maltopyranoside, Anagrade	N	482.6	1.66 (0.08%)	N/A
C324G	32	CYGLU-4, Anagrade	N	318.4	1.8 (0.058%)	N/A
D322	37	n-Decyl–β–D-Maltopyranoside, Anagrade	N	482.6	1.8 (0.087%)	69
D322LA	37	n-Decyl–β–D-Maltopyranoside, Anagrade	N	482.6	1.8 (0.087%)	69
T385	123	Cy-Tripglu	N	665.8	1.8 (0.12)	N/A
F306	105	Fos-Choline-11, Anagrade	Z	337.4	1.85 (0.062%)	18
D321	33	n-Decyl–β–D-Glucopyranoside, Anagrade	N	320.4	2.2 (0.070%)	N/A
C325	49	CYMAL-5, Anagrade	N	494.5	2.4 (0.12%)	47
C516	102	Cyclofos-6, Anagrade	Z	349.2	2.68 (0.094%)	N/A
AZ312	70	Anzergent 3-12, Analytical Grade	Z	335.5	2.8 (0.094%)	55-87
N335	62	n-Nonyl–β–D-Thioglucopyranoside, Anagrade	N	322.4	2.9 (0.093%)	N/A
B300	136	Big Chap, Analytical Grade	N	878.1	2.9 (0.25%)	10
S2033	66	Sodium Taurocholate, Anagrade	A	537.7	3-11 (0.16-0.59%)	4
N350	63	n-Nonyl–β–D-Thiomaltopyranoside, Anagrade	N	484.6	3.2 (0.15%)	N/A
U360	68	n-Undecyl-N,N-Dimethylamine-Oxide, Anagrade	Z	215.4	3.21 (0.069%)	N/A
T908	133	12-Selenotetraethyleneglycol Mono Octyl Ether	N	369.4	3.5	N/A
T380	123	Ph-Tripglu	N	659.8	3.6 (0.24)	N/A
T370	123	Tripao	Z	362.5	4.5	N/A
C514	102	Cyclofos-5, Anagrade	Z	335	4.5 (0.15%)	N/A
L210	92	LysoFos Choline 10, Anagrade	Z	411.5	4.7	N/A
F210	112	Fos-Mea-10, Anagrade	Z	295	5.25 (0.15%)	N/A
M320	57	Mega-10, Anagrade	N	349.5	6 (0.21%)	N/A
D380	65	Deoxycholic Acid, Sodium Salt, Anagrade	A	414.6	6 (0.24%)	22
N330	41	n-Nonyl–β–D-Maltopyranoside, Anagrade	N	468.5	6 (0.28%)	55
FCU110	111	Fos-Choline-Unsat-11-10	Z	335.4	6.2 (0.21%)	N/A
N324	34	n-Nonyl–β–D-Glucopyranoside, Anagrade	N	306.4	6.5 (0.20%)	N/A
N324LA	35	n-Nonyl–β–D-Glucopyranoside, Anagrade	N	306.4	6.5 (0.20%)	N/A
H110	56	HEGA-10, Anagrade	N	379.5	7 (0.26%)	N/A
P350	60	Pentaethylene Glycol Monooctyl Ether, Anagrade	N	350.5	7.1 (0.25%)	N/A
C324	49	CYMAL-4, Anagrade	N	480.5	7.6 (0.37%)	25
T350	60	Tetraethylene Glycol Monooctyl Ether, Anagrade	N	306.5	8 (0.25%)	82
C316	137	CHAPS, Anagrade	Z	614.9	8 (0.49%)	10
C317	137	CHAPSO, Sol-Grade	Z	630.9	8 (0.50%)	11
C512	101	Cyclofos-4, Anagrade	Z	320.9	8.45 (0.45%)	N/A
O320	64	n-Octyl–β–D-Thiomaltopyranoside, Anagrade	N	470.6	8.5 (0.40%)	N/A
O314	62	n-Octyl–β–D-Thioglucopyranoside, Anagrade	N	308.4	9 (0.28%)	N/A
O314LA	62	n-Octyl–β–D-Thioglucopyranoside, Anagrade	N	308.4	9 (0.28%)	N/A
S1010	65	Sodium Cholate, Anagrade	A	430.6	9.5 (0.41%)	2.0-4.8
H350	59	Hexaethylene Glycol Monooctyl Ether, Anagrade	N	394.5	10 (0.39%)	32
O311HA	35	n-Octyl–α–D-Glucopyranoside, Anagrade	N	292.4	10-21 (0.3-0.6%)	N/A
AZ316	71	Anzergent 3-16, Analytical Grade	Z	391.7	10-60	N/A
D365	67	n-Decyl-N,N-Dimethylamine-N-Oxide, Anagrade	Z	201.4	10.48 (0.211%)	N/A
F304	104	Fos-Choline-10, Anagrade	Z	323.4	11 (0.35%)	45-53

The types of detergents: A = Anionic / C = Cationic / N = Nonionic / Z = Zwitterionic

Detergent Properties, continued

Product No.	Page No.	Detergent	Type	FW	CMC mM (%)	Aggregation No.
C411	55	C-HEGA-11, Anagrade	N	391.5	11.5 (0.45%)	N/A
S300	66	Sodium Dodecanoyl Sarcosine, Anagrade	A	293.4	14.4 (0.42%)	N/A
D606	97	1,2-Dihexanoyl-sn-Glycero-3-Phosphocholine	Z	453.5	15	35-40
O311	36	n-Octyl–β–D-Glucopyranoside, Anagrade	N	292.4	18 (0.53%)	78
D352	69	n-Decyl-N,N-Dimethylglycine, Anagrade	Z	243.4	19 (0.46%)	N/A
A340	32	Anameg-7	N	335.4	19.5 (0.65%)	92
O310	42	n-Octyl–β–D-Maltopyranoside, Anagrade	N	454.4	19.5 (0.89%)	47
H907	131	Heptyl–β–D-Selenoglucoside	N	341.3	21.3	N/A
F208	112	Fos-Mea-8, Anagrade	Z	267	22 (0.59%)	N/A
O310F	43	Octyl Maltoside, Fluorinated, Anagrade	N	676.4	23	N/A
M325	57	Mega-9, Anagrade	N	335.5	25 (0.84%)	N/A
FCI11	111	Fos-Choline-ISO-11, Anagrade	Z	337.4	26.6 (0.9%)	N/A
DH325	38	2,6-Dimethyl-4-Heptyl–β–D-Maltoside	N	468.5	27.5 (1.2%)	N/A
C323G	32	CYGLU-3, Anagrade	N	304.4	28 (0.86%)	N/A
H301	61	n-Heptyl–β–D-Thioglucopyranoside, Anagrade	N	294.4	29 (0.85%)	N/A
H301LA	61	n-Heptyl–β–D-Thioglucopyranoside, Anagrade	N	294.4	29 (0.85%)	N/A
O312	53	n-Octyl–β–D-Galactopyranoside, Anagrade	N	292.4	29.5 (0.86%)	N/A
FCI09	110	Fos-Choline-ISO-9, Anagrade	Z	309	32 (0.99%)	N/A
C323	48	CYMAL-3, Anagrade	N	466.5	34.5 (1.6%)	N/A
C410	54	C-HEGA-10, Anagrade	N	377.5	35 (1.3%)	N/A
AZ310	70	Anzergent 3-10, Analytical Grade	Z	307.6	39 (1.2%)	41
H109	55	HEGA-9, Anagrade	N	365.5	39 (1.4%)	N/A
F302	103	Fos-Choline-9, Anagrade	Z	309.4	39.5 (1.2%)	N/A
P310	43	2-Propyl-1-Pentyl Maltopyranoside, Anagrade	N	455.5	42.5 (1.9%)	N/A
C510	101	Cyclofos-3, Anagrade	Z	306.9	43 (1.3%)	N/A
NIDP40	139	Nonidet P40 Substitute	N	603	50 (0.05-0.3%)	100-155
H300	33	n-Heptyl–β–D-Glucopyranoside, Anagrade	N	278.4	70 (1.9%)	N/A
H300LA	34	n-Heptyl–β–D-Glucopyranoside, Anagrade	N	278.4	70 (1.9%)	N/A
M319	57	Mega-8, Anagrade	N	321.4	79 (2.5%)	N/A
C409	54	C-HEGA-9, Anagrade	N	363.5	108 (3.9%)	N/A
H108	55	HEGA-8, Anagrade	N	351.5	109 (3.8%)	N/A
F300	102	Fos-Choline-8, Anagrade	Z	295.4	114 (3.4%)	N/A
C322	48	CYMAL-2, Anagrade	N	452.5	120 (5.4%)	104
H310	41	n-Hexyl–β–D-Maltopyranoside, Anagrade	N	426.4	210 (8.9%)	N/A
H305	34	n-Hexyl–β–D-Glucopyranoside, Anagrade	N	264.4	250(6.6%)	N/A
C508	101	Cyclofos-2, Anagrade	Z	293.8	256 (7.5%)	N/A
C408	54	C-HEGA-8, Anagrade	N	349.5	277 (9.7%)	N/A
C321	48	CYMAL-1, Anagrade	N	438.5	340 (15%)	360
AZ308	70	Anzergent 3-8, Analytical Grade	Z	279.6	390 (10.9%)	N/A
ND195	138	NDSB-195	Z	195.3	do not form micelles	N/A
ND201	138	NDSB-201	Z	201.2	do not form micelles	N/A
ND211	138	NDSB-211	Z	211.3	do not form micelles	N/A
ND221	138	NDSB-221	Z	221.3	do not form micelles	N/A
ND256	138	NDSB-256	Z	257.4	do not form micelles	N/A

The types of detergents: A = Anionic / C = Cationic / N = Nonionic / Z = Zwitterionic

Detergent Analysis

Each lot of Anatrace detergent is analyzed so that you can be assured of the highest consistent quality available anywhere. Our Anagrade detergents are purified to be greater than 99% pure as measured by HPLC and to be low in UV absorbing or fluorescent impurities.

We are pleased to list below the analytical procedures used to evaluate our detergents. Should you have any questions about these procedures, please feel free to contact us.

Measurement of Purity (HPLC)
Anagrade detergents are greater than 99% pure and Sol-Grade detergents are greater than 97% pure as determined by HPLC. The column used is a standard C18 column (4.6 mm x 250 mm) in conjunction with a light scattering detector. An eluant of either acetonitrile/water or methanol/water is acceptable. The ratio will vary depending on the hydrophobicity of the detergent. Some examples are given below:

Detergent	Acetonitrile/water	Methanol/water
n-Heptyl–β–D-Glucopyranoside	25/75	45/55
n-Nonyl–β–D-Glucopyranoside	35/65	55/45
n-Hexyl–β–D-Maltopyranoside	20/80	40/60
n-Octyl–β–D-Maltopyranoside	30/70	55/45
n-Nonyl–β–D-Maltopyranoside	35/65	60/40
n-Dodecyl–β–D-Maltopyranoside	45/55	75/25
n-Tridecyl–β–D-Maltopyranoside	60/40	80/20
n-Hexadecyl–β–D-Maltopyranoside	70/30	90/10
Fos-Choline-10	45/55	65/35
Fos-Choline-12	45/55	75/25
Fos-Choline-14	45/55	85/15
CYMAL-3	35/65	65/35
CYMAL-5	45/55	70/30

Some impurities may be less than one percent and still affect the properties of a detergent lot. Therefore, the following tests are also performed to insure that you receive the highest quality detergent available.

Absorbance
The absorbance of the detergent solution (1% w/v) in water is measured in the UV region. Glucosides and maltosides should have low absorbance throughout this region.

Fluorescence
The fluorescence of the detergent solution (0.1% w/v) in water is compared to a standard BSA solution unless otherwise stated. The excitation wavelength is 280 nm and the emission is measured at 345 nm.

Conductance
The conductance of the detergent solution (10% w/v) in water is routinely measured. For those detergents which are nonionic or zwitterionic, a detergent solution should have conductance nearly the same as deionized water.

Solubility in water:
The solubility of the detergent solution in water is routinely tested. Many of the impurities in detergent preparations are not soluble in water; the cloudiness of a detergent solution at a concentration where it is known to be soluble indicates the presence of an insoluble impurity.

Measurement of pH
The pH of the detergent solution is routinely measured. The pH should be neutral for detergents that are either nonionic or zwitterionic.

Alcohol contamination
Glucoside and maltoside detergents are prepared from the corresponding hydrophobic alcohol. Trace amounts of this alcohol in the detergent lot can cause cloudiness in a detergent solution. Therefore, we measure the amount of alcohol in each lot of detergent by HPLC.

Alpha isomer
Glucoside and maltoside detergents have two isomeric forms, α and β. Each β detergent is analyzed for the percent α isomer present by HPLC.

Lot analysis, shipping and storage
Every lot of Anatrace detergent will be shipped with a certificate of analysis listing the results of the appropriate tests described above.

Anapoe detergents should be stored refrigerated in the dark. All other detergents should be stored frozen and kept dry. Warm to room temperature before opening the container.

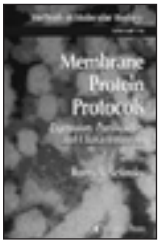
Affymetrix is pleased to offer the following texts.

BOOK01

Methods and Results in Crystallization of Membrane Proteins
Edited by So Iwata
Part I: Introduction
Part II: Principles and Techniques in Membrane Protein Crystallization
Part III: Examples of Successful Crystallization of Membrane Proteins
Part IV: Crystallization Informatics of Membrane Proteins
"Membrane protein crystallisation is still one of the hardest challenges in Structural Biology. This book...is written to assist the researchers attempting to crystallize their own membrane proteins."

—from book Abstract (Introduction)

BOOK02



Membrane Protein Protocols: Expression, Purification, and Characterization
Edited by Barry S. Selinsky
A collection of key techniques for the study of receptors and transport proteins. The book provides examples of how different membrane proteins can be over-expressed in both prokaryotic and eukaryotic expression systems, how natural and overexpressed proteins can be solubilized from their host membranes, and how the solubilized protein can be purified in active form. Each protocol contains step-by-step instructions to ensure success, troubleshooting advice, lists of reagents, and tips on avoiding pitfalls.

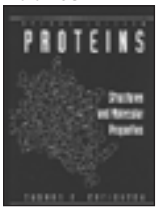
BOOK03

Protein Structure and Function
Petsko and Ringe
This text introduces general principles of protein structure, folding, and function, then goes beyond these basics to tackle the conceptual basis of inferring structure and function from genomic sequence. Written for upper-level undergraduates and beginning graduate students, Protein Structure and Function will also be useful for working scientists needing an up-to-date introduction to the field. (Available in the U.S. and Canada only)

BOOK04

Structure & Mechanism in Protein Science:
A Guide to Enzyme Catalysis and Protein Folding
Alan Fersht
There is a new era of protein design, sparked by the convergence of protein folding and enzymology. This book is a depiction of the principles of protein structure, activity, and mechanism today. It takes a more general look at mechanisms in protein science, emphasizing the unity of concepts in folding and catalysis and the importance of the relationships between basic chemistry, kinetics, thermodynamics, and structure. It makes protein engineering easier to understand and apply.

BOOK05



Proteins: Structures and Molecular Properties
T. E. Creighton
In one convenient resource, Creighton's landmark textbook offers an expert introduction to all aspects of proteins—biosynthesis, evolution, structures, dynamics, ligand binding, and catalysis. It works equally well as a reference or classroom textbook.

BOOK06

Introduction to Protein Structure
Branden and Tooze
An up-to-date account of the principles of protein structure, with examples of key proteins in their biological context generously illustrated in full color. Introduces the general principles of protein structure and provides specific examples of proteins to show how they fulfill a wide variety of biological functions. Presents experimental approaches to determining and predicting protein structure, as well as engineering new proteins to modify their functions.

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Broad Application Detergents

Product information
- Dodecyl maltoside
- Detergents designed for membrane proteins
- Non-ionic detergents

Non-ionic
- Glucosides
- Maltosides
- Maltosides – CYMALs
- Other alkyl glycosides
- HEGAs
- MEGAs
- Polyoxyethylene glycols
- Thioglucosides
- Thiomaltosides

Ionic
- Bile salts

Zwitterionic
- Amine oxides
- Dimethyl glycines
- Zwittergents

Start with better clarity.
Finish with
greater resolution.

Dodecyl Maltoside

(Lauryl Maltoside, n-Dodecyl--D-Maltoside, n-Dodecyl--D-Maltopyranoside, Lauryl--D-Maltoside, DDM, LM)

Dodecyl Maltoside is one of the most commonly used detergents for membrane protein purification and structure determination. The detergent has been well characterized in its usefulness for extracting and solubilizing/stabilizing membrane proteins in aqueous environments. Chemically, Dodecyl Maltoside is a mild nonionic detergent comprised of a sugar based hydrophilic head and a long aliphatic hydrophobic tail.

The mild chemical properties of Dodecyl Maltoside allow it to disrupt protein lipid interactions without rapidly destroying the cell membrane. Once free of the membrane, proteins are seamlessly incorporated into detergent micelles, thereby creating the conditions necessary to solubilize/stabilize them in aqueous environments. In contrast, harsher detergents, like SDS, immediately destabilize the lipid bilayer and cause protein denaturation. Milder detergents, such as Tween 20 and Triton X-100, have solubilizing properties but are often too weak to reliably extract membrane proteins from native lipid bilayers. Generally, Anatrace Dodecyl Maltoside should be your first choice among a number of commercially available specialty detergents offered by Affymetrix. Additionally, Affymetrix is the exclusive provider of the next generation NG class detergents. Lauryl Maltoside Neopentyl Glycol can be used as a substitute for Dodecyl Maltoside.

In addition to offering highly purified Dodecyl Maltoside (PN D310), Affymetrix also tailors this popular molecule into useful derivatives to meet your most specific needs. Specifically, both and -anomers are available, as well as deuterium, selenium, and sulfur variants. These structurally modified Dodecyl Maltosides have been applied to a variety of different structural and functional studies.

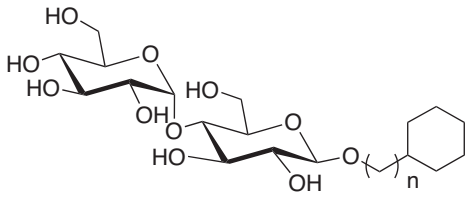
Lauryl Maltoside and Derivatives

- Traditional
  n-Dodecyl-–D-Maltopyranoside, Anagrade (D310, D310A)
  n-Dodecyl-–D-Maltopyranoside, Sol-Grade (D310S)
  n-Dodecyl-–D-Maltopyranoside, Anagrade, Low Alpha (D310LA)
  n-Dodecyl-–D-Maltopyranoside, Anagrade, Alpha Isomer (D310HA)
- Deuterium
  n-Dodecyl-d25—D-Maltopyranoside (D310T)
- NG Class Detergents
  Lauryl Maltose Neopentyl Glycol (NG310)
- Sulfur
  N-Dodecyl—D-Thiomaltopyranoside, Anagrade (D342)
- Selenium
  Dodecyl—D-Selenomaltoside (D912)

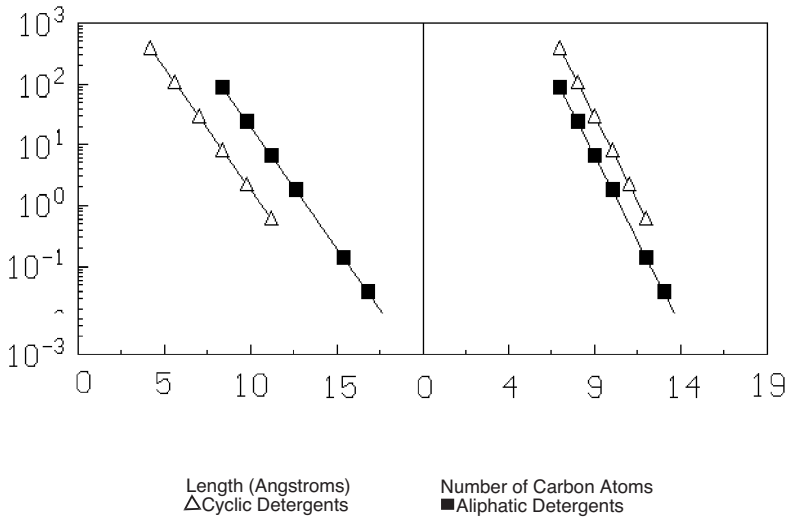
Detergents Designed for Membrane Proteins

CYMAL Detergents

The CYMAL[1,6] detergents are nonionic maltoside detergents that were designed specifically for the extraction, purification and crystallization of membrane proteins[2-4]. These detergents have the formula:



The CMC values for CYMAL detergents are higher than for the corresponding linear chains containing the same number of carbons. Viewed another way, the cyclohexyl tails pack more hydrophobicity into a shorter effective chain length. It has been suggested that detergents that have a shorter chain length, but higher hydrophobicity, are useful for stabilizing proteins during crystallization.



CYMAL-5 has also been shown to be effective for purifying G-protein coupled receptors[5].

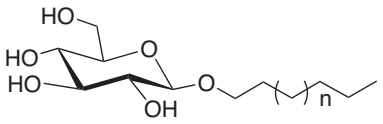
1. US Patent 5,674,987 and US Patent 5,763,586.
2. Askolin, S., Turkenburg, J. P., Tenkanen, M. *et al.* (2004) *Acta Crystallogr. D Biol. Crystallogr.* **60**, 1903-1905.
3. Katayama, H., Tabata, T., Ishihama, Y., *et al.* (2004) *Rapid Commun. Mass Spectrom.* **18**, 2388-2394.
4. Babcock, G. J., Farzan, M. and Sodroski, J. (2005) *J. Biol. Chem.* **278**, 3378-3385.
5. Mirzabekov, T., Bannert, N., Farzan, M., Hofmann, W., Kolchisky, P., Wu, L., Ayalt, R. and Sodroski, I. (1999) *J. of Biological Chemistry* **274**, 28745-28750.
6. Developed through support of NIH SBIR 1R43DK043172-01, 2R44DK043172-02, and 5R44DK043172-03.

Non-Ionic Detergents

Most of the detergents useful for the extraction and purification of membrane proteins are nonionic detergents which possess either a sugar-based or a polyoxyethylene head group.

Sugar-based Detergents

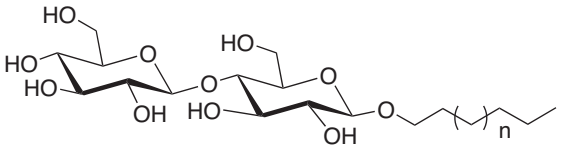
Sugar-based detergents are among the most popular detergents used for membrane protein applications. The alkyl glucoside series is available from the six carbon to the twelve carbon tail. The somewhat less polar thioglycoside analogs of some of these compounds are also available.



n = 1, Hexyl-β-D-Glucopyranoside
n = 2, Heptyl-β-D-Glucopyranoside
n = 3, Octyl-β-D-Glucopyranoside
n = 4, Nonyl-β-D-Glucopyranoside
n = 5, Decyl-β-D-Glucopyranoside
n = 7, Dodecyl-β-D-Glucopyranoside

The high CMC value of Hexyl–β–D-Glucopyranoside (0.25 M) indicates that a detergent with a shorter chain would typically not be useful. Decyl–β–D-Glucopyranoside has a reasonable CMC value, but is marginally soluble. Dodecyl–β–D-Glucopyranoside is even less soluble.

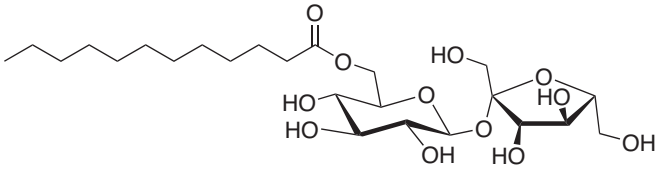
For many membrane proteins, a member of the maltoside series is milder and more effective than the comparable member of the glucoside series.



n = 1, Hexyl-β-D-Maltopyranoside
n = 3, Octyl-β-D-Maltopyranoside
n = 4, Nonyl-β-D-Maltopyranoside
n = 5, Decyl-β-D-Maltopyranoside
n = 6, Undecyl-β-D-Maltopyranoside
n = 7, Dodecyl-β-D-Maltopyranoside
n = 8, Tridecyl-β-D-Maltopyranoside
n = 9, Tetradecyl-β-D-Maltopyranoside
n = 11, Hexadecyl-β-D-Maltopyranoside

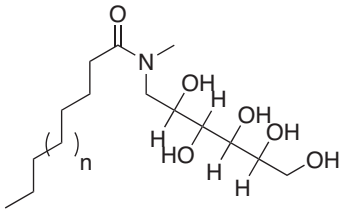
Another advantage of the maltoside head group is the increased solubility of the higher members of this series compared to the glucoside series. Even Hexadecyl–β–D-Maltopyranoside is soluble although it must be heated to 50˚C for a few minutes to make a true solution. The entire series of maltoside detergents is available from Hexyl–β–D-Maltopyranoside to Hexadecyl–β–D-Maltopyranoside, except for the pentadecyl member.

Two sugar-based detergents that have been available for some time are sucrose monododecanoate and sucrose monodecanoate. As with the maltose-based detergent series, these detergents are mild and useful for the extraction of membrane proteins. However, these detergents are esters and thus are easily hydrolyzed in acid, base or by proteases. The sucrose ester detergents are also mixtures of isomers in which the aliphatic ester is linked to any one of the three primary alcohols in the sucrose structure.



Please note: Sucrose Monoalkyl Ester is a mixture of the three possible primary alcohol esters. Only one structure is shown here.

The MEGA detergents are another series of glucose derivatives with an amide linkage between the alkyl tail and the glycoside head group[1-6]. However, these detergents are poorly soluble in water.

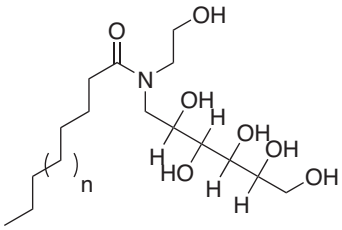


n = 1, MEGA-8
n = 2, MEGA-9
n = 3, MEGA-10

The Anatrace HEGA detergents overcome the low solubility problems associated with the MEGA detergents; the presence of an additional hydroxyl group increases the detergents aqueous solubility.

Non-Ionic Detergents

HEGA Detergents



n = 1, HEGA-8
n = 2, HEGA-9
n = 3, HEGA-10
n = 4, HEGA-11

1. Churchward, M., Butt, R. H. and Lang, J. C., *et al.* (2005) *Proteome Sci.* **3**, 5.
2. Roberts, C., Bond, B., White, I. R. and Herdon, H. J. (2000) *J. Recept. Signal Transduct Res.* **20**, 167-186.
3. Choudhury, D., Thompson, A. and Stojanoff, V., *et al.* (1999) *Science* **285**, 1061-1066.
4. Yue, W. H., Zou, Y. P., Yu, L. and Yu, C. A. (1991) *Biochemistry* **30**, 2303-2306.
5. Cortes, D. M. and Perozo, E. (1997) *Biochemistry* **36**, 10343-10352.
6. Hanatani, M., Nishifuji, K., Futai, M. and Tsuchiya, T. (1984) *J. Biochem.* **95**, 1349-1353.

Anameg®-7, Anagrade®

[Methyl-6-O-(N-Heptylcarbamoyl)–α–D-Glucopyranoside / HECAMEG / 6-O-(N-Heptylcarbamoyl)-Methyl–α–D-Glucopyranoside]

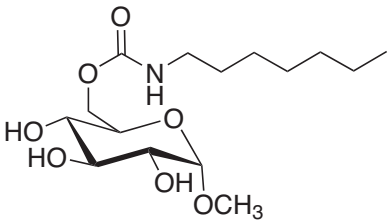
A340	1 gm
	5 gm

Chemical Properties:
FW: 335.4 [115457-83-5] $C_{15}H_{29}NO_7$
CMC (H_2O): ~ 19.5 mM[1] (0.65%)
Aggregation number (H_2O): ~ 92

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 0-5°C: ≥ 10%
Conductance (10% solution): < 80 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.03
280 nm: < 0.05
260 nm: < 0.07
225 nm: < 0.1

Reference:
1. Plusquellec, D., Chevalier, G., Talibart, R. and Wroblewski, H. (1989) *Anal. Biochem.* **179**, 145-153.



CYGLU®-3, Anagrade

[3-Cyclohexyl-1-Propyl–β–D-Glucoside]

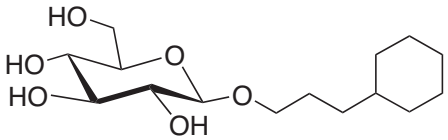
C323G	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 304.4 [869541-00-4] $C_{15}H_{28}O_6$
CMC (H_2O): ~ 28 mM[1] (0.86%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylpropanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

Reference:
1. Anatrace measurement.



CYGLU-4, Anagrade

[4-Cyclohexyl-1-Butyl–β–D-Glucoside]

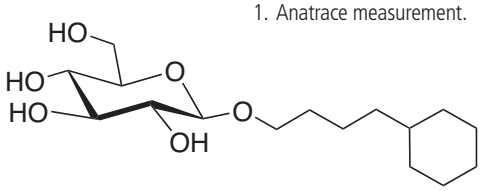
C324G	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 318.4 [869542-54-1] $C_{16}H_{30}O_2$
CMC (H_2O): ~ 1.8 mM[1] (0.058%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent (cyclohexylbutanol): < 0.005 (HPLC)
pH (0.1% solution): 5-8
Solubility in water at 20°C: ≥ 0.1%
Conductance (0.1% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.08

Reference:
1. Anatrace measurement.



n-Decyl–β–D-Glucopyranoside, Anagrade

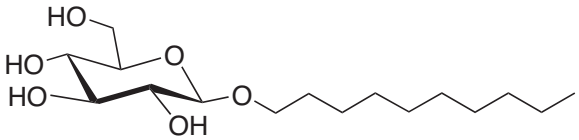
[n-Decyl–β–D-Glucoside]

D321 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 320.4 [58846-77-8] $C_{16}H_{32}O_6$
CMC (H_2O): ~ 2.2 mM[1] (0.070%)
CMC (0.01 M PO_4 Buffer) ~ 2.3 mM[2]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
For molar volume check reference 3.
Percent alpha: < 2 (HPLC)
Percent decanol: < 0.005 (HPLC)
pH (0.03% solution): 5-8
Solubility in water at 20˚C: ≥ 0.1%
Conductance (0.1% solution): < 20 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



References:

1. Helenius, A., McCaslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 734-749.
2. Brito, R. M. M. and Vaz, W. L. C. (1986) *Anal. Biochem.* **152**, 250-255.
3. Brown, G. M., Dubreuil, P., Ichhaporia, F. M. and Desnoyers, J. E. (1970) *Canadian J. Chem.* **48**, 2525-2531.

n-Dodecyl–β–D-Glucopyranoside, Anagrade

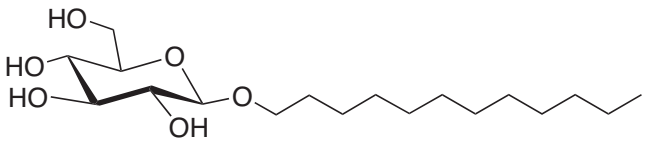
[n-Dodecyl–β–D-Glucoside]

D318 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 348.5 [59122-55-3] $C_{18}H_{36}O_6$
CMC (H_2O): ~ 0.19 mM[1] (0.0066%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
For molar volume check reference 2.
Percent alpha: < 2 (HPLC)
Percent dodecanol: < 0.005 (HPLC)
pH (0.005% solution): 5-8
Insoluble in water at 20˚C.
Conductance (0.005% solution): < 10 µS
Percent fluorescence due to a 0.005% detergent solution at 345 nm: < 10

Absorbance of a 0.005% detergent solution:
340 nm: < 0.06
280 nm: < 0.06
260 nm: < 0.06
225 nm: < 0.2



References:

1. Helenius, A., McCaslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 734-749.
2. Brown, G. M., Dubreuil, P., Ichhaporia, F. M. and Desnoyers, J. E. (1970) *Canadian J. Chem.* **48**, 2525-2531.

n-Heptyl–β–D-Glucopyranoside, Anagrade

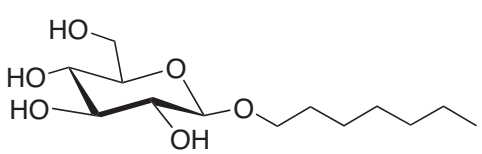
[n-Heptyl–β–D-Glucoside]

H300 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 278.4 [78617-12-6] $C_{13}H_{26}O_6$
CMC (H_2O): ~ 70 mM[1] (1.9%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent heptanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



Reference:

1. Anatrace measurement.

n-Heptyl–β–D-Glucopyranoside, Anagrade

[n-Heptyl–β–D-Glucoside] (Contains almost no alpha isomer)

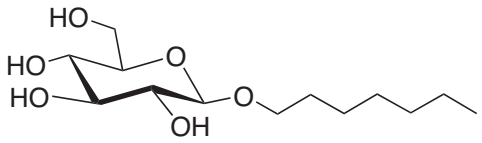
H300LA 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 278.4 [78617-12-6] $C_{13}H_{26}O_6$
CMC (H_2O): ~ 70 mM[1] (1.9%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.1 (HPLC)
Percent heptanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

Reference:
1. Anatrace measurement.



n-Hexyl–β–D-Glucopyranoside, Anagrade

[n-Hexyl–β–D-Glucoside]

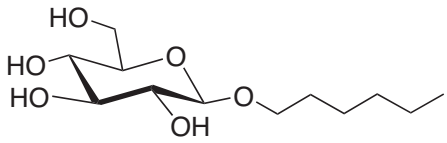
H305 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 264.4 [59080-45-4] $C_{12}H_{24}O_6$
CMC (H_2O): ~ 250 mM[1] (6.6%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
For molar volume check reference 2.
Percent alpha: < 2 (HPLC)
Percent hexanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. Anatrace measurement.
2. Brown, G. M., Dubreuil, P., Ichhaporia, F. M. and Desnoyers, J. E. (1970) *Canadian J. Chem.* **48**, 2525-2531.



n-Nonyl–β–D-Glucopyranoside, Anagrade

[n-Nonyl–β–D-Glucoside]

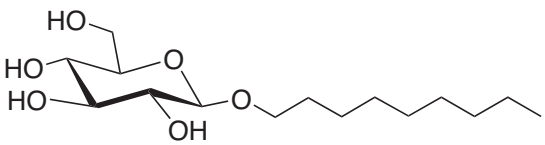
N324 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 306.4 [69984-73-2] $C_{15}H_{30}O_6$
CMC (H_2O): ~ 6.5 mM[1] (0.20%)
CMC (0.15 M NaCl): ~ 6 mM[2]
CMC (1 M NaCl): ~ 3.5 mM[1]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent nonanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. Anatrace measurement.
2. H. Zer, M. Vink, S. Shochat, *et al.* (2003) *Biochemistry* **42**, 728-738.
3. Ostermeier, C., Harrenga, A., ErmLer, U. and Michel, H. (1997) *Proc. Natl. Acad. Sci. USA* **94**, 10547-10553.
4. Mechref, Y. and Rassi, Z. E. (1997) *J. Chromatography* **757**, 263-273.
5. DeGrip, W. J. and Bovee-Geurts, P. H. M. (1979) *Chem. Phys. Lipids* **23**, 312-325.



n-Nonyl–β–D-Glucopyranoside, Anagrade

[n-Nonyl–β–D-Glucoside] (Low alpha)

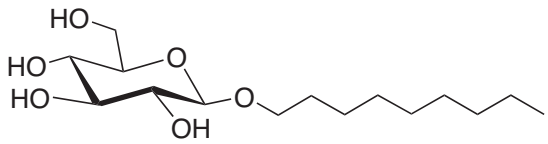
N324LA 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 306.4 [69984-73-2] $C_{15}H_{30}O_6$
CMC (H_2O): ~ 6.5 mM[1]
CMC (0.15 M NaCl): ~ 6 mM[2]
CMC (1 M NaCl): ~ 3.5 mM[1]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.4 (HPLC)
Percent nonanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. See N324 for references.



n-Nonyl–β–D-Glucopyranoside, Sol-Grade®

[n-Nonyl–β–D-Glucoside]

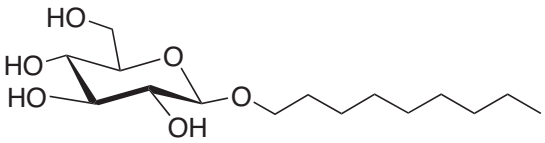
N324S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 306.4 [69984-73-2] $C_{15}H_{30}O_6$
CMC (H_2O): ~ 6.5 mM[1] (0.20%)
CMC (0.15 M NaCl): ~ 6 mM[2]
CMC (1 M NaCl): ~ 3.5 mM[1]

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent nonanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2

References:
1. See N324 for references.



n-Octyl–α–D-Glucopyranoside, Anagrade

[n-Octyl–α–D-Glucoside]

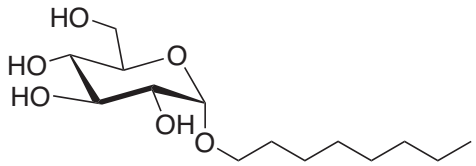
O311HA 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 292.4 [29781-80-4] $C_{14}H_{28}O_6$
CMC (H_2O): ~ 10-21 mM (0.3-0.6%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: > 98% (HPLC)
Percent octanol: < 0.005 (HPLC)
pH (0.1% solution): 5-8
Solubility in water at 20˚C: ≥ 0.1%

Heating may be required to dissolve detergent
Conductance (0.1% solution): < 50 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.10



n-Octyl–β–D-Glucopyranoside, Anagrade

[n-Octyl–β–D-Glucoside]

O311 1 gm
5 gm
25 gm

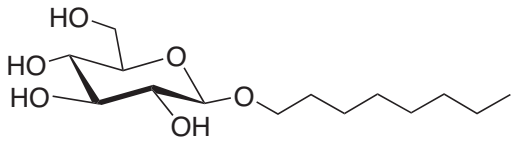
Chemical Properties:
FW: 292.4 [29836-26-8] $C_{14}H_{28}O_6$
CMC (H_2O): ~ 18-20 mM[1] (0.53%)
CMC (0.1 M NaCl): ~ 23.4 mM[2]
Aggregation number (H_2O)[1]: ~ 27-100

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
For Molar volume check reference 4.
Percent alpha: < 2 (HPLC)
Percent octanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:

1. Lorber, B., Bishop, J. B. and DeLucas, L. J. (1990) *Biochim. Biophys. Acta* **1023**, 254-265.
2. Chattopadhyay, A. and London, E. (1984) *Anal. Biochem.* **139**, 408-412.
3. Womack, M. D., Kendall, D. A. and MacDonald, R. C. (1983) *Biochim. Biophys. Acta* **733**, 210-215.
4. Brown, G. M., Dubreuil, P., Ichhaporia, F. M. and Desnoyers, J. E. (1970) *Canadian J. Chem.* **48**, 2525-2531.
5. Conlan, S. and Bayley, H. (2003) *Biochem.* **42**, 9453-9465.
6. Fanucci, G. E., Lee, J. Y., and Cafiso, D. S. (2003) *Biochemistry* **42**, 13106-13112.



n-Octyl–β–D-Glucopyranoside, Sol-Grade

[n-Octyl–β–D-Glucoside]

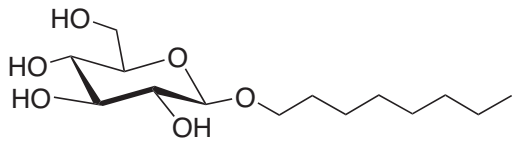
O311S 1 gm
5 gm
25 gm

Chemical Properties:
FW: 292.4 [29836-26-8] $C_{14}H_{28}O_6$
CMC (H_2O): ~ 18-20 mM[1] (0.53%)
CMC (0.1 M NaCl): ~ 23.4 mM[2]
Aggregation number (H_2O)[1]: ~ 27-100

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent octanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm < 0.05
280 nm < 0.1
260 nm < 0.1
225 nm < 0.2

References:
1. See O311 for references.



n-Octyl-d17–β–D-Glucopyranoside-d7

[n-Octyl-d17–β–D-Glucoside-d7]

O311D
See page 130

n-Decyl–α–D-Maltopyranoside, Anagrade

[n-Decyl–α–D-Maltoside] (Alpha isomer)

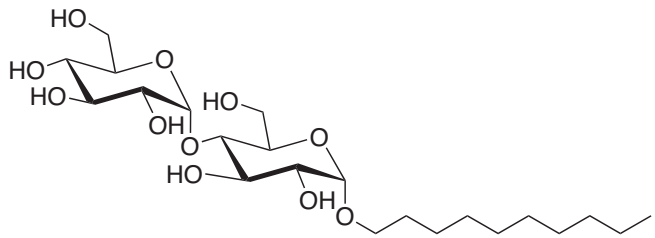
D322HA 1 gm, 5 gm, 25 gm

Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.10
260 nm: < 0.15
225 nm: < 0.25

Chemical Properties:
FW: 482.6 [168037-12-5] $C_{22}H_{42}O_{11}$
CMC (H_2O): 1.66 mM (0.08%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: > 94 (HPLC)
Percent decanol: < 0.005 (HPLC)
pH (1% solution): 5-8



n-Decyl–β–D-Maltopyranoside, Anagrade

[n-Decyl–β–D-Maltoside]

D322 1 gm, 5 gm, 25 gm

Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

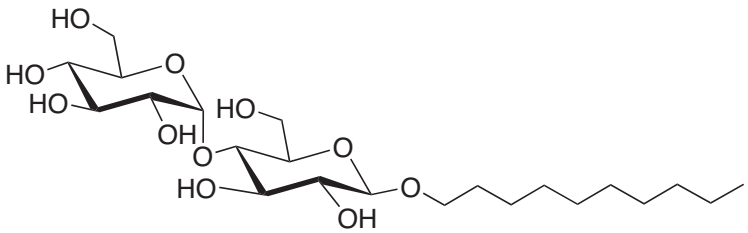
Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:

1. Alpes, H., Apell, H.-J., Knoll, G., Plattner, H. and Riek, R. (1988) *Biochim. Biophys. Acta* **946**, 379-388.
2. Anatrace measurement in collaboration with Professor R. M. Garavito (Michigan State University).
3. Brown, G. M., Dubreuil, P., Ichhaporia, F. M. and Desnoyers, J. E. (1970) *Canadian J. Chem.* **48**, 2525-2531.

Chemical Properties:
FW: 482.6 [82494-09-5] $C_{22}H_{42}O_{11}$
CMC (H_2O): ~ 1.8 mM[1] (0.087%)
CMC (0.15 M NaCl): ~ 1.8 mM[2]
Aggregation number (H_2O)[2]: ~ 69

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
For molar volume check reference 3.
Percent alpha: < 2 (HPLC)
Percent decanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%



n-Decyl–β–D-Maltopyranoside, Anagrade

[n-Decyl–β–D-Maltoside] (Low alpha)

D322LA 1 gm, 5 gm, 25 gm

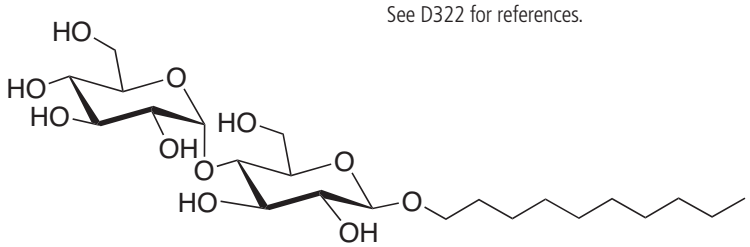
Percent decanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
See D322 for references.

Chemical Properties:
FW: 482.6 [82494-09-5] $C_{22}H_{42}O_{11}$
CMC (H_2O): ~ 1.8 mM[1] (0.087%)
CMC (0.15 M NaCl): ~ 1.8 mM[2]
Aggregation number (H_2O)[2]: ~ 69

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
For Molar volume check reference 3.
Percent alpha: < 0.2 (HPLC)



n-Decyl–β–D-Maltopyranoside, Sol-Grade

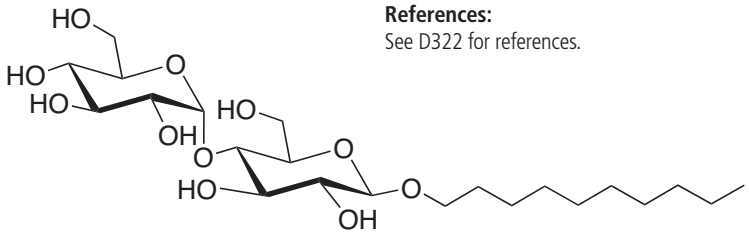
[n-Decyl–β–D-Maltoside]

D322S	1 gm 5 gm 25 gm

Chemical Properties:
FW: 482.6 [82494-09-5] $C_{22}H_{42}O_{11}$
CMC (H_2O): ~ 1.8 mM[1] (0.087%)
CMC (0.15 M NaCl): ~ 1.8 mM[2]
Aggregation number (H_2O)[2]: ~ 69

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent decanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2



References:
See D322 for references.

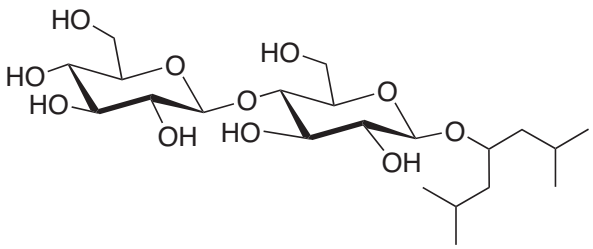
2,6-Dimethyl-4-Heptyl–β–D-Maltopyranoside, Anagrade

DH325	1 gm 5 gm 25 gm

Chemical Properties:
FW: 468.5 [869638-31-3] $C_{21}H_{40}O_{11}$
CMC (H_2O): ~ 27.5 mM[1] (1.2%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 15%
Percent (2-6-dimethyl-4-heptanol): < 0.005%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



Reference:
1. Anatrace measurement.

n-Dodecyl–α–D-Maltopyranoside, Anagrade

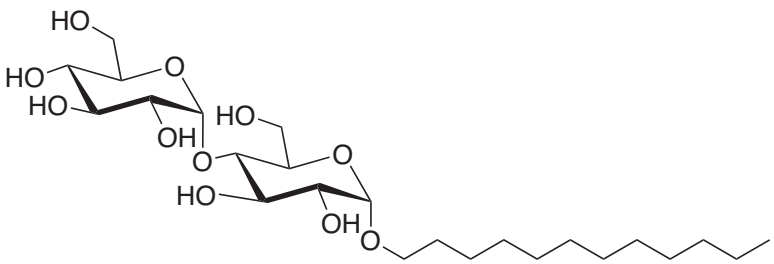
[n-Dodecyl–α–D-Maltoside / Lauryl Maltoside] (Alpha isomer)

D310HA	1 gm 5 gm 25 gm

Chemical Properties:
FW: 510.6 [116183-64-3] $C_{24}H_{46}O_{11}$
CMC (H_2O): ~ 0.152 mM (0.0076%)
Aggregation number (H_2O)[1]: ~ 90

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: > 94 (HPLC)
Percent dodecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.10
260 nm: < 0.15
225 nm: < 0.25



Reference:
1. VanAken, T., Foxall-VanAken, S., Castleman, S. and Ferguson-Miller, S. (1986) *Methods Enzymol.* **125**, 27-35.

n-Dodecyl–β–D-Maltopyranoside, Anagrade

[n-Dodecyl–β–D-Maltoside / Lauryl Maltoside / Dodecyl 4-O–α–D-Glucopyranosyl–β–D-Glucopyranoside]

D310	1 gm
	5 gm
	25 gm

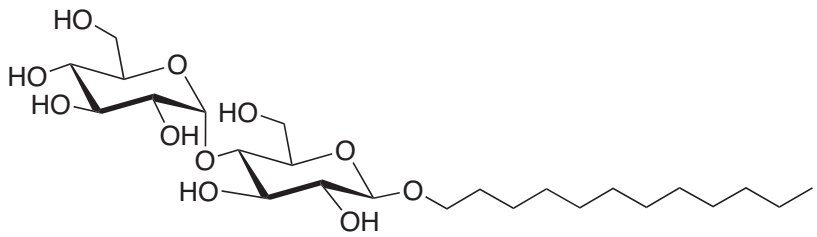
Chemical Properties:
FW: 510.6 [69227-93-6] $C_{24}H_{46}O_{11}$
CMC (H_2O): ~ 0.17 mM[1] (0.0087%)
CMC (0.2 M NaCl): ~ 0.12 mM[2]
Aggregation number (H_2O)[1-2]: ~ 78-149
dn/dc (H_2O)[4] 0.1435 ml/gm
Micelle Size[5]: 72 kDa

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
For molar volume check reference 3.
Percent alpha: < 2 (HPLC)
Percent dodecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:

1. VanAken, T., Foxall-VanAken, S., Castleman, S. and Ferguson-Miller, S. (1986) *Methods Enzymol.* **125**, 27-35.
2. Anatrace measurement in collaboration with Professor R. M. Garavito (Michigan State University).
3. Brown, G. M., Dubreuil, P., Ichhaporia, F. M. and Desnoyers, J. E. (1970) *Canadian J. Chem.* **48**, 2525-2531.
4. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
5. Strop, P. and Brunger, A. T. (2005) *Protein Sci.* **14**, 2207-2211.



n-Dodecyl–β–D-Maltopyranoside, Anagrade

[n-Dodecyl–β–D-Maltoside / Lauryl Maltoside / Dodecyl 4-O–α–D-Glucopyranosyl–β–D-Glucopyranoside] (Contains up to 15% alpha isomer)

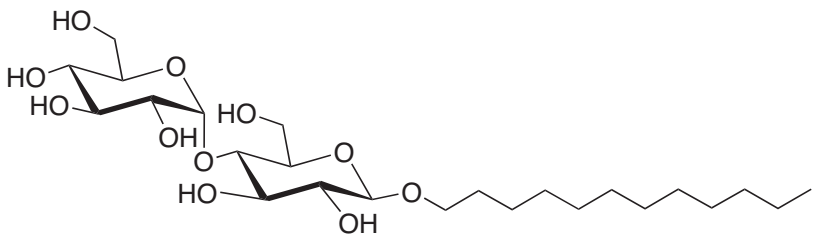
D310A	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 510.6 [69227-93-6] $C_{24}H_{46}O_{11}$
CMC (H_2O): ~ 0.17 mM[1] (0.0087%)
CMC (0.2 M NaCl): ~ 0.12 mM[2]
Aggregation number (H_2O)[1-2]: ~ 78-149
dn/dc (H_2O)[4] 0.1435 ml/gm
Micelle Size[5]: 72 kDa

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 15 (HPLC)
Percent dodecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
See D310 for references.



n-Dodecyl–β–D-Maltopyranoside, Anagrade

[n-Dodecyl–β–D-Maltoside / Lauryl Maltoside / Dodecyl 4-O–α–D-Glucopyranosyl–β–D-Glucopyranoside] (Low alpha)

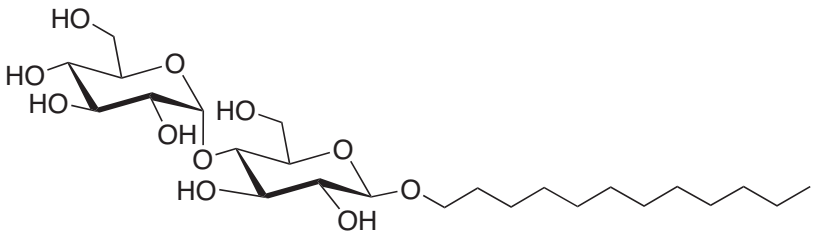
D310LA	1 gm 5 gm 25 gm

Chemical Properties:
FW: 510.6 [69227-93-6] $C_{24}H_{46}O_{11}$
CMC (H_2O): ~ 0.17 mM[1] (0.0087%)
CMC (0.2 M NaCl): ~ 0.12 mM[2]
Aggregation number (H_2O)[1-2]: ~ 78-149

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.2 (HPLC)
Percent dodecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
See D310 for references.



n-Dodecyl–β–D-Maltopyranoside, Sol-Grade

[n-Dodecyl–β–D-Maltoside / Lauryl Maltoside / Dodecyl 4-O–α–D-Glucopyranosyl–β–D-Glucopyranoside]

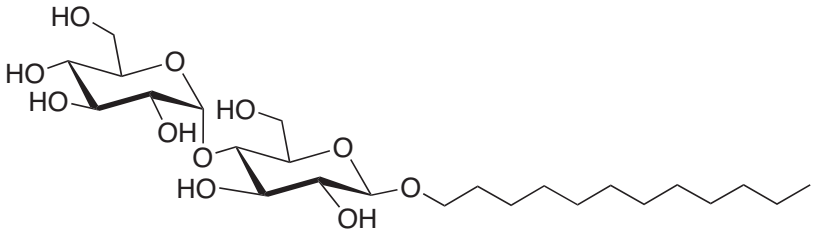
D310S	1 gm 5 gm 25 gm

Chemical Properties:
FW: 510.6 [69227-93-6] $C_{24}H_{46}O_{11}$
CMC (H_2O): ~ 0.17 mM[1] (0.0087%)
CMC (0.2 M NaCl): ~ 0.12 mM[2]
Aggregation number (H_2O)[2]: ~ 78-149
dn/dc (H_2O)[4]: 0.1435 ml/gm
Micelle Size[5]: 72 kDa

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent dodecanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2

References:
See D310 for references.



n-Dodecyl-d25–β–D-Maltopyranoside

(n-Dodecyl-d25–β–D-Maltoside, Lauryl Maltoside)

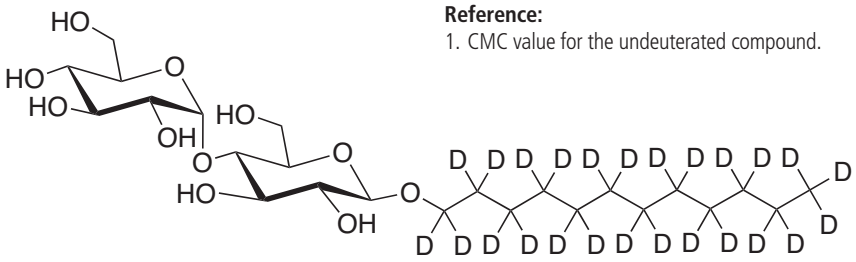
D310T	100 mg 250 mg 500 mg

Chemical Properties:
FW: 535.8 [849110-74-3] $C_{24}D_{25}H_{21}O_{11}$
CMC (H_2O): ~ 0.2 mM[1]

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 15 (HPLC)
Percent dodecanol: < 0.05 (HPLC)
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 10%
Conductance (1% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.25
260 nm: < 0.25
225 nm: < 0.8

Reference:
1. CMC value for the undeuterated compound.



n-Hexadecyl–β–D-Maltopyranoside, Anagrade

[n-Hexadecyl–β–D-Maltoside]

H320 1 gm, 5 gm, 25 gm

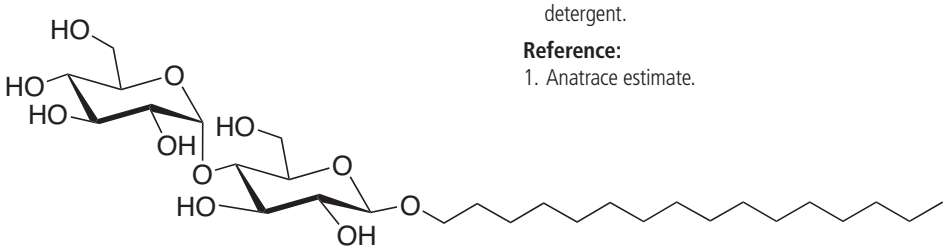
Chemical Properties:
FW: 566.6 [98064-96-1] $C_{28}H_{54}O_{11}$
CMC (H_2O): ~ 0.0006 mM[1] (0.00003%)

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent hexadecanol: < 0.01 (HPLC)
pH (0.1% solution): 5-8
Solubility in water at 40°C: ≥ 1%
Conductance (0.1% solution): < 80 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.15
225 nm: < 0.3

NOTE: Heating may be required to dissolve detergent.

Reference:
1. Anatrace estimate.



n-Hexyl–β–D-Maltopyranoside, Anagrade

[n-Hexyl–β–D-Maltoside]

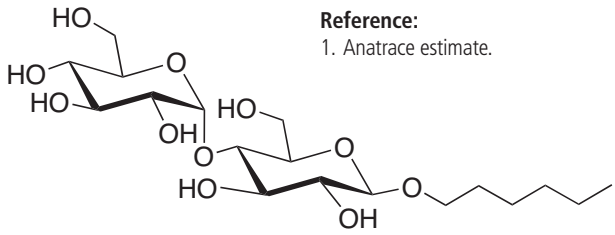
H310 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 426.4 [870287-95-9] $C_{18}H_{34}O_{11}$
CMC (H_2O): ~ 210 mM[1] (8.9%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent hexanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

Reference:
1. Anatrace estimate.



n-Nonyl–β–D-Maltopyranoside, Anagrade

[n-Nonyl–β–D-Maltoside]

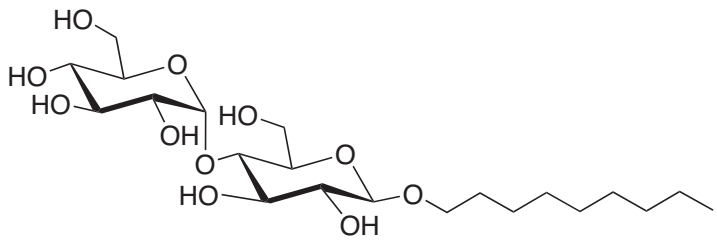
N330 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 468.5 [106402-05-5] $C_{21}H_{40}O_{11}$
CMC (H_2O): ~ 6 mM[1] (0.28%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[2]: ~ 55

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent nonanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. Anatrace measurement.
2. Anatrace measurement in collaboration with Professor R. M. Garavito (Michigan State University).



n-Octyl–β–D-Maltopyranoside, Anagrade

[n-Octyl–β–D-Maltoside]

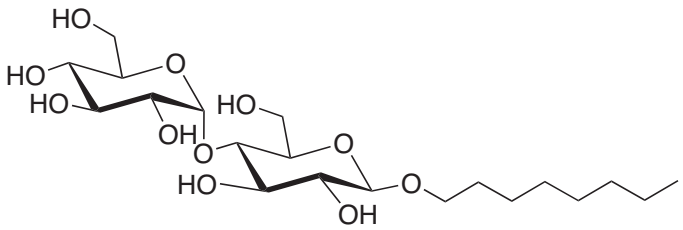
O310	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 454.4 [82494-08-4] $C_{20}H_{38}O_{11}$
CMC (100 mM NaCl, 20 mM HEPES pH 7.5):
~ 19.5 mM[1] (0.89%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[1]: ~ 47

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent octanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%

Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



Reference:
1. Anatrace measurement in collaboration with Professor R. M. Garavito (Michigan State University).

n-Octyl–β–D-Maltopyranoside, Sol-Grade

[n-Octyl–β–D-Maltoside]

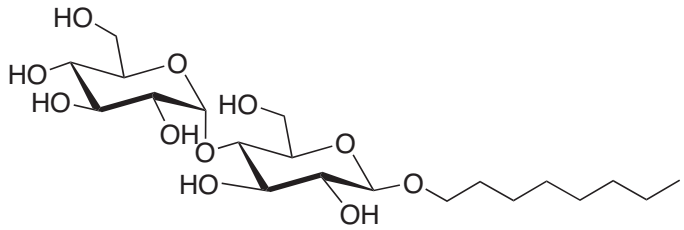
O310S	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 454.4 [82494-08-4] $C_{20}H_{38}O_{11}$
CMC (100 mM NaCl, 20 mM HEPES pH 7.5):
~ 19.5 mM[1] (0.89%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[1]: ~ 47

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent octanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%

Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2



Reference:
1. Anatrace measurement in collaboration with Professor R. M. Garavito (Michigan State University).

Octyl Maltoside, Fluorinated, Anagrade

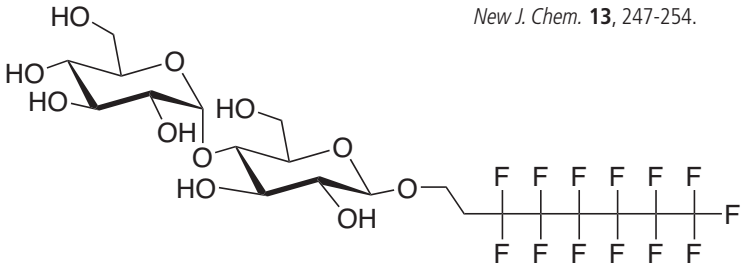
[1H, 1H, 2H, 2H-Perfluorooctyl)-β-D-Maltopyranoside]

O310F 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 688.4 $C_{20}H_{25}F_{13}O_{11}$
CMC (H_2O): 1.02 mM[1]

Product Specifications:
Purity: >99% by HPLC analysis
Percent alpha: <2 (HPLC)
pH (1% solution): 5-8
Solubility in water at 20˚C: >10%
Conductance (10% solution): <100 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1



Reference:
1. Greiner, J., Manfredi, A. and Riess, J. G. (1989) *New J. Chem.* **13**, 247-254.

2-Propyl-1-Pentyl–β–D-Maltopyranoside, Anagrade

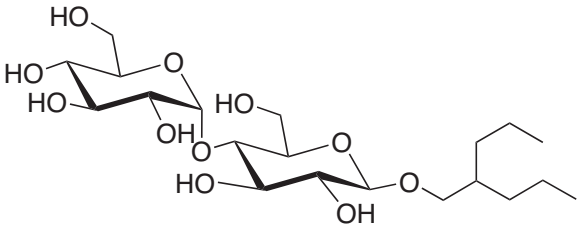
P310 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 455.5 [869668-28-0] $C_{20}H_{39}O_{11}$
CMC (H_2O): ~ 42.5 mM[1] (1.9%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 10%
Percent (2-propyl-1-pentanol): < 0.005%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%

Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



Reference:
1. Anatrace measurement.

n-Tetradecyl–β–D-Maltopyranoside, Anagrade

[n-Tetradecyl–β–D-Maltoside / Tetradecyl 4-O–α–D-Glucopyranosyl–β–D-Glucopyranoside]

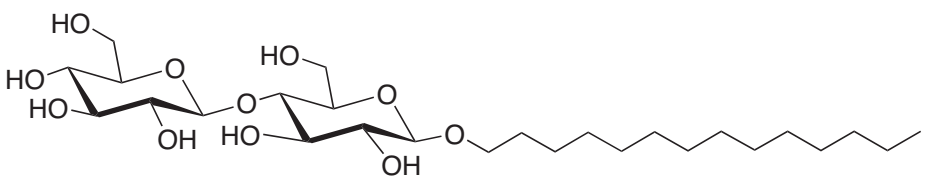
T315 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 538.6 [18449-82-6] $C_{26}H_{50}O_{11}$
CMC (H_2O): ~ 0.01 mM[1] (0.00054%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent tetradecanol: < 0.005 (HPLC)
pH (1% solution): 5-8

Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.06
260 nm: < 0.1
225 nm: < 0.2



Reference:
1. Anatrace measurement.

n-Tetradecyl–β–D-Maltopyranoside, Sol-Grade

[n-Tetradecyl–β–D-Maltoside / Tetradecyl 4-O–α–D-Glucopyranosyl–β–D-Glucopyranoside]

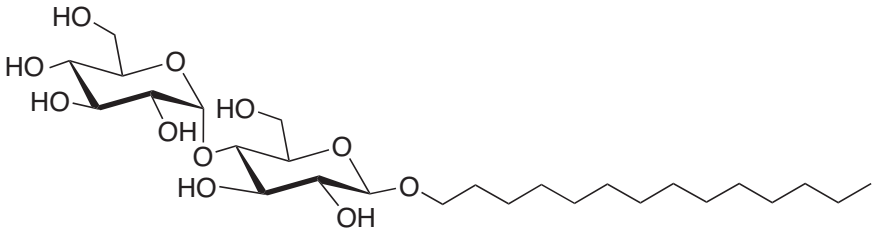
T315S	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 538.6 [18449-82-6] $C_{26}H_{50}O_{11}$
CMC (H_2O): ~ 0.01 mM[1] (0.00054%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent tetradecanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2

Reference:
1. Anatrace measurement.



n-Tridecyl–β–D-Maltopyranoside, Anagrade

[n-Tridecyl–β–D-Maltoside]

T323	500 mg
	1 gm
	5 gm
	25 gm

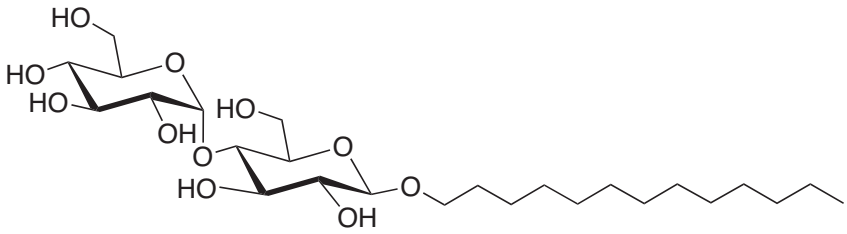
Chemical Properties:
FW: 524.6 [93911-12-7] $C_{25}H_{48}O_{11}$
CMC (H_2O): ~ 0.033 mM[1] (0.0017%)
CMC (0.15 mM NaCl): ~ 0.024 mM[1] (0.0013%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[2]: ~ 186

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent tridecanol: < 0.005 (HPLC)
pH (1% solution): 5-8

Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.06
260 nm: < 0.1
225 nm: < 0.2

References:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.



n-Tridecyl–β–D-Maltopyranoside, Anagrade

[n-TridecylD-Maltoside] (Low alpha)

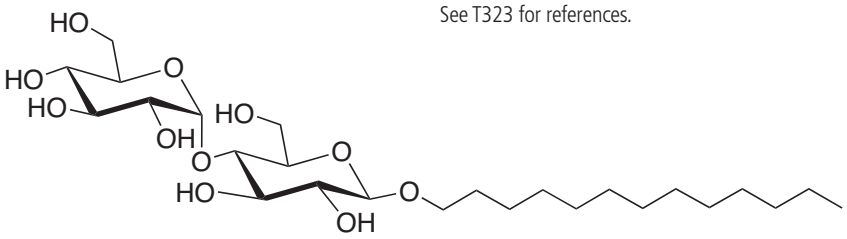
T323LA 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 524.6 [93911-12-7] $C_{25}H_{48}O_{11}$
CMC (H_2O): ~ 0.033 mM[1] (0.0017%)
CMC (0.15 mM NaCl): ~ 0.024 mM[1] (0.0013%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[2]: ~ 186

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.2 (HPLC)
Percent tridecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.06
260 nm: < 0.1
225 nm: < 0.2

References:
See T323 for references.



n-Tridecyl–β–D-Maltopyranoside, Sol-Grade

[n-Tridecyl–β–D-Maltoside]

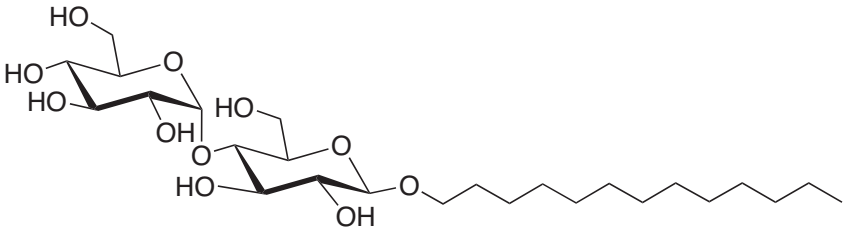
T323S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 524.6 [93911-12-7] $C_{25}H_{48}O_{11}$
CMC (H_2O): ~ 0.033 mM[1] (0.0017%)
CMC (0.15 mM NaCl): ~ 0.024 mM[1] (0.0013%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[2]: ~ 186

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent tridecanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2

References:
See T323 for references.



n-Undecyl–α–D-Maltopyranoside, Anagrade

[n-Undecyl–α–D-Maltoside / Undecyl Maltoside] (Alpha isomer)

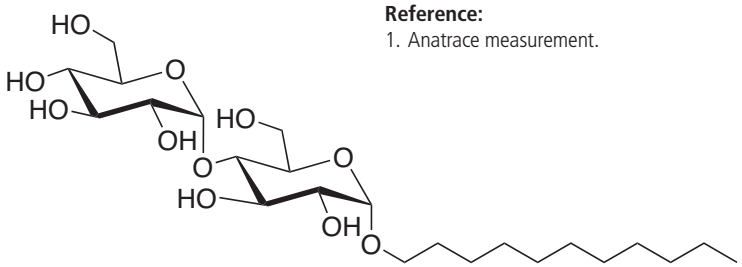
U300HA 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 496.6 [168037-13-6] $C_{23}H_{44}O_{11}$
CMC (H_2O): ~ 0.58 mM[1] (0.029%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: > 94 (HPLC)
Percent undecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.10
260 nm: < 0.15
225 nm: < 0.25

Reference:
1. Anatrace measurement.



n-Undecyl–β–D-Maltopyranoside, Anagrade

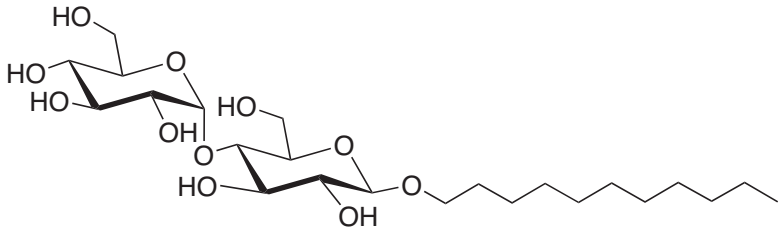
[n-Undecyl–β–D-Maltoside]

U300	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 496.6 [253678-67-0] $C_{23}H_{44}O_{11}$
CMC (H_2O): ~ 0.59 mM[1] (0.029%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[2]: ~ 71

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent undecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



References:

1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Ostermeier, C., Harrenga, A., ErmLer, U., and Michel, H. (1997) *Proc. Natl. Acad. Sci. USA* **94**, 10547-10553.
4. Zhang, H., Kurisu, G., Smith, J. L., and Cramer, W. A. (2003) *PNAS* **100**, *No. 9*, 5160-5163.

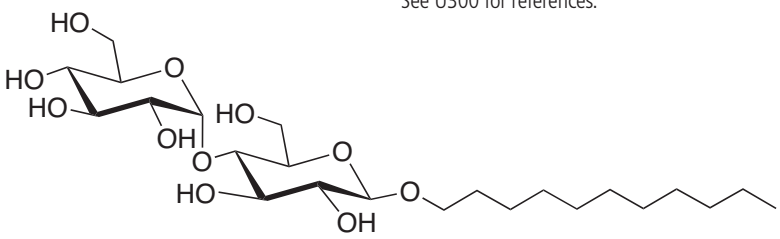
n-Undecyl–β–D-Maltopyranoside, Anagrade

[n-Undecyl–β–D-Maltoside] (Low alpha)

U300LA	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 496.6 [253678-67-0] $C_{23}H_{44}O_{11}$
CMC (H_2O): ~ 0.59 mM[1] (0.029%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[2]: ~ 71

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.2 (HPLC)
Percent undecanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS



Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
See U300 for references.

n-Undecyl–β–D-Maltopyranoside, Sol-Grade

[n-Undecyl–β–D-Maltoside]

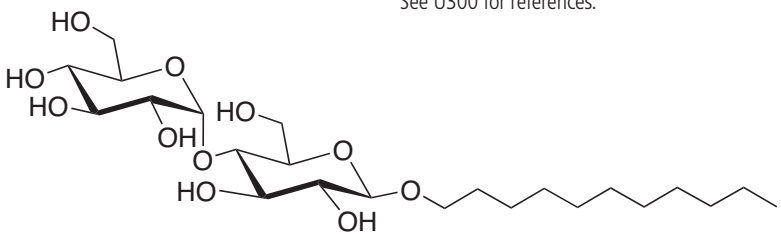
U300S	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 496.6 [253678-67-0] $C_{23}H_{44}O_{11}$
CMC (H_2O): ~ 0.59 mM[1] (0.029%)
Aggregation number (100 mM NaCl, 20 mM HEPES pH 7.5)[2]: ~ 71

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 5 (HPLC)
Percent undecanol: < 0.05 (HPLC)
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2

References:
See U300 for references.



ω–Undecylenyl–β–D-Maltopyranoside, Anagrade

[ω–Undecylenyl–β–D-Maltoside]

U310	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 494.6 $C_{23}H_{42}O_{11}$
CMC (H_2O): ~ 1.2 mM[1] (0.059%)

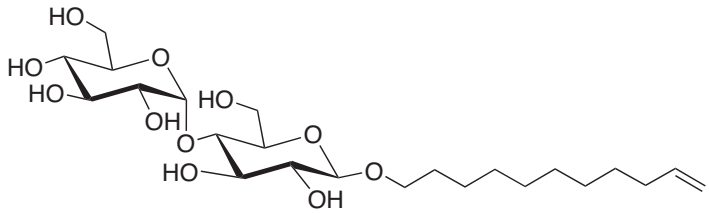
Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent ω–undecylenyl alcohol: < 0.005 (HPLC)
pH (1% solution): 5-8

Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06

References:

1. Anatrace measurement.
2. Anatrace measurement in collaboration with Professor R. M. Garavito (Michigan State University).
3. Ostermeier, C., Harrenga, A., ErmLer, U. and Michel, H. (1997) *Proc. Natl. Acad. Sci. USA* **94**, 10547-10553.



CYMAL®-1, Anagrade

[Cyclohexyl-Methyl–β–D-Maltoside[1]]

C321	1 gm
	5 gm
	25 gm

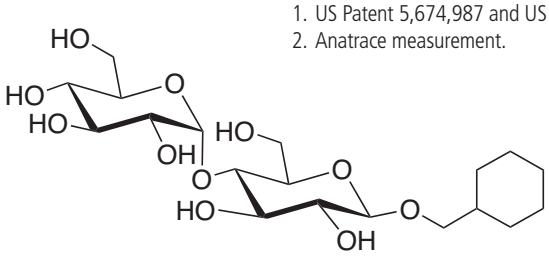
Chemical Properties:
FW: 438.5 [26080-64-6] $C_{19}H_{34}O_{11}$
CMC (H_2O): ~ 340 mM[2] (15%)
CMC (0.15 M NaCl): ~ 360 mM[2]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylmethanol: < 0.005 (HPLC)
pH (1% solution): 5-8

Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. US Patent 5,674,987 and US Patent 5,763,586.
2. Anatrace measurement.



CYMAL-2, Anagrade

[2-Cyclohexyl-1-Ethyl–β–D-Maltoside[1]]

C322	1 gm
	5 gm
	25 gm

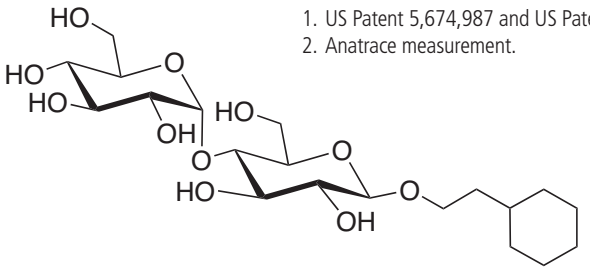
Chemical Properties:
FW: 452.5 [260804-65-7] $C_{20}H_{36}O_{11}$
CMC (H_2O): ~ 120 mM[2] (5.4%)
CMC (0.15 M NaCl): ~ 104 mM[2]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylethanol: < 0.005 (HPLC)
pH (1% solution): 5-8

Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. US Patent 5,674,987 and US Patent 5,763,586.
2. Anatrace measurement.



CYMAL-3, Anagrade

[3-Cyclohexyl-1-Propyl–β–D-Maltoside[1]]

C323	1 gm
	5 gm
	25 gm

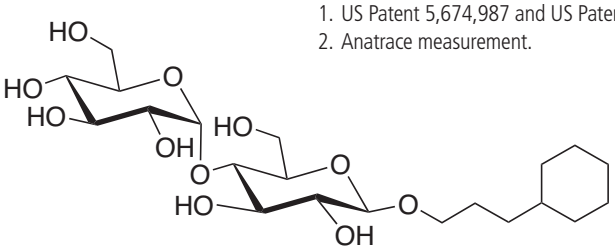
Chemical Properties:
FW: 466.5 [181135-58-0] $C_{21}H_{38}O_{11}$
CMC (H_2O): ~ 34.5 mM[2] (1.6%)
CMC (0.15 M NaCl): ~ 29 mM[2]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylpropanol: < 0.005 (HPLC)

pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. US Patent 5,674,987 and US Patent 5,763,586.
2. Anatrace measurement.



CYMAL-4, Anagrade

[4-Cyclohexyl-1-Butyl–β–D-Maltoside(1)]

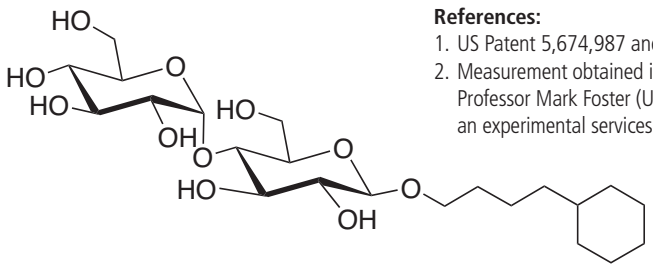
C324 1 gm, 5 gm, 25 gm

pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

Chemical Properties:
FW: 480.5 [181135-57-9] $C_{22}H_{40}O_{11}$
CMC (H_2O): ~ 7.6 mM(2) (0.37%)
CMC (0.15 M NaCl): ~ 7.3 mM(2)
Aggregation number (H_2O)(2): ~ 25

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylbutanol: < 0.005 (HPLC)



References:
1. US Patent 5,674,987 and US Patent 5,763,586.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.

CYMAL-5, Anagrade

[5-Cyclohexyl-1-PentylD-Maltoside(1)]

C325 1 gm, 5 gm, 25 gm

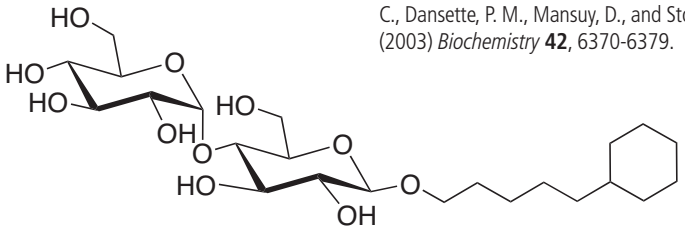
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:
1. US Patent 5,763,586.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. S. Askolin, J. P. Turkenburg, M. Tenkanen, *et al.* (2004) *Acta Crystallogr. D Biol. Crystallogr.* **60**, 1903-1905.
4. H. Katayama, T. Tabata, Y. Ishihama, *et al.* (2004) *Rapid Commun. Mass Spectrom.* **18**, 2388-2394.
5. D. Dorjsuren, Y. Badralmaa, J. Mikovits, *et al.* (2003) *Protein Expr. Purif.* **29**, 42-50.
6. Wester, M. R., Johnson, E. F., Marques-Soares, C., Dansette, P. M., Mansuy, D., and Stout, C. D. (2003) *Biochemistry* **42**, 6370-6379.

Chemical Properties:
FW: 494.5 [250692-65-0] $C_{23}H_{42}O_{11}$
CMC (H_2O): ~ 2.4-5.0 mM(2) (0.12%)
CMC (0.15 M NaCl): ~ 2.0 mM(2)
Aggregation number (H_2O)(2): ~ 47

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylpentanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 40 µS



CYMAL-5, Sol-Grade

[5-Cyclohexyl-1-Pentyl–β–D-Maltoside(1)]

C325S 1 gm, 5 gm, 25 gm

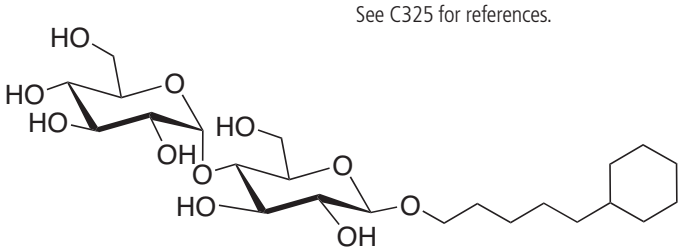
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2

References:
See C325 for references.

Chemical Properties:
FW: 494.5 [250692-65-0] $C_{23}H_{42}O_{11}$
CMC (H_2O): ~ 2.4-5.0 mM(2) (0.12%)
CMC (0.15 M NaCl): ~ 2.0 mM(2)
Aggregation number (H_2O)(2): ~ 47

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 10 (HPLC)
Percent cyclohexylpentanol: < 0.05 (HPLC)



CYMAL-6, Anagrade

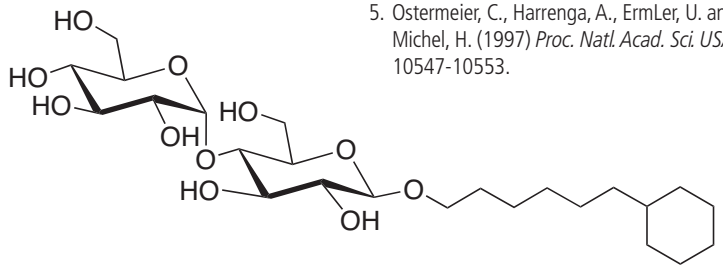
[6-Cyclohexyl-1-Hexyl–β–D-Maltoside[1]]

C326	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 508.5 [228579-27-9] $C_{24}H_{44}O_{11}$
CMC (H_2O): ~ 0.56 mM[2] (0.028%)
Aggregation number (H_2O)[2]: ~ 91

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylhexanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



References:

1. US Patent 5,674,987 and US Patent 5,763,586.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Nukaga, M., Abe, T., Venkatesan, A. M., Mansour, T. S., Bonomo, R. A., and Knox, J. R. (2003) *Biochemistry* **42**, 13152-13159.
4. R. J. Guan, Y. Xiang, M. Wang, *et al.* (2001) *Acta Crystallogr. D Biol. Crystallogr.* **57**, 1313-1315.
5. Ostermeier, C., Harrenga, A., ErmLer, U. and Michel, H. (1997) *Proc. Natl. Acad. Sci. USA* **94**, 10547-10553.

CYMAL-6, Anagrade

[6-Cyclohexyl-1-HexylD-Maltoside[1]]
(Low alpha)

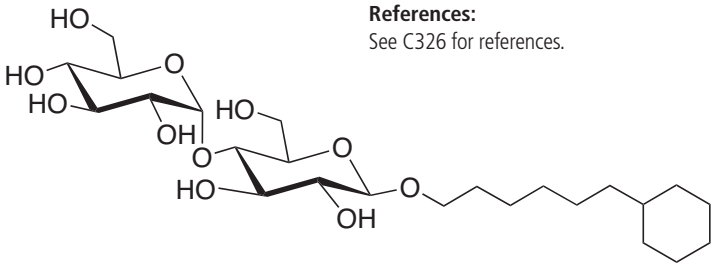
C326LA	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 508.5 [228579-27-9] $C_{24}H_{44}O_{11}$
CMC (H_2O): ~ 0.56 mM[2] (0.028%)
Aggregation number (H_2O)[2]: ~ 91

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.5 (HPLC)
Percent cyclohexylhexanol: < 0.005 (HPLC)

pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



References:
See C326 for references.

CYMAL-6, Sol-Grade

[6-Cyclohexyl-1-Hexyl–β–D-Maltoside[1]]

C326S 1 gm
5 gm
25 gm

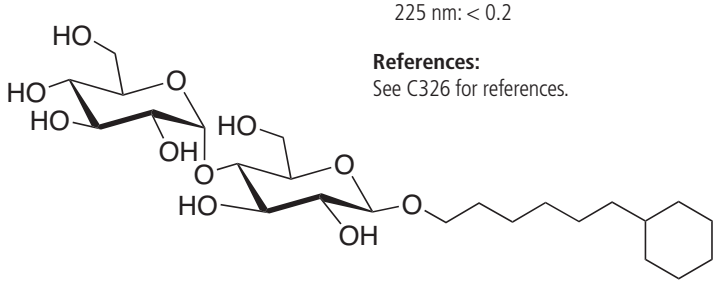
Chemical Properties:
FW: 508.5 [228579-27-9] $C_{24}H_{44}O_{11}$
CMC (H_2O): ~ 0.56 mM[2] (0.028%)
Aggregation number (H_2O)[2]: ~ 91

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 10 (HPLC)
Percent cyclohexylhexanol: < 0.05 (HPLC)
pH (1% solution): 4-9

Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.1
225 nm: < 0.2

References:
See C326 for references.



CYMAL-7, Anagrade

[7-Cyclohexyl-1-Heptyl–β–D-Maltoside[1]]

C327 1 gm
5 gm
25 gm

Chemical Properties:
FW: 522.5 [349477-49-2] $C_{25}H_{46}O_{11}$
CMC (H_2O): ~ 0.19 mM[2] (0.0099%)
Aggregation number (H_2O)[2]: ~ 150

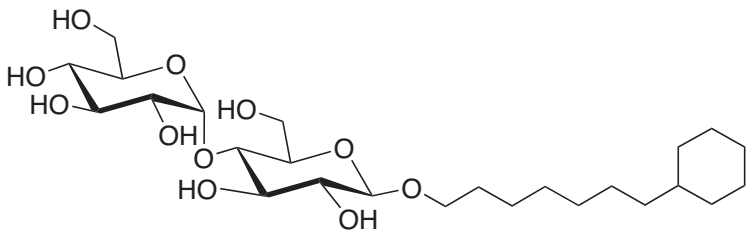
Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 4 (HPLC)
Percent cyclohexylheptanol: < 0.005 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 40 µS

Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

References:

1. US Patent 5,763,586.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Babcock, G. J., Farzan, M., and Sodroski, J. (2003) *J. Biol. Chem.* **278**, 3378-3385.



CYMAL-7, Sol-Grade

[7-Cyclohexyl-1-Heptyl––D-Maltoside[1]]

C327S 1 gm
5 gm
25 gm

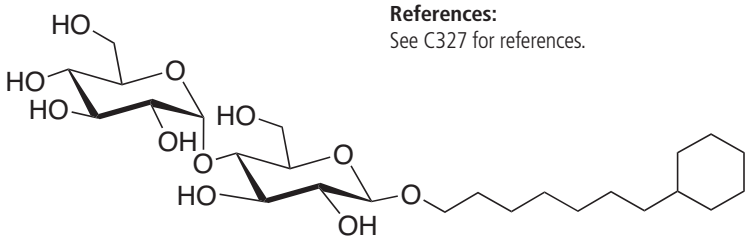
Chemical Properties:
FW: 522.5 [349477-49-2] $C_{25}H_{46}O_{11}$
CMC (H_2O): ~ 0.19 mM[2] (0.0099%)
Aggregation number (H_2O)[2]: ~ 150

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 10 (HPLC)
Percent cyclohexylheptanol: < 0.05 (HPLC)
pH (1% solution): 4-9

Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm < 10

Absorbance of a 1% detergent solution:
340 nm < 0.05
280 nm < 0.1
260 nm < 0.1
225 nm < 0.2

References:
See C327 for references.



Non-ionic – Other Alkyl Glycosides

Decyl Maltose Neopentyl Glycol

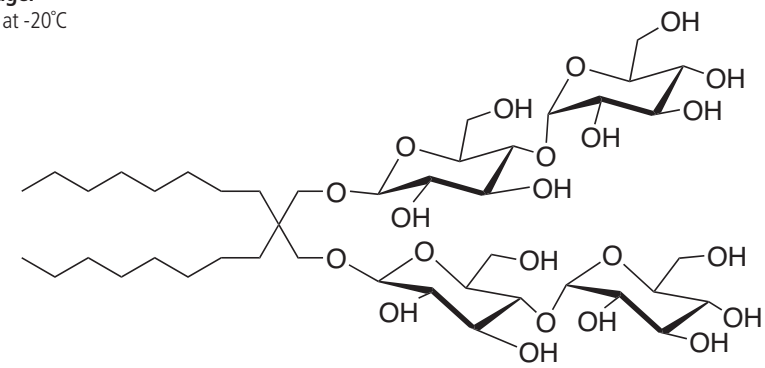
[2,2-Dioctylpropane-1,3-bis-β-D-Maltopyranoside]

NG322 1 gm, 5 gm, 25 gm

Storage:
Store at -20˚C

Chemical Properties:
FW: 949.1 $C_{43}H_{80}O_{22}$

Product Specifications:
Form: White solid
Solubility: Water



Lauryl Maltose Neopentyl Glycol

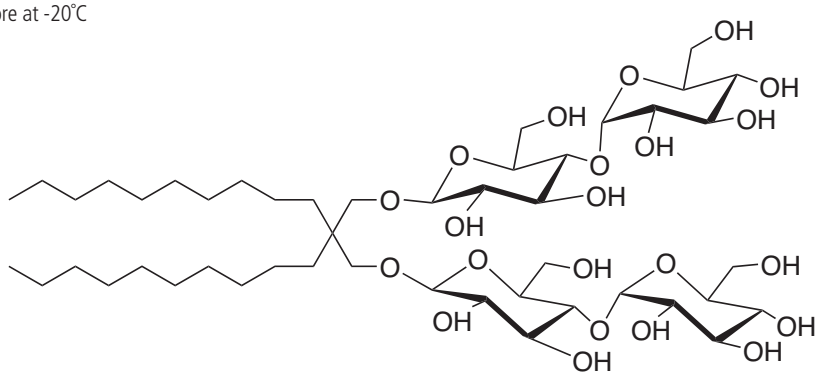
[2,2-Didecylpropane-1,3-bis-β-D-Maltopyranoside]

NG310 1 gm, 5 gm, 25 gm

Storage:
Store at -20˚C

Chemical Properties:
FW: 1005.2 $C_{47}H_{88}O_{22}$

Product Specifications:
Form: White solid
Solubility: Water



Octyl Glucose Neopentyl Glycol

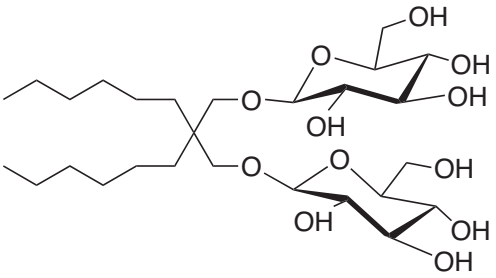
[2,2-Dihexylpropane-1,3-bis-β-D-Glucopyranoside]

NG311 1 gm, 5 gm, 25 gm

Storage:
Store at -20˚C

Chemical Properties:
FW: 568.7 $C_{27}H_{52}O_{12}$

Product Specifications:
Form: White solid
Solubility: Water



n-Octyl–β–D-Galactopyranoside, Anagrade

[n-Octyl–β–D-Galactoside]

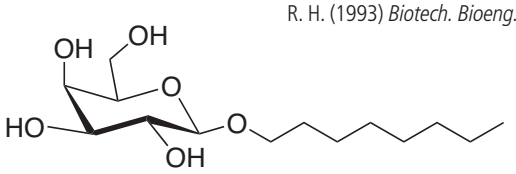
O312 1 gm
5 gm

Chemical Properties:
FW: 292.4 [40427-75-6] $C_{14}H_{28}O_6$
CMC (H_2O): ~ 29.5 mM[1] (0.86%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent octanol: < 0.005 (HPLC)
pH (0.5% solution): 5-8
Solubility in water at 0-5°C: ≥ 0.5%
Conductance (0.5% solution): < 10 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.5% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

Reference:
1. Stevenson, D. E., Stanley, R. A. and Furneaux, R. H. (1993) *Biotech. Bioeng.* **42**, 657-666.



Sucrose Monododecanoate, Anagrade

[β-D-Fructopyranosyl–α–D-Glucopyranoside Monododecanoate / Lauroyl Sucrose / Dodecanoyl Sucrose]

S350 1 gm
5 gm
25 gm

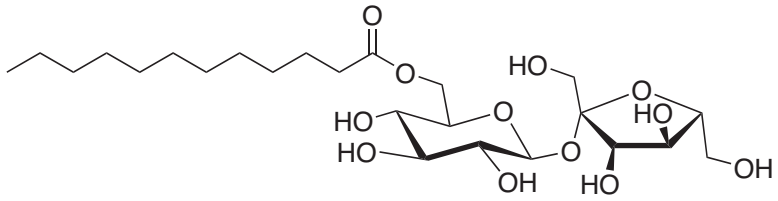
Chemical Properties:
FW: 524.6 [25339-99-5] $C_{24}H_{44}O_{12}$
CMC (H_2O): ~ 0.3 mM[1] (0.016%)

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.08
260 nm: < 0.10

NOTE: Sucrose monododecanoate (S350) contains three different isomers which differ in the location of the ester linkage. Esterification takes place at each of the primary alcohols in the sucrose molecule.

References:
1. Makino, H., *et al.* (1983) *Agric. Biol. Chem.* **4**, 319.
2. Ostermeier, C., Harrenga, A., ErmLer, U. and Michel, H. (1997) *Proc. Natl. Acad. Sci. USA* **94**, 10547-10553.



C-HEGA®-8, Anagrade

[Cyclohexylethanoyl-N-Hydroxyethylglucamide]

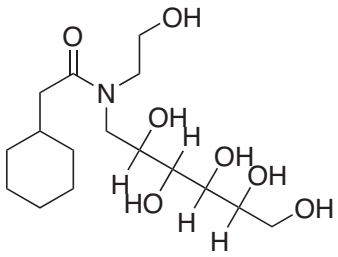
C408 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 349.5 [603111-75-7] $C_{16}H_{31}NO_7$
CMC (H_2O): ~ 277 mM[1] (9.7%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



C-HEGA-9, Anagrade

[Cyclohexylpropanoyl-N-Hydroxyethylglucamide]

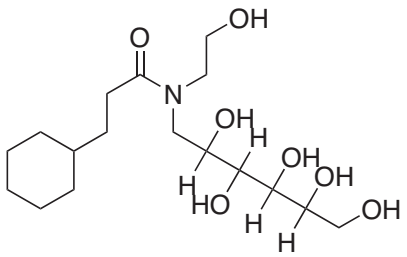
C409 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 363.5 [864434-14-0] $C_{17}H_{33}NO_7$
CMC (H_2O): ~ 108 mM[1] (3.9%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



C-HEGA-10, Anagrade

[Cyclohexylbutanoyl-N-Hydroxyethylglucamide]

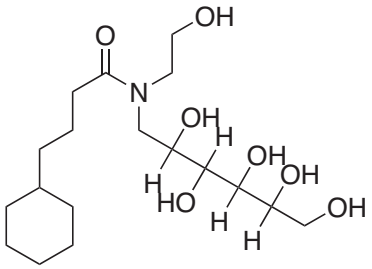
C410 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 377.5 [864434-15-1] $C_{18}H_{35}NO_7$
CMC (H_2O): ~ 35 mM[1] (1.3%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

References:
1. Anatrace measurement.
2. Choudhury, D., Thompson, A., Stojanoff, V., *et al.* (1999) *Science* **285**, 1061-1066.



C-HEGA-11, Anagrade

[Cyclohexylpentanoyl-N-Hydroxyethylglucamide]

C411	1 gm
	5 gm
	25 gm

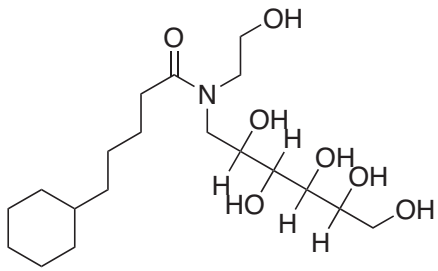
Chemical Properties:
FW: 391.5 [864434-16-2] $C_{19}H_{37}NO_7$
CMC (H_2O): ~ 11.5 mM[1] (0.45%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 10%

Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



HEGA®-8, Anagrade

[Octanoyl-N-Hydroxyethylglucamide]

H108	1 gm
	5 gm
	25 gm

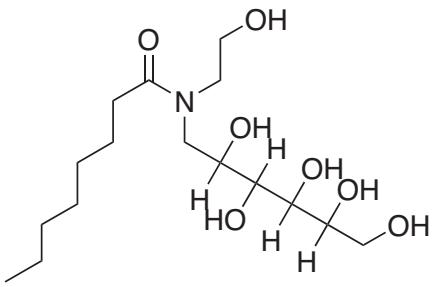
Chemical Properties:
FW: 351.5 [869652-63-1] $C_{16}H_{33}NO_7$
CMC (H_2O): ~ 109 mM[1] (3.8%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8

Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



HEGA-9, Anagrade

[Nonanoyl-N-Hydroxyethylglucamide]

H109	1 gm
	5 gm
	25 gm

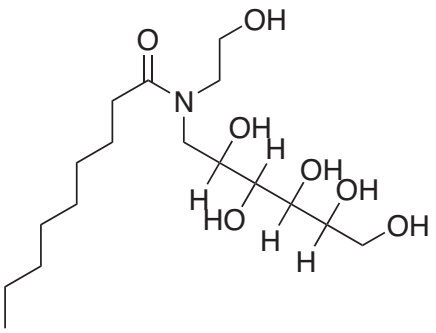
Chemical Properties:
FW: 365.5 [869653-90-7] $C_{17}H_{35}NO_7$
CMC (H_2O): ~ 39 mM[1] (1.4%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8

Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



HEGA-10, Anagrade

[Decanoyl-N-Hydroxyethylglucamide]

H110 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 379.5 [139361-84-5] $C_{18}H_{37}NO_7$
CMC (H_2O): ~ 7.0 mM[1] (0.26%)

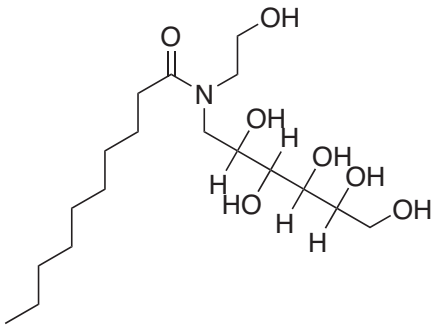
Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 10%
Conductance (10% solution): < 100 µS

Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

NOTE: Heating may be required to dissolve the detergent.

References:
1. Anatrace measurement.
2. Cortes, D. M. and Perozo, E. (1997) *Biochem.* **36**, 10343-10352.



HEGA-11, Anagrade

[Undecanoyl-N-Hydroxyethylglucamide]

H111 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 393.5 [869654-10-4] $C_{19}H_{39}NO_7$
CMC (H_2O): ~ 1.4 mM[1] (0.055%)

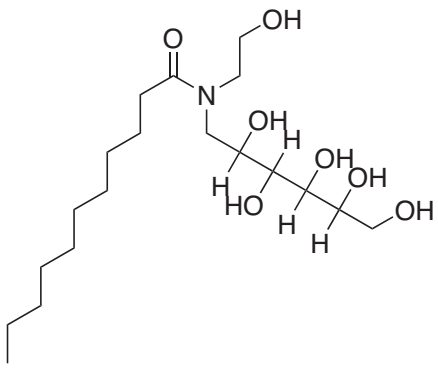
Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (0.5% solution): 5-8
Solubility in water at 0-5˚C: ≥ 0.5%

Conductance (0.5% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.5% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

NOTE: Heating may be required to dissolve the detergent.

Reference:
1. Anatrace measurement.



Mega-8, Anagrade

[Octanoyl-N-Methylglucamide]

M319 1 gm
5 gm
25 gm

Chemical Properties:
FW: 321.4 [85316-98-9] $C_{15}H_{31}NO_6$
CMC (H_2O): ~ 79 mM[1,2] (2.5%)

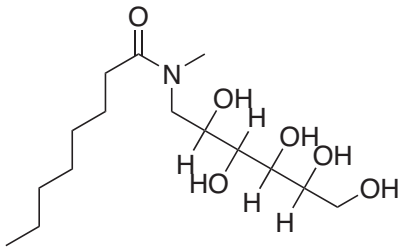
Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 80 µS

Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

References:

1. Anatrace measurement.
2. Mine, Y., Fukunaga, K., Maruoka, N., *et al.* (2000) *J. Biosci. Bioeng.* **90**, 631-636.
3. Hanatani, M., *et al.* (1984) *J. Biochem.* **95**, 1349-1353.
4. Hildreth, J. E. K. (1982) *Biochem. J.* **207**, 363.



Mega-9, Anagrade

(Nonanoyl-N-Methylglucamide)

M325 1 gm
5 gm
25 gm

Chemical Properties:
FW: 335.5 [85261-19-4] $C_{16}H_{33}NO_6$
CMC (H_2O): ~ 25 mM[1,2] (0.84%)

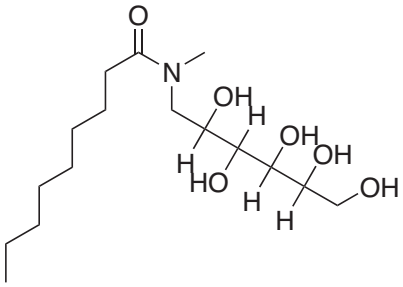
Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 5°C: ≥ 5%
Conductance (5% solution): < 80 µS

Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

References:

1. Anatrace measurement.
2. Hanatani, M., *et al.* (1984) *J. Biochem.* **95**, 1349-1353.
3. Hildreth, J. E. K. (1982) *Biochem. J.* **207**, 363.



Mega-10, Anagrade

[Decanoyl-N-Methylglucamide]

M320 1 gm
5 gm
25 gm

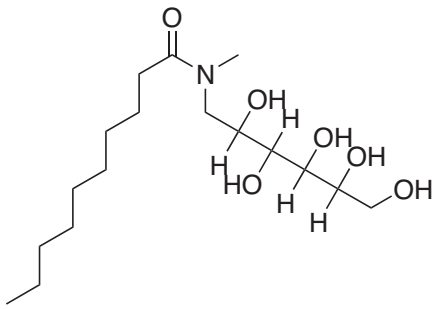
Chemical Properties:
FW: 349.5 [85261-20-7] $C_{17}H_{35}NO_6$
CMC (H_2O): ~ 6-7 mM[1,4] (0.21%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (0.3% solution): 5-8
Solubility in water at 0-5°C: ≥ 0.3%
Conductance (0.3% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.3% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

References:

1. Anatrace measurement.
2. Churchward, M. A., Butt, R. H., Lang, J. C., *et al.* (2005) *Proteome Sci.* **3**, 5.
3. Hierrezuelo, J. M., Aguiar, J., Ruiz, C. C. (2004) *Langmuir* **20**, 10419-10426.
4. Hanatani, M., *et al.* (1984) *J. Biochem.* **95**, 1349-1353.
5. Hildreth, J. E. K. (1982) *Biochem. J.* **207**, 363.



Anapoe®-$C_{10}E_6$

[Polyoxyethylene(6)decyl Ether / 3,6,9,12,15,18-Hexaoxaoctacosan-1-ol]

APO106
See page 76

Anapoe-$C_{10}E_9$

[Polyoxyethylene(9)decyl Ether / –Decyl––Hydroxy-Poly(oxy-1,2-Ethanediyl]

APO109
See page 76

Anapoe-$C_{12}E_8$

[Polyoxyethylene(8)dodecyl Ether / 3,6,9,12,15,18,21,24-Octaoxahexatriacontan-1-ol]

APO128
See page 77

Anapoe-$C_{12}E_9$

[Polyoxyethylene(9)dodecyl Ether / Thesit / Polydocanol /α–Dodecyl–ω–Hydroxy-Poly (Oxy-1,2-Ethanediyl]

APO129
See page 77

Anapoe-$C_{12}E_{10}$

[Polyoxyethylene(10)dodecyl Ether / 3,6,9,12,15,18,24,27,30-Decaoxadotetracontan-1-ol]

AP1210
See page 77

Anapoe-$C_{13}E_8$

[Polyoxyethylene(8)tridecyl Ether]

APO138
See page 78

Hexaethylene Glycol Monodecyl Ether, Analytical Grade

[$C_{10}E_6$ / Decyl Hexaethylene Glycol Ether / Decyl Hexaglycol

H360 4 ml (1 ampule)
10 ml (1 ampule)

Chemical Properties:
FW: 422.6 [5168-89-8] $C_{22}H_{46}O_7$
CMC (H_2O): ~ 0.9 mM[1]
Aggregation number (H_2O)[1]: ~ 73
Supplied as a 25% (w/w) aqueous solution under argon.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 3-7
Conductance (10% solution): < 100 µS
Solubility in water at 20˚C: ≥ 25%

Reference:
1. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.

$CH_3(CH_2)_9O(CH_2CH_2O)_6H$

Hexaethylene Glycol Monooctyl Ether, Anagrade

[C_8E_6]

H350 2 ml (1 ampule)
10 ml (1 ampule)
50 ml (5 ampules)

Chemical Properties:
FW: 394.5 [4440-54-4] $C_{20}H_{42}O_7$
CMC (H_2O): ~ 10 mM[1] (0.39%)
Aggregation number (H_2O)[1]: ~ 32
Supplied as a 50% (w/w) solution under argon.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 5-8
Conductance (10% solution): < 50 µS

Reference:
1. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.

$CH_3(CH_2)_{15}O(CH_2CH_2O)_{20}H$

Octaethylene Glycol Monododecyl Ether, Anagrade

[$C_{12}E_8$ / Dodecyl Octaethylene Glycol Ether / Dodecyl Octaglycol / 6,9,12,15,18,21,24-Octaoxahexatriacontan-1-Ol]

O330 4 ml (1 ampule)
20 ml (2 ampules)
100 ml (10 ampules)

Chemical Properties:
FW: 538.8 [3055-98-9] $C_{28}H_{58}O_9$
CMC (0.01 M TES, pH 7.5, 0.05 M NaCl, 0.1 mM $CaCl_2$): ~ 0.09 mM[1,2] (0.0048%)
Aggregation number (0.01 M TES, pH 7.5, 0.05 M NaCl, 0.1 mM $CaCl_2$)[2]: ~ 90-120
Supplied as a 25% (w/w) aqueous solution under argon.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 3-7
Conductance (10% solution): < 100 µS
Solubility > 25% at room temperature

References:
1. LeMaire, M., Kwee, S., Andersen, J. P. and Miller, J. V. (1983) *Eur. J. Biochem.* **129**, 525-532.
2. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.

$CH_3(CH_2)_{11}O(CH_2CH_2O)_8H$

Octaethylene Glycol Monododecyl Ether, Analytical Grade

[$C_{12}E_8$ / Dodecyl Octaethylene Glycol Ether / Dodecyl Octaglycol / 3,6,9,12,15,18,21,24-Octaoxahexatriacontan-1-Ol]

O330A 4 ml (1 ampule), 20 ml (2 ampules), 100 ml (10 ampules)

Chemical Properties:
FW: 538.8 [3055-98-9] $C_{28}H_{58}O_9$
CMC (0.01 M TES, pH 7.5, 0.05 M NaCl, 0.1 mM $CaCl_2$): ~ 0.09 mM[1,2] (0.0048%)

Aggregation number (0.01 M TES, pH 7.5, 0.05 M NaCl, 0.1 mM $CaCl_2$)[2]: ~ 90-120
Supplied as a 25% (w/w) aqueous solution under argon.

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
pH (1% solution): 3-7
Conductance (10% solution): < 500 µS
Solubility > 25% at room temperature
NOTE: May contain organic peroxides.

References:

1. LeMaire, M., Kwee, S., Andersen, J. P. and Miller, J. V. (1983) *Eur. J. Biochem.* **129**, 525-532.
2. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.

$CH_3(CH_2)_{11}O(CH_2CH_2O)_8H$

Pentaethylene Glycol Monodecyl Ether, Anagrade

[$C_{10}E_5$ / Decyl Pentaethylene Glycol Ether / Decylpentaglycol / 3,6,9,12,15-Pentaoxapentacosan-1-Ol]

P340 2 ml (1 ampule), 10 ml (1 ampule), 50 ml (5 ampules)

Chemical Properties:
FW: 378.6 [23244-49-7] $C_{20}H_{42}O_6$
CMC (H_2O): ~ 0.81mM[1] (0.031%)

Aggregation number (H_2O)[2]: ~ 73
Supplied as a 50% (w/w) solution under argon.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 5-8
Conductance (10% solution): < 50 µS

References:

1. Borchardt, J. K. (1996) *Today's Chemist at Work 5,* **10**, 20-24.
2. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.

$CH_3(CH_2)_9O(CH_2CH_2O)_5H$

Pentaethylene Glycol Monooctyl Ether, Anagrade

[C_8E_5 / Octyl Pentaethylene Glycol Ether / Octylpentaglycol / 3,6,9,12,15-Pentaoxatricosan-1-Ol]

P350 2 ml (1 ampule), 10 ml (1 ampule), 50 ml (5 ampules)

Chemical Properties:
FW: 350.5 [19327-40-3] $C_{18}H_{38}O_6$
CMC (0.1 M NaCl): ~ 7.1 mM[1] (0.25%)

Supplied as a 50% (w/w) solution under argon.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 5-8
Conductance (10% solution): < 50 µS

Reference:

1. Eisele, J. and Vulliez-Le Normand, B. (1993) *Anal. Biochem.* **208**, 241-243.

$CH_3(CH_2)_7O(CH_2CH_2O)_5H$

Tetraethylene Glycol Monooctyl Ether, Anagrade

[C_8E_4 / Octyl Tetraethylene Glycol Ether / Octyltetraglycol / 3,6,9,12-Tetraoxaeicosan-1-Ol]

T350 2 ml (1 ampule), 10 ml (1 ampule), 50 ml (5 ampules)

Chemical Properties:
FW: 306.5 [19327-39-0] $C_{16}H_{34}O_5$
CMC (0.1 M NaCl): ~ 8 mM[1] (0.25%)

Aggregation number (H_2O)[1]: ~ 82
Supplied as a 50% (w/w) aqueous solution under argon.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Chromatographically purified to contain < 500 µM of equivalent peroxide.
pH (5% solution): 5-8
Conductance (10% solution): < 50 µS

References:

1. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.
2. Cortes, D. M. and Perozo, E. (1997) *Biochem.* **36**, 10343-10352.

$CH_3(CH_2)_7O(CH_2CH_2O)_4H$

n-Decyl–β–D-Thioglucopyranoside, Anagrade

[n-Decyl–β–D-Thioglucoside]

D323	1 gm
	5 gm
	25 gm

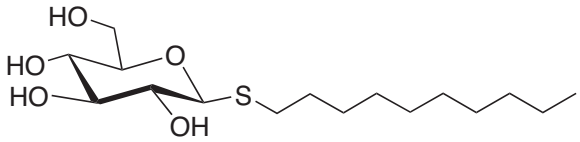
Chemical Properties:
FW: 336.4 [98854-16-1] $C_{16}H_{32}O_5S$
CMC (methanol/water)[2]: ~ 0.9 mM[1] (0.30%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
pH (1% solution[2]): 5-8
Solubility in methanol:water[2] at 20˚C: ≥ 1%
Conductance (1% solution[2]): < 40 µS
Percent fluorescence due to a 0.1% detergent solution[2] at 345 nm: < 10

Absorbance of a 1% detergent solution[2]:
340 nm: < 0.05
280 nm: < 0.15
260 nm: < 0.2

NOTE: n-Decyl–β–D-Thioglucopyranoside is insoluble in water.

References:
1. Anatrace measurement.
2. Solvent: (1:1) v/v methanol: water.



n-Heptyl–β–D-Thioglucopyranoside, Anagrade

[n-Heptyl–β–D-Thioglucoside]

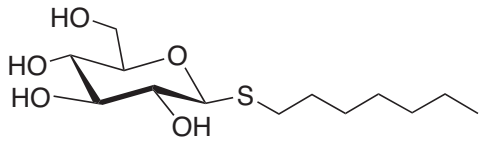
H301	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 294.4 [85618-20-8] $C_{13}H_{26}O_5S$
CMC (H_2O): ~ 29 mM[1] (0.85%)
PLEASE NOTE: Product is a gummy solid.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 10%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.5% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.25

Reference:
1. Anatrace measurement.



n-Heptyl–β–D-Thioglucopyranoside, Anagrade

[n-Heptyl–β–D-Thioglucoside] (Low alpha)

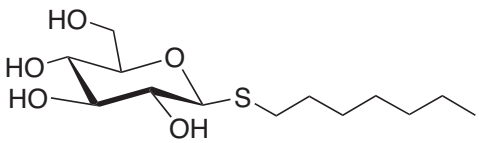
H301LA	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 294.4 [85618-20-8] $C_{13}H_{26}O_5S$
CMC (H_2O): ~ 29 mM[1] (0.85%)
PLEASE NOTE: Product is a gummy solid.

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.1 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 10%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.5% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.25

Reference:
1. Anatrace measurement.



n-Nonyl–β–D-Thioglucopyranoside, Anagrade

[n-Nonyl–β–D-Thioglucoside]

N335 1 gm, 5 gm, 25 gm

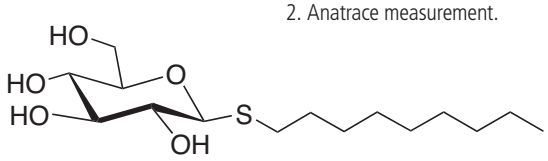
Chemical Properties:
FW: 322.4 [98854-15-0] $C_{15}H_{30}O_5S$
CMC (water: methanol[1]) ~ 2.9 mM[2] (0.093%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)

pH (0.05% solution[1]) 5-8
Solubility in water at 0-5°C[1]: ≥ 0.05%
Conductance (0.05% solution[1]) < 40 µS
Percent fluorescence due to a 0.05% detergent solution[1] at 345 nm: < 10

Absorbance of a 0.05% detergent solution[1]:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.25

References:
1. Solvent: (1:1) v/v methanol : water.
2. Anatrace measurement.



n-Octyl–β–D-Thioglucopyranoside, Anagrade

[n-Octyl–β–D-Thioglucoside]

O314 1 gm, 5 gm, 25 gm

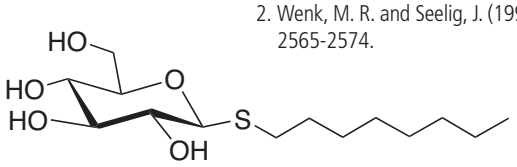
Chemical Properties:
FW: 308.4 [85618-21-9] $C_{14}H_{28}O_5S$
CMC (H_2O): ~ 9 mM[1] (0.28%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)

pH (0.5% solution): 5-8
Solubility in water at 0-5°C: ≥ 0.8%
Conductance (0.5% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.5% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.25

References:
1. Saito, S. and Tsuchiya, T. (1984) *Biochem. J.* **222**, 829-832.
2. Wenk, M. R. and Seelig, J. (1997) *Biophys. J.* **73**, 2565-2574.



n-Octyl–β–D-Thioglucopyranoside, Anagrade

[n-OctylD-Thioglucoside] (Low alpha)

O314LA 1 gm, 5 gm, 25 gm

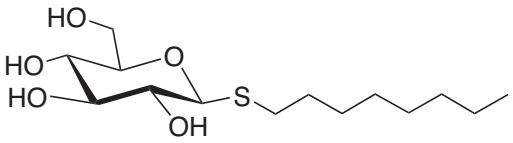
Chemical Properties:
FW: 308.4 [85618-21-9] $C_{14}H_{28}O_5S$
CMC (H_2O): ~ 9 mM[1] (0.28%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 0.1 (HPLC)

pH (0.5% solution): 5-8
Solubility in water at 0-5°C: ≥ 0.8%
Conductance (0.5% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.5% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.25

References:
See O314 for references.



n-Decyl–β–D-Thiomaltopyranoside, Anagrade

[n-Decyl–β–D-Thiomaltoside]

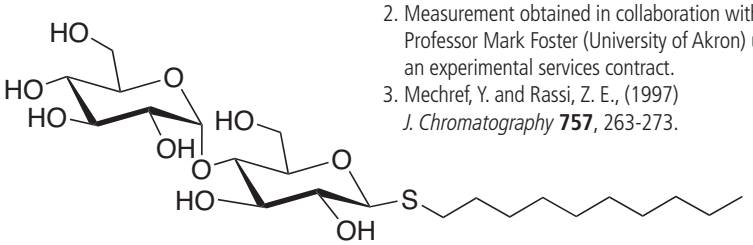
D335 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 498.6 [14565-56-4] $C_{22}H_{42}O_{10}S$
CMC (H_2O): ~ 0.9 mM[1] (0.045%)
Aggregation number (H_2O)[2]:~ 75

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
pH (1% solution): 5-8

Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.15
260 nm: < 0.2



References:

1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Mechref, Y. and Rassi, Z. E., (1997) *J. Chromatography* **757**, 263-273.

n-Dodecyl–β–D-Thiomaltopyranoside, Anagrade

[n-Dodecyl–β–D-Thiomaltoside]

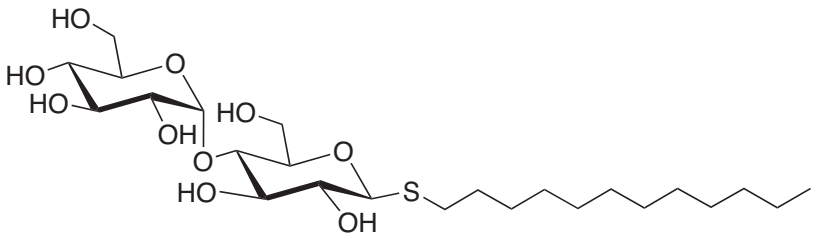
D342 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 526.6 [148565-58-6] $C_{24}H_{46}O_{10}S$
CMC (H_2O): ~ 0.05 mM[1] (0.0026%)
Aggregation number (H_2O)[2]: ~ 126

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 2 (HPLC)
pH (1% solution): 5-8

Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.15
260 nm: < 0.2



References:

1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Mechref, Y. and Rassi, Z. E. (1997) *J. Chromatography* **757**, 263-273.

n-Nonyl–β–D-Thiomaltopyranoside, Anagrade

[n-NonylD-Thiomaltoside]

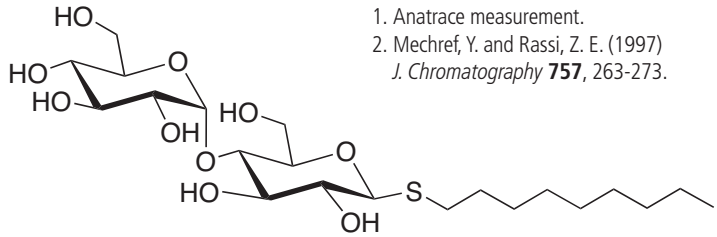
N350 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 484.6 [148565-55-3] $C_{21}H_{40}O_{10}S$
CMC (H_2O): ~ 3.2 mM[1] (0.15%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%

Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.15
260 nm: < 0.2



References:

1. Anatrace measurement.
2. Mechref, Y. and Rassi, Z. E. (1997) *J. Chromatography* **757**, 263-273.

n-Octyl–β–D-Thiomaltopyranoside, Anagrade

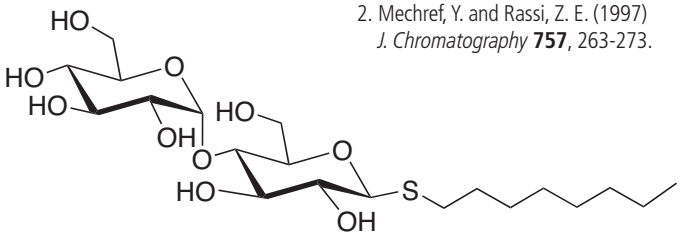
[n-Octyl–β–D-Thiomaltoside]

O320	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 470.6 [148616-91-5] $C_{20}H_{38}O_{10}S$
CMC (H_2O): ~ 8.5 mM[1] (0.40%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent alpha: < 2 (HPLC)
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.15
260 nm: < 0.2



References:
1. Anatrace measurement.
2. Mechref, Y. and Rassi, Z. E. (1997) *J. Chromatography* **757**, 263-273.

n-Undecyl–β–D-Thiomaltopyranoside, Anagrade

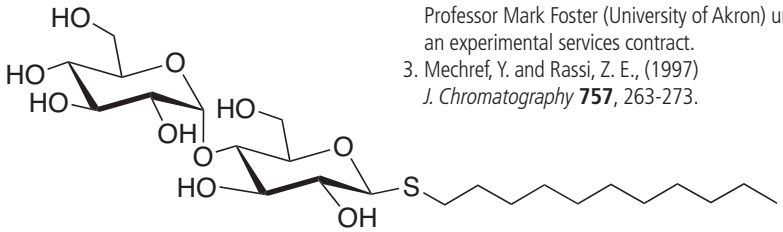
[n-Undecyl–β–D-Thiomaltoside]

U342	1 gm
	5 gm
	25 gm

Chemical Properties:
FW: 512.7 [148565-57-5] $C_{23}H_{44}O_{10}S$
CMC (H_2O): ~ 0.21 mM[1] (0.011%)
Aggregation number (H_2O)[2]: ~ 106

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Percent alpha: < 2 (HPLC)
pH (1% solution): 5-8
Solubility in water at 20°C: ≥ 10%
Conductance (10% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.15
260 nm: < 0.2



References:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Mechref, Y. and Rassi, Z. E., (1997) *J. Chromatography* **757**, 263-273.

Deoxycholic Acid, Sodium Salt, Anagrade

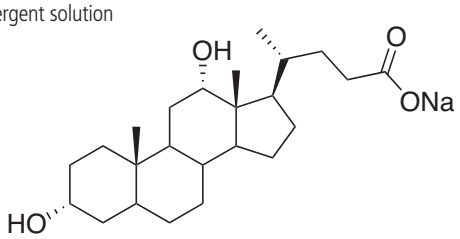
[3α,12α–Dihydroxy-5β-Cholan-24-oic Acid, Monosodium Salt]

D380	5 gm
	25 gm
	100 gm

Chemical Properties:
FW: 414.6 [302-95-4] $C_{24}H_{39}O_4Na$
CMC (H_2O): ~ 6 mM[1] (0.24%)
Aggregation number (H_2O)[2]: ~ 22

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 20˚C: ≥ 5%

Absorbance of a 1% detergent solution
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.2



References:
1. Anatrace measurement.
2. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html .

Sodium Cholate, Anagrade

[3α,7α,12α–Trihydroxy-5β-Cholan-24-Oic Acid, Monosodium Salt]

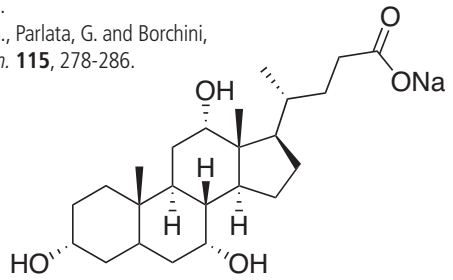
S1010	5 gm
	25 gm
	100 gm

Chemical Properties:
FW: 430.6 [361-09-1] $C_{24}H_{39}O_5Na$
CMC (pH 9.0): ~ 9.5 mM[1] (0.41%)
CMC (pH 7.5): ~ 14 mM[2]
Aggregation number (H_2O)[3]: ~ 2.0-4.8

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 40%

Absorbance of a 1% detergent solution:
400 nm: < 0.02
340 nm: < 0.04
280 nm: < 0.08
260 nm: < 0.1

References:
1. Brito, R. M. M and Vaz, W. L. C. (1986) *Anal. Biochem* **152**, 250-255.
2. Vendittis, E., Paumbo, G., Parlata, G. and Borchini, U. (1981) *Anal. Biochem.* **115**, 278-286.
3. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.
4. Iwaki, M., Giotta, L., Akinsiku, A. O., Schagger, H., Fisher, N., Breton, J., and Rich, P. R. (2003) *Biochem.* **42**, 11109-11119.



Sodium Cholate, Sol-Grade

[3α,7α,12α–Trihydroxy-5β-Cholan-24-Oic Acid, Monosodium Salt]

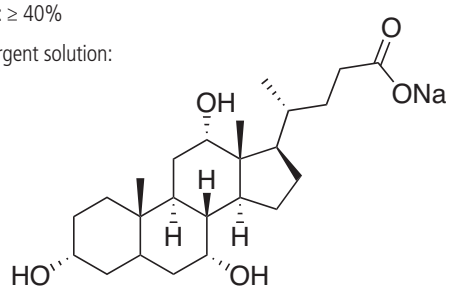
S1010S	10 gm
	25 gm
	100 gm
	500 gm
	1 kg

Chemical Properties:
FW: 430.6 [361-09-1] $C_{24}H_{39}O_5Na$
CMC (pH 9.0): ~ 9.5 mM[1] (0.41%)
CMC (pH 7.5): ~ 14 mM[2] (0.60%)
Aggregation number (H_2O)[3]: ~ 2.0-4.8

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 40%

Absorbance of a 1% detergent solution:
400 nm: < 0.04
340 nm: < 0.08
280 nm: < 0.12
260 nm: < 0.2

References:
See S1010 for references.



Sodium Dodecanoyl Sarcosine, Anagrade

[Sodium Lauroyl Sarcosine / Sarkosyl / N-Methyl-N-(1-Oxododecyl)-Glycine, Sodium Salt]

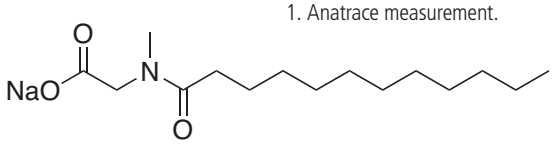
S300	1 gm 5 gm 25 gm

Chemical Properties:
FW: 293.4 [137-16-6] $C_{15}H_{29}NO_3Na$
CMC (H_2O): ~ 14.4 mM[1] (0.42%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Percent lauric acid < 0.1
pH (10% solution): 7-9
Solubility in water at 20˚C: ≥ 10%

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.06
260 nm: < 0.08

Reference:
1. Anatrace measurement.



Sodium Dodecanoyl Sarcosine, Sol-Grade

[Sodium Lauroyl Sarcosine / N-Methyl-N-(1-Oxododecyl)-Glycine, Sodium Salt]

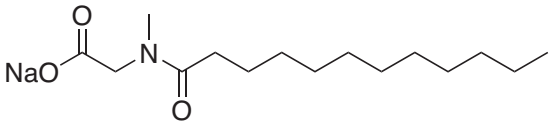
S300S	5 gm 25 gm 100 gm

Chemical Properties:
FW: 293.4 [137-16-6] $C_{15}H_{28}NNaO_3$
CMC (H_2O): ~ 14.4 mM[1] (0.42%)

Product Specifications:
Purity: ≥ 96% pure by HPLC analysis.
Percent lauric acid < 4
pH (10% solution): 7-9
Solubility in water at 20˚C: ≥ 10%

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.15

Reference:
1. Anatrace measurement.



Sodium Taurocholate, Anagrade

[3α, 7α, 12α–Trihydroxy-5β-Cholan-24-Oic Acid N-(2-Sulfoethyl) Amide]

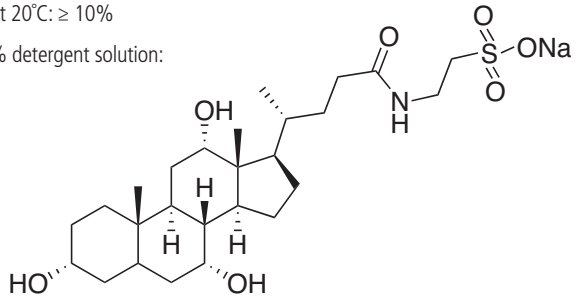
S2033	25 gm 100 gm 500 gm

Chemical Properties:
FW: 537.7 [145-42-6] $C_{26}H_{44}NO_7SNa$
CMC: ~ 3-11 mM[1] (0.16-0.59%)
Aggregation number (H_2O)[1]: ~ 4

Product Specifications:
Purity: ≥ 95% pure by HPLC analysis.
pH (1% solution): 4-8
Solubility in water at 20˚C: ≥ 10%

Absorbance of a 1% detergent solution:
400 nm: < 0.02
340 nm: < 0.04
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.



n-Decyl-N,N-Dimethylamine-N-Oxide, Anagrade

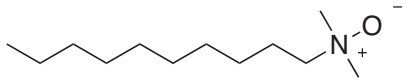
D365 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 201.4 [2605-79-0] $C_{12}H_{27}NO$
CMC (H_2O): ~ 10.48 mM[1] (0.211%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.06
260 nm: < 0.08

Reference:
1. Anatrace measurement.



n-Dodecyl-N,N-Dimethylamine-N-Oxide, Anagrade

[Lauryldimethylamine-N-Oxide / LDAO / DDAO / N,N-Dimethyl-1-Dodecanamine-N-Oxide]

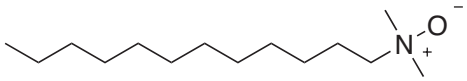
D360 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 229.4 [1643-20-5] $C_{14}H_{31}NO$
CMC (H_2O): ~ 1-2 mM[5] (0.023%)
CMC (0.1 M NaCl): ~ 0.14 mM[5]
Aggregation number (H_2O)[6]: ~ 76
dn/dc (H_2O)[7] 0.1381 ml/gm
Micelle Size[5,8]: 17 kDa, 21.5 kDa

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 6-8.5
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.06
260 nm: < 0.08

References:
1. Michel, H. (1982) *J. Mol. Biol.* **158**, 567-572.
2. Malkin, R. (1975) *Arch. Biochem. Biophys.* **169**, 77-83.
3. Reithmeier, A. F., *et al.* (1993) *Biochem.* **32**, 1172-1179.
4. Dawkins, D. J., *et al.* (1991) in *Crystallization of Membrane Proteins* (Hartmut Michel, Ed.) 125-137, CRC Press, Boca Raton.
5. Herrmann, K. W. (1962) *J. Phys. Chem.* **66**, 292.
6. Herrmann, K. W. (1966) *J. Colloid Interface Sci.* **22**, 352.
7. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
8. Strop, P. and Brunger, A. T. (2005) *Protein Sci.* **14**, 2207-2211.



n-Dodecyl-N,N-Dimethylamine-N-Oxide, Sol-Grade

[Lauryldimethylamine-N-Oxide / LDAO / DDAO / N,N-Dimethyl-1-Dodecanamine-N-Oxide]

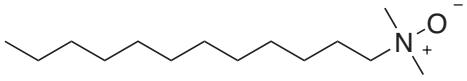
D360S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 229.4 [1643-20-5] $C_{14}H_{31}NO$
CMC (H_2O): ~ 1-2 mM[5] (0.023%)
CMC (0.1 M NaCl): ~ 0.14 mM[5]
Aggregation number (H_2O)[6]: ~ 76
dn/dc (H_2O)[7] 0.1381 ml/gm
Micelle Size[5,8]: 17 kDa, 21.5 kDa

Product Specifications:
Purity: ≥ 95% pure by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 5-9
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.1
260 nm: < 0.2

References:
See D360 for references.



LAPAO, Sol-Grade

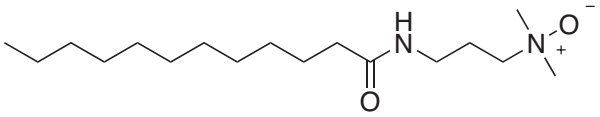
[3-Dodecylamido-N,N'-Dimethylpropyl Amine Oxide / 3-Laurylamido-N,N'-Dimethylpropyl Amine Oxide]

L360S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 300.6 [61792-31-2] $C_{17}H_{36}N_2O_2$
CMC (H_2O): ~ 1.56 mM (0.052%)
Aggregation number (H_2O): ~ 126

Product Specifications:
Purity: ≥ 95% by HPLC analysis.
Color: Pale yellow
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 20%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.2
280 nm: < 0.3
260 nm: < 0.4



References:
1. Dahout-Gonzalez, C., Brandolin, G., Pebay-Peyroula. E. (2003) *Acta. Cryst.* **D59**, 2353-2355.

n-Tetradecyl-N,N-Dimethylamine-N-Oxide, Anagrade

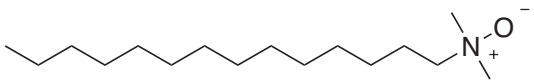
[TDAO / N,N-Dimethyl-1-Tetradecanamine-N-Oxide]

T360 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 257.5 [3332-27-2] $C_{16}H_{35}NO$
CMC (H_2O): ~ 0.29 mM (0.0075%)
CMC (0.1 M NaCl): ~ 0.024 mM

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Chromatographically purified to contain < 600 µM of equivalent peroxide.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 1%
Conductance (1% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.06
260 nm: < 0.08



n-Undecyl-N,N-Dimethylamine-Oxide, Anagrade

[Undecyldimethylamine-N-Oxide / UDAO / N,N-Dimethyl-1-Undecamine-N-Oxide]

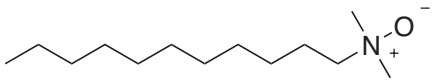
U360 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 215.4 [15178-71-9] $C_{13}H_{29}NO$
CMC (H_2O): ~ 3.21 mM[1] (0.069%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
Purified to contain < 500 µM of equivalent peroxide.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.06
260 nm: < 0.08

Reference:
1. Anatrace measurement.



n-Decyl-N,N-Dimethylglycine, Anagrade

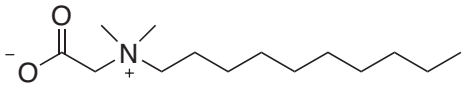
D352 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 243.4 [2644-45-3] $C_{14}H_{29}O_2N$
CMC (H_2O): ~ 19 mM[1] (0.46%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 80 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



n-Dodecyl-N,N-Dimethylglycine, Anagrade

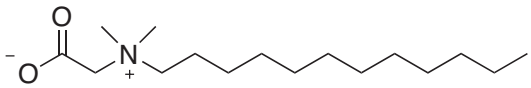
(Major component of the industrial detergent, Empigen BB®)

D350 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 271.4 [683-10-3] $C_{16}H_{33}O_2N$
CMC (H_2O): ~ 1.5 mM[1] (0.041%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 80 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1



n-Dodecyl-N,N-Dimethylglycine, Sol-Grade

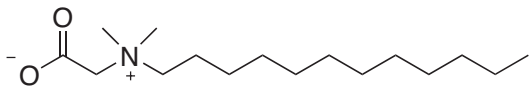
(Major component of the industrial detergent, Empigen BB®)

D350S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 271.4 [683-10-3] $C_{16}H_{33}O_2N$
CMC (H_2O): ~ 1.5 mM[1] (0.041%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.2
280 nm: < 0.4
260 nm: < 0.8



n-Tetradecyl-N,N-Dimethylglycine, Anagrade

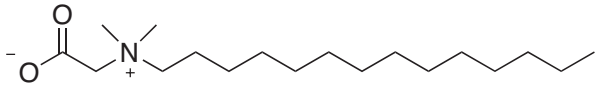
T305 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 299.4 [2601-33-4] $C_{18}H_{37}NO_2$
CMC (H_2O): ~ 0.034 mM[1] (0.0010%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.10

Reference:
1. Anatrace measurement.



Anzergent® 3-8, Analytical Grade

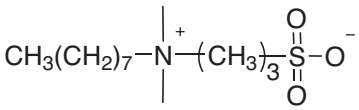
[n-Octyl-N,N-Dimethyl-3-Ammonio-1-Propanesulfonate / N,N-Dimethyl-N-(3-Sulfopropyl)-1-Octaminium Hydroxide, Inner Salt]

AZ308 5 gm, 25 gm, 100 gm

Chemical Properties:
FW: 279.6 [15178-76-4] $C_{13}H_{29}NO_3S$
CMC (H_2O): ~ 390 mM[1] (10.9%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 70 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



Anzergent 3-8 is chemically identical to Zwittergent® 3-8.

References:
1. Navarette, R. and Serrano, R. (1983) *Biochim. Biophys. Acta* **728**, 403-408.

Anzergent 3-10, Analytical Grade

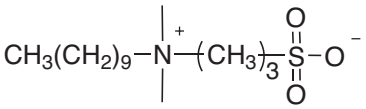
[n-Decyl-N,N-Dimethyl-3-Ammonio-1-Propanesulfonate / N,N-Dimethyl-N-(3-Sulfopropyl)-1-Decanaminium Hydroxide, Inner Salt]

AZ310 5 gm, 25 gm, 100 gm

Chemical Properties:
FW: 307.6 [15163-36-7] $C_{15}H_{33}NO_3S$
CMC (H_2O): ~ 39 mM[1] (1.2%)
Aggregation number (H_2O)[2]: ~ 41

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 70 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



Anzergent 3-10 is chemically identical to Zwittergent 3-10.

References:
1. Navarette, R. and Serrano, R. (1983) *Biochim. Biophys. Acta* **728**, 403-408.
2. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.

Anzergent 3-12, Analytical Grade

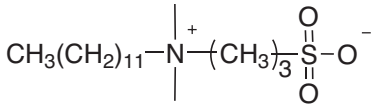
[n-Dodecyl-N,N-Dimethyl-3-Ammonio-1-Propanesulfonate / N,N-Dimethyl-1-N-(3-Sulfopropyl)-1-Dodecanaminium Hydroxide, Inner Salt]

AZ312 5 gm, 25 gm, 100 gm

Chemical Properties:
FW: 335.5 [14933-08-5] $C_{17}H_{37}NO_3S$
CMC (20 mM Tris-HCl, pH 8.0, 0.1 M NaCl): ~ 2.8 mM[1] (0.094%)
Aggregation number (H_2O)[2]:~ 55-87

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 70 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1



Anzergent 3-12 is chemically identical to Zwittergent 3-12.

References:
1. Vulliez-LeNormand, B. and Eisele, J. (1993) *J. Anal. Biochem.* **208**, 241-243.
2. LeMaire, M., Champeil, P., and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.

Anzergent 3-14, Analytical Grade

[n-Tetradecyl-N,N-Dimethyl-3-Ammonio-1-Propanesulfonate / Dimethyl(3-Sulfopropyl) Tetradecyl-Ammonium Hydroxide, Inner Salt]

AZ314 5 gm, 25 gm, 100 gm

Chemical Properties:
FW: 363.6 [14933-09-6] $C_{19}H_{41}NO_3S$
CMC (H_2O): ~ 0.16 mM[1]
CMC (10 mM Phosphate, pH 7.5): ~ 0.2 mM[2] (0.007%)
Aggregation number (H_2O)[3]: ~ 83-130

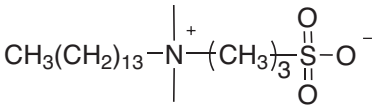
Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 30%
Conductance (10% solution): < 70 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

Anzergent 3-14 is chemically identical to Zwittergent 3-14.

References:

1. Anatrace measurement.
2. Brito, R. M. M. and Vaz, W. L. C. (1986) *Anal. Biochem.* **152**, 250-255.
3. LeMaire, M., Champeil, P., and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.



Anzergent 3-16, Analytical Grade

[n-Hexadecyl-N,N-Dimethyl-3-Ammonio-1-Propanesulfonate]

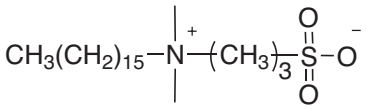
AZ316 5 gm, 25 gm, 100 gm

Chemical Properties:
FW: 391.7 [2281-11-0] $C_{21}H_{45}NO_3S$
CMC (H_2O): 10-60 mM
Aggregation number (H_2O): ~155

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 70 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06
225 nm: < 0.1

Anzergent 3-16 is chemically identical to Zwittergent 3-16.



Anzergent 3-18, Analytical Grade

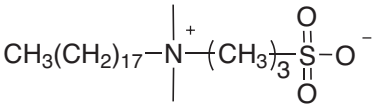
[n-Octadecyl-N,N-Dimethyl-3-Ammonio-1-Propanesulfonate]

AZ318 5 gm, 25 gm, 100 gm

Chemical Properties:
FW: 419.7 [13177-41-8] $C_{23}H_{49}NO_3S$

Product Specifications:
Form: White powder
Assay (from C): ≥ 98%
Identity: By IR
Conductivity (0.05 M, H_2O): < 50 µmhos/cm
Moisture (KF): < 2.0%
Residue on Ignition: < 0.1%

Anzergent 3-18 is chemically identical to Zwittergent 3-18.



Specialty Detergents for Extraction

Product information

Anapoe detergents

If you're as serious about clarity
as we are, this catalog
is essential reading.

Anapoe Detergents

Most polyoxyethylene detergents used in the early studies of membrane proteins were developed for large industrial applications. Today an increasing number of well defined, highly purified detergents, designed specifically for the extraction of membrane proteins in their active state are available. Detergents such as Dodecyl–β–D-Maltopyranoside and Octyl–β–D-Glucopyranoside have replaced many polyoxyethylene detergents. Yet for some proteins, the polyoxyethylene detergents remain very useful—particularly for routine extraction procedures.

Polyoxyethylene detergents are available in a variety of structures and under an often confusing list of trade names, such as Triton®, Tween®, Genapol®, Brij®, Thesit®, Lubrol®, etc. In addition to the confusion caused by trade names, industrial detergents are often a mixture of closely related detergents that may vary from lot to lot. They may also contain additives and contaminants which result in undesirable effects during protein extraction. One such contaminant are peroxides, which can increase in concentration upon aging of the detergent solution[1].

The "aging" of polyoxyethylene detergents results from the tendency of ethers to react with oxygen to form peroxides; light accelerates this process. In samples of polyoxyethylene detergents, hydrogen peroxide and organic peroxides with a variety of structures may be found[2-4]. In fact, the concentration of hydrogen peroxide can be as high as 0.2%[5]. Conversely, peroxides may react with detergent molecules in solution, resulting in the presence of several undesirable derivatives[2].

The presence of peroxides during extraction of membrane proteins can result in inactivation and/or degradation of biological materials[4]. Sulfhydryl groups are readily oxidized by peroxides and such oxidation induces protein aggregation and inactivation[6-8].

Peroxides can also interfere in biochemical assays[2, 9-10]. Peroxides are likely responsible for the high blanks noted by Heath and Tappel when measuring lipid peroxides in detergent-solubilized membrane components[9]. Even protein determinations can be affected, as noted by Stutzenberger for the Coomassie blue dye-binding assay, bicinchoninic acid method, and the Folin phenol method[10].

1. Chang, H. W. and Bock, E. (1980) *Anal. Biochem.* **104**, 112-117.
2. Lever, M. (1977) *Anal. Biochem.* **83**, 274-284.
3. Miki, T. and Orii, Y. (1985) *Anal. Biochem.* **146**, 28-34.
4. Jaeger, J., Sorensen, K. and Wolff, J. (1994) *Biochem. Biophys. Methods* **29**, 77-81.
5. Ashani, Y. and Catravas, G. (1980) *Anal. Biochem.* **109**, 55-62.
6. Chang, H. W. (1974) *Proc. Nat. Acad. Sci. USA* **71**, 2113-2117.
7. O'Brien, R. D. and Gibson, R. E. (1975) *ABB* **169**, 458-463.
8. Chang, H. W. and Neumann, E. (1976) *Proc. Nat. Acad. Sci. USA* **73**, 3364-3368.
9. Heath, R. L. and Tappel, A. L. (1976) *Anal. Biochem.* **76**, 184-191.
10. Stutzenberger, F. J. (1992) *Anal. Biochem.* **207**, 249-254.

To reduce the problems associated with excess peroxides in detergent solutions, we have created the Anapoe detergents. These detergents have been purified to contain less than 20 µM of equivalent peroxide and each detergent is supplied as a 10% aqueous solution packaged under argon gas.

Anapoe-20

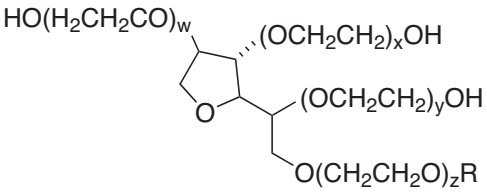
[Tween® 20 / Polyoxyethylene(20)sorbitan Monolaurate / Poly(oxy-1,2-ethanediyl) Derivs., Sorbitan Monododecanoate]

APT020
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 1228.0 [9005-64-5]
CMC (H_2O): ~ 0.059 mM[1] (0.0072%)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

Reference:
1. Helenius, A., McCauslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 743-749.



Sum of w+x+y+z=20
R=$C_{11}H_{23}C(O)$

Anapoe-35

[Brij®-35 / $C_{12}E_{23}$ / α–Dodecyl–ω–Hydroxy-Poly (oxy-1,2-Ethanediyl / Polyethylene Glycol (23) Monododecyl Ether]

APB035
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 1198.0 [9002-92-0]
$(C_2H_4O)_nC_{12}H_{26}O$, n ~ 23
CMC (H_2O): ~ 0.091 mM[1] (0.011%)
Aggregation number (H_2O)[2]: ~ 40

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

References:
1. Helenius, A., McCauslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 743-749.
2. le Maire, M., Champeil, P. and Moller, J. V. (2000) *Biochim. Biophys. Acta* **1508**, 86-111.

$CH_3(CH_2)_{11}O(CH_2CH_2O)_{23}H$

Anapoe-58

[Brij®-58 / $C_{16}E_{20}$ / α–Hexadecyl–ω–Hydroxy-Poly(oxy-1,2-Ethanediyl / Polyethylene Glycol (20) Monohexadecyl Ether]

APB058
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 1122.0 [9004-95-9]
$(C_2H_4O)_nC_{16}H_{34}O$, n ~ 20
CMC (H_2O): ~ 0.004 mM[1] (0.00045%)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

Reference:
1. For $C_{16}E_{21}$ listed in Helenius, A., McCauslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 743-749.

$CH_3(CH_2)_{15}O(CH_2CH_2O)_{20}H$

Anapoe-80

[Tween® 80 / Polyoxyethylene(80)sorbitan Monolaurate / Poly(oxy-1,2-ethanediyl) Derivs., (Z)-Sorbitan Mono-9-octadecanoate]

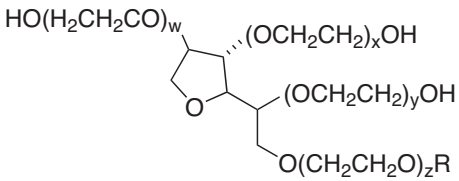
APT080
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 1310.0 [9005-65-6]
CMC (H_2O): ~ 0.012 mM[1] (0.0016%)
Aggregation number (H_2O)[2]: ~ 58

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

References:

1. Helenius, A., McCauslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 743-749.
2. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.



Sum of w+x+y+z=20
R=$C_{17}H_{33}C(O)$

Anapoe-$C_{10}E_6$

[Polyoxyethylene(6)decyl Ether / 3,6,9,12,15,18-Hexaoxaoctacosan-1-ol]

APO106
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 423.0 [5168-89-8]
$(C_2H_4O)nC_{10}H_{22}O$, n ~ 6
CMC (H_2O): ~ 0.9 mM[1] (0.038%)
Aggregation number (H_2O)[2]: ~ 40

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

References:

1. Helenius, A., McCauslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 743-749.
2. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.

$CH_3(CH_2)_9O(CH_2CH_2O)_6H$

Anapoe-$C_{10}E_9$

[Polyoxyethylene(9)decyl Ether / α–Decyl–ω–Hydroxy-Poly(oxy-1,2-Ethanediyl]

APO109
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 555.0 [26183-52-81]
$(C_2H_4O)_nC_{10}H_{22}O$, n ~ 9
CMC (H_2O): ~ 1.3 mM[1] (0.072%)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

Reference:

1. Borchardt, J. K. (1996) *Lab Products Notebook 7, No. **10***, 20.

$CH_3(CH_2)_9O(CH_2CH_2O)_9H$

Anapoe-$C_{12}E_8$

[Polyoxyethylene(8)dodecyl Ether / 3,6,9,12,15, 18,21,24-Octaoxahexatriacontan-1-ol]

APO128
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide
Supplied in a 10% (w/v) solution under argon gas.

References:

1. LeMaire, M., Kwee, S., Andersen, J. P., and Miller, J. V. (1983) *Eur. J. Biochem.*, **129**, 525-532.
2. LeMaire, M., Champeil, P., and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.
3. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.

Chemical Properties:
FW avg.: 539.0 [3055-98-9]
$(C_2H_4O)_nC_{12}H_{26}O$, n ~ 8
CMC (0.01 M TES, pH 7.5, 0.05 M NaCl, 0.1 mM $CaCl_2$): ~ 0.09 mM[1,2] (0.0048%)
Aggregation number (H_2O)[3]: ~ 123

$$CH_3(CH_2)_{11}O(CH_2CH_2O)_8H$$

Anapoe-$C_{12}E_9$

[Polyoxyethylene(9)dodecyl Ether / Thesit / Polydocanol /α–Dodecyl–ω–Hydroxy-Poly (Oxy-1,2-Ethanediyl]

APO129
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% solution under argon gas.

References:

1. Mast, R. C., and Haynes, L. V. (1975) *J. Colloid Inerface Sci.* **53**, 35.
2. Strop, P., and Brunger, A. T. (2005) *Protein Sci.* **14**, 2207-2211.
3. Rigler, P., Ulrich, W-P., Hovius, R., Ilegens, E., Pick, H., and Voegl, H. (2003) *Biochemistry* **42**, 14017-14022.

Chemical Properties:
FW avg.: 583.0 [3055-99-0]
$(C_2H_4O)nC_{12}H_{26}O$ n ~ 9
CMC (H_2O): ~ 0.05 mM[1] (0.003%)
dn/dc (H_2O)[2] 0.109 ml/gm
Micelle Size[2]: 83 kDa

$$CH_3(CH_2)_{11}O(CH_2CH_2O)_9H$$

Anapoe-$C_{12}E_{10}$

[Polyoxyethylene(10)dodecyl Ether / 3,6,9,12, 15,18,24,27,30-Decaoxadotetracontan-1-ol]

AP1210
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

Reference:

1. Mukerjee, P. and Mysels, K. J. (1971) *NSRDS-NBS* **36,** 222.

Chemical Properties:
FW avg.: 627.0 [6540-99-4]
$(C_2H_4O)_nC_{12}H_{26}O$, n ~ 10
CMC (H_2O): ~ 0.2 mM[1] (0.013%)

$$CH_3(CH_2)_{11}O(CH_2CH_2O)_{10}H$$

Anapoe-$C_{13}E_8$

[Polyoxyethylene(8)tridecyl Ether]

APO138
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 553.0 [9043-30-5]
$(C_2H_4O)_nC_{13}H_{28}O$, n ~ 8
CMC (H_2O): ~ 0.1 mM[1] (0.0055%)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

Reference:
1. Borchardt, J. K. (1996) *Lab Products Notebook 7, No. **10***, 20.

$$CH_3(CH_2)_{12}O(CH_2CH_2O)_8H$$

Anapoe-NID-P40

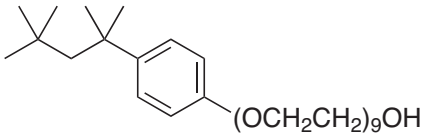
(Igepal CA-630 / [Octylphenoxy] Polyethoxyethanol) Nonidet P40 Substitute. Chemically indistinguishable from Nonidet P40, which is no longer commercially available.

APND40
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 603.0 [2497-59-8]
CMC (50 mM Na^+): ~ 0.05-0.3 mM[1]
Aggregation number (H_2O)[1]: ~ 100-155

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

Reference:
1. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.



Anapoe-X-100

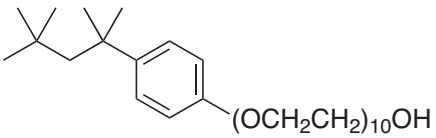
[Triton® X-100 / α–[4-(1,1,3,3-Tetramethyl-butyl)phenyl]–ω–Hydroxy-Poly(Oxy-1,2-Ethanediyl)]

APX100
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 647.0 [9002-93-1]
t-Oct-C_6H_4-$(OCH_2CH_2)_x$OH, x = 9-10
CMC (H_2O): ~ 0.23 mM[1-4] (0.015%) (w/v)
Aggregation number (H_2O)[5]: ~ 75-165

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.

References:
1. Vendittis, E., Paumbo, G., Parlata, G. and Borchini, U. (1981) *Anal. Biochem.* **115**, 278-286.
2. Ross, S. and Oliver, J. P. (1959) *J. Phys. Chem.* **63**, 1671-1674.
3. Mankovich, A. M. (1964) *J. Amer. Oil Chem. Soc.* **41**, 449-452.
4. Rosenthal, K. S. and Koussale, F. (1983) *Anal. Chem.* **55**, 1115-1117.
5. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.



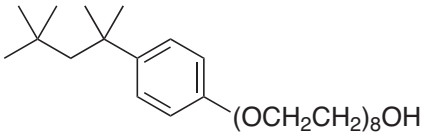
Anapoe-X-114

[Triton® X-114 / α–[(1,1,3,3-Tetramethylbutyl) Phenyl]–ω–Hydroxy-Poly(Oxy-1,2-Ethanediyl)]

APX114
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 536.0 [9036-19-5]
t-Oct-C_6H_4-$(OCH_2CH_2)_n$OH, n ~ 7-8
CMC (H_2O): ~ 0.2 mM[1] (0.011%) (w/v)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.



Reference:
1. Rosenthal, K. S. and Koussale, F. (1983) *Anal. Chem.* **55**, 1115-1117.

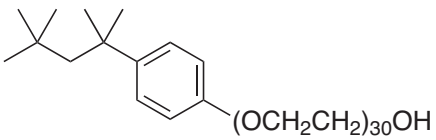
Anapoe-X-305

[Triton® X-305 / α–[4-(1,1,3,3-Tetramethyl-Butyl)Phenyl]-ω–Hydroxy-Poly(Oxy-1,2-Ethanediyl)]

APX305
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 1526.0 [9002-93-1]
t-Oct-C_6H_4-$(OCH_2CH_2)_n$OH, n ~ 30
CMC (H_2O): ~ 0.65 mM[1]

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.



Reference:
1. Egan, R. W., Jones, M. A., and Lehninger, A. L. (1976) *J Biol Chem* **251**, 4442-4447.

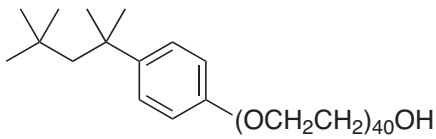
Anapoe-X-405

[Triton® X-405 / α–[4-(1,1,3,3-Tetramethyl-Butyl)Phenyl]–ω–Hydroxy-Poly(Oxy-1,2-Ethanediyl)]

APX405
50 ml (50 ampules/1 ml each)
50 ml (5 ampules/10 ml each)
100 ml (10 ampules/10 ml each)
500 ml (screw cap bottle)

Chemical Properties:
FW avg.: 1967.0 [9002-93-1]
t-Oct-C_6H_4-$(OCH_2CH_2)_n$OH, n ~ 40
CMC (H_2O): ~ 0.81 mM[1] (0.16%)

Product Specifications:
Low-Oxidant
Purified industrial detergent.
Contains: < 20 µM of equivalent peroxide.
Supplied in a 10% (w/v) solution under argon gas.



Reference:
1. McPherson, A. (1999) *Crystallization of Biological Macromolecules*, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

Specialty Detergents for Refolding

Product information

- Amphipol A8-35 amphipathic polymer for membrane protein studies
- Sherpas – Polymeric solubilization aids

Refolding

Can you get great results without clarity? Why risk it?

Amphipol A8-35: Amphipathic Polymer for Membrane Protein Studies

Amphipols are a new class of polymers that serve as stabilizers of membrane proteins in aqueous solutions. Amphipol detergents can be used to extract membrane proteins, keeping them soluble in detergent-free aqueous solutions while stabilizing them biochemically[1-3]. Amphipol A8-35 is the most thoroughly characterized amphipol and is becoming widely used for membrane protein research. It consists of a strong hydrophilic polyacrylate chain onto which octylamine and isopropylamine have been randomly grafted[1, 4, 5] (Figure 1 A). Amphipol A8-35 is highly water soluble (> 200 gm/lt depending on pH and ionic strength of the solutions)[4, 5]. The high solubility is due to the anionic charges (~25 per molecule) carried by the carboxylate groups[4]. The average molecular mass of individual A8-35 molecules is 9-10 kDa[1, 4, 5]. In aqueous solutions (pH > 7.0), Amphipol A8-35 self-assembles into globular particles, each comprising ~4 molecules, with an average mass of ~40 kDa and a Stokes radius of ~3.15 nm[5] (Figure 1B). The critical aggregation concentration is so low as to be negligible under most circumstances[3].

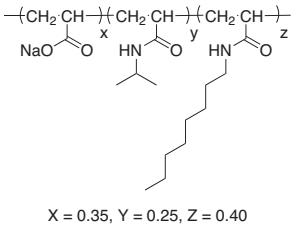


Figure 1A

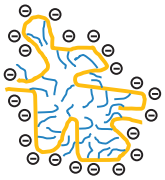


Figure 1B

Due to its amphipathic character, Amphipol A8-35 is able to "trap" solubilized membrane proteins by adsorbing onto their hydrophobic transmembrane surface, stabilizing their native structure and preserving their functionality[2, 3].

Applications

Although its detergency is too weak to effectively extract and solubilize most membrane proteins [for some exceptions, see ref. 2], Amphipol A8-35 has been very successfully used to replace the detergent after the solubilization step and handle the extracted proteins in their native state in detergent-free solutions [for an example of trapping procedure, see ref. (8) (Figure 3)]. To date, amphipols have been used to trap ~30 different types of membrane proteins, ranging in molecular weight from 5 kDa to > 1MDa[2, 3]. Small proteins may bind ~50 kDa of Amphipols[10], the mass of Amphipol bound increasing slowly with the size of the transmembrane region[2]. The protein/Amphipol complexes thus formed are slightly larger than those formed with classical detergents[6, 8, 10, 13]. Although there can be exceptions[3, 6, 14] in most cases, trapping by Amphipol A8-35 affects neither the binding of ligands or substrates nor the functionality of membrane proteins[3, 7, 10, 12, 15]. A list of applications is given in Table 1.

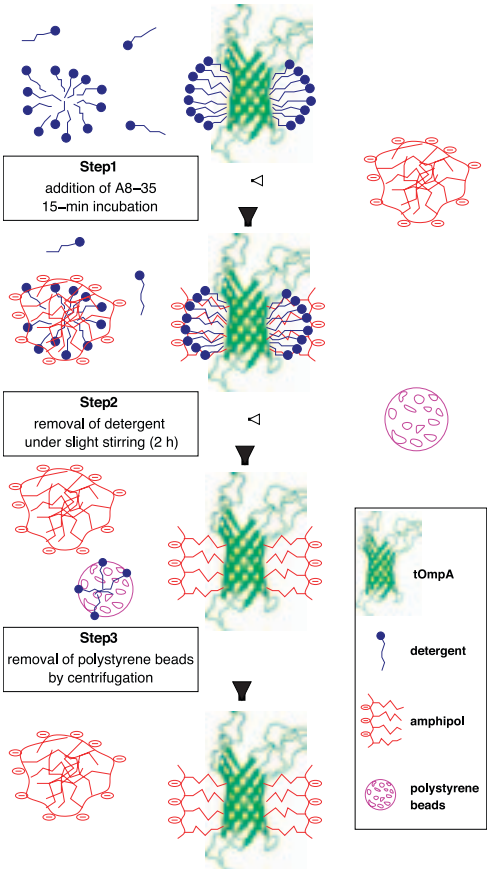


Figure 3. An example of trapping procedure. Figure reproduced from "NMR study of a membrane protein in detergent-free aqueous solution." (2005) *Proc. Natl. Acad. Sci. USA*,**102**, 8893-8898, Zoonens, M., Catoire, L. J., Giusti, F. and Popot, J.-L. Copyright (2005) National Academy of Sciences, U.S.A.

Table 1. Applications of Amphipol A8-35 to membrane protein studies.

Application	Benefits	Example of studies	References
Stabilization	Reducing inactivation by the detergent and preserving membrane protein native structure.	cytochrome b_6f complex bacteriorhodopsin Ca^{2+}-ATPase GPCRs	(1-3, 6, 10, 12, 14)
Functional studies	Reducing inactivation by the detergent and preserving membrane protein native structure and function. Avoiding perturbations of the latter by detergents. In the vast majority of cases, trapping by Amphipol A8-35 has no effect on ligand/substrate binding.	Ca^{2+}-ATPase bacteriorhodopsin nicotinic acetylcholine receptor GPCRs	(3, 6, 7, 10, 12, 14, 15)
Folding/Refolding	Amphipol A8-35 is a mild surfactant which provides a favorable environment for proteins to fold or refold from denatured state.	GPCRs OmpA and FomA bacteriorhodopsin	(12, 16)
NMR	Maintaining the solubilized membrane protein soluble without detergent, thus stabilizing the native structure. Note, however, that membrane protein/Amphipol A8-35 complexes cannot be handled at acidic pH. Addition of EDTA improves the spectra.	OmpX transmembrane β-barrel of OmpA	(8, 11, 17)
Electron microscopy	Stabilizing native structure. Mitochondrial Complex I/Amphipol A8-35 particles were observed to spread better than Complex I/ detergent ones in cryo-EM single-particle experiments.	mitochondrial Complex I bacteriorhodopsin	(9, 10)
Immobilization of membrane proteins onto solid supports	Appropriate functionalization of Amphipol A8-35 turns it into a sort of double-faced tape that can be used to anchor amphipol-trapped membrane proteins onto solid surfaces such as chips or beads for ligand binding studies.	nicotinic acetylcholine receptor bacteriorhodopsin cytochrome b_6f complex cytochrome bc_1 complex detection of antibodies or toxin binding by SPR or fluorescence measurements	(15)

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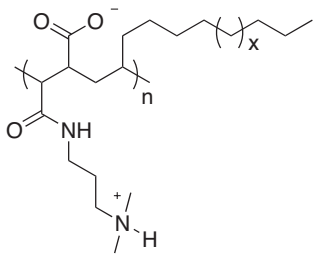
Sherpas® – Polymeric Solubilization Aids

Sherpas polymeric solubilization aids (PMALs) are polymeric reagents that are used to maintain the solubility and stability of intergral membrane proteins in aqueous solution[13]. These polymers wrap themselves around the hydrophobic transmembrane domains of membrane proteins so that the hydrophobic side chains of the polymer stabilize the hydrophobic surface of the protein, while the polar side chains of the polymer confer aqueous solubility to the protein-polymer complex[1-4,9-12].

PMAL-C12 has been used to deliver complex integral membrane proteins into a model membrane[5,6]. Applications can be imagined where it would be desirable to add a purified membrane protein to lipid vesicles or biological membranes under conditions where the protein could spontaneously insert and adopt its functionally active state without lysing the target bilayer. Moreover, these polymers appear to have some of the functions of the naturally occurring molecules called chaperones[7,8]. However, since they are synthetic polymers and not naturally occuring, the mechanism of transport may be different than biological chaperones.



x = 1, PMAL-C8
x = 5, PMAL-C12
x = 9, PMAL-C16

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13. Developed through support of NIH SBIR 1R43GM060071-01, 2R44GM060071-02, 5R44GM060071-3.

Amphipol A8-35

Amphipathic surfactant for maintaining solubilized membrane proteins in detergent-free solutions

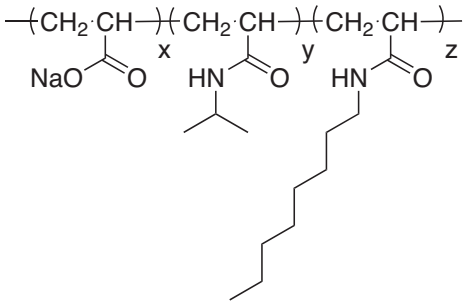
A835	50 mg 100 mg 500 mg

Chemical Properties:
FW: 9-10 kDa $(C_{6.2}H_{10.3}O_{1.35}N_{0.65}N_{0.35})_{\sim 70}$

Product Specifications:
Form: White solid
Solubility: Up to 20% in water

Amphipols are a new class of surfactants that serve as stabilizers of membrane proteins in aqueous solutions. Amphipols can substitute out the detergents used to extract membrane proteins, keeping them soluble in detergent-free aqueous solution while stabilizing them biochemically.

Applications:
- Stabilization of native membrane protein structure
- *in vitro* functional studies
- Facilitating membrane protein folding /refolding
- NMR
- Electron microscopy
- Immobilization of membrane proteins onto solid surface



X = 0.35, Y = 0.25, Z = 0.40

PMAL®-C8

[Poly (Maleic Anhydride-alt-1-Decene) substituted with 3-(Dimethylamino) Propylamine]

P5008	1 gm 5 gm

Chemical Properties:
FW: ~ 18,500.0
[869856-84-8] $(C_{19}H_{36}O_3N_2)_n$

Product Specifications:
Solubility in water at 20˚C: ≥ 10%

Absorbance of a 0.1% detergent solution:
340 nm: < 0.1
280 nm: < 0.3
260 nm: < 0.5

IR spectrum conforms to specifications.
No maleic anhydride present by thermographic analysis

References:

1. Nagy, J. K., Hoffmann, A. K., Keyes, M. H., Gray, D. N., Oxenoid, K. and Sanders, C. R. (2001) *FEBS Letters* **501**, 115-120.
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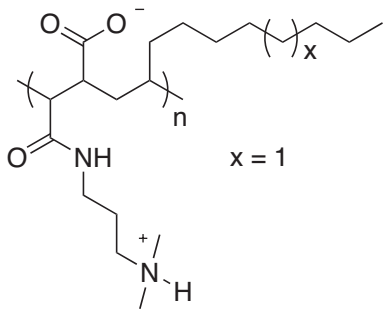


PMAL-C12

[Poly (Maleic Anhydride-alt-1-Tetradecene) substituted with 3-(Dimethylamino) Propylamine]

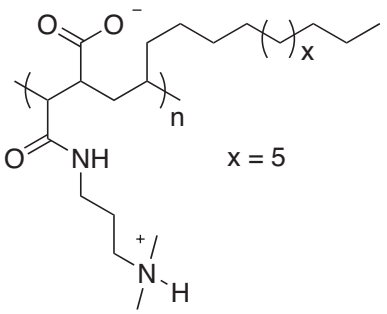
P5012	1 gm 5 gm

Chemical Properties:
FW: ~ 12,000.0
[869857-14-7] $(C_{22}H_{44}O_3N_2)_n$

Product Specifications:
Solubility in water at 20˚C: ≥ 5%

Absorbance of a 0.1% detergent solution:
340 nm: < 0.1
280 nm: < 0.3
260 nm: < 0.5
IR spectrum conforms to specifications.
No maleic anhydride present by thermographic analysis

References:
See P5008 for references.



PMAL-C16

[Poly (Maleic Anhydride-alt-1-Octadecene) substituted with 3-(Dimethylamino) Propylamine]

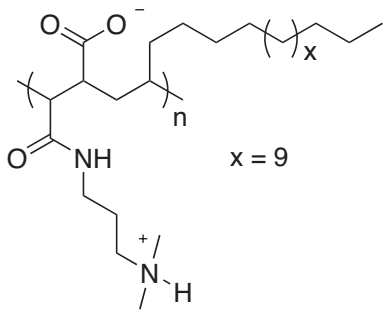
P5016	1 gm 5 gm

Chemical Properties:
FW: ~ 39,000–65,000
[869857-16-9] $(C_{22}H_{52}O_3N_2)_n$

Product Specifications:
Solubility in water at 20˚C: ≥ 5%

Absorbance of a 0.1% detergent solution:
340 nm: < 0.1
280 nm: < 0.3
260 nm: < 0.5
IR spectrum conforms to specifications.
No maleic anhydride present by thermographic analysis

References:
See P5008 for references.



Specialty Detergents for Solubility and Stabilization

Product Information

- Synthetic lysophospholipids: LysoFos glycerol and LysoFos choline ether
- Lipid-like detergents
- Bicelles
- β-Chobimalt™

Lysolipids
Lipids
Lipid-like
Cholesterols

To achieve clarity,
protein stability is key.

Synthetic Lysophospholipids: LysoFos Glycerol and LysoFos Choline Ether

The lysophospholipids (LPs) are a family of simple phospholipids that have been considered as components in the biosynthesis of cell membranes and play critical roles in cell development and disease occurring[1]. They share a basic set of structural similarity, particular a phosphate headgroup and a single hydrophobic chain[2].

Lysophospholipids have also been shown to be components of oxidized low density lipoproteins (LDL) in atherosclerotic lesions, where they play a role in several cell signaling pathways, and enhance radiation-induced apoptosis of malignant cells[3]. *In vivo*, Lysophosphatidylcholine (LPC) modulates inflammatory responses[4]. LPC is synthesized by the enzymatic hydrolysis of phosphatidylcholine by phospholipase A_2[5]. This highly specific lipase cleaves the acyl chain at the sn-2 position leaving a single acyl chain in the sn-1 position.

Synthetic lysophospholipids have a variety of uses in membrane protein science including membrane protein purification, folding, and structural studies[6]. LPC, in particular, has been used to purify functional recombinant human P-glycoprotein[7] and the cystic fibrosis transmembrane conductance regulator (CFTR)[8] as well as the G-protein coupled vasopressin V1 receptor[9].

In addition to offering a line of lysophosphatidylcholines, the LysoFos Cholines, Affymetrix offers a novel family of synthetic lysophospholipid analogs, LysoFos Glycerol and LysoFos Choline Ether. These lysophospholipid analogs are designed to improve LP solubility and stability in aqueous solution so that the molecules could have an extended period to exercise their functions during experiments.

LysoFos Glycerol and LysoFos Choline Ether are produced according to our rigorous standards of purity; all products are ≥99% pure by HPLC and have low absorbance and conductance specifications. We offer five different acyl chain lengths (C10, C12, C14, C16, and C18) to meet your needs with a suitable range of physical properties.

References:

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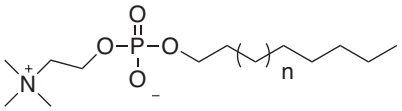
Detergent Exchange Strategy for Increased Solubility & Stability

One of the biggest challenges scientists face in membrane protein work is keeping the protein soluble and stabilized in aqueous solution, especially since undesirable hydrophobic interactions between non-polar amino acids during cell lysis are a major cause of protein denaturation and precipitation. While experience has shown that a detergent based extraction approach often helps prevent denaturation and precipitation, the ideal detergent for extraction is not necessarily the best choice for maintaining a soluble or functionally stable protein. Sometimes two different detergents are needed and by simply exchanging one detergent optimized for extraction with one designed to promote solubility and stability, you can overcome this problem. For example our unique lipid-like detergents such as Fos-Cholines are useful in this detergent exchange approach following extraction with our Anapoe range or other polyethylene glycols. In addition we offer a Bicelle kit to easily reconstitute the protein in a state similar to a natural lipid bilayer.

Lipid-like Detergents

Anatrace phospholipid analogs are competitively priced lipid-alternatives for all your membrane protein applications. From the Fos-Choline line to the Fos-Mea and Cyclofos detergents, you will be able to find the right detergent for your application[1-6].

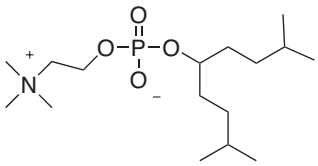
Fos-Choline Detergents
The detergents in this series have a phosphocholine headgroup, but unlike phospholipids they possess simple hydrophobic tails.

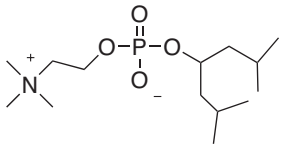


n = 1, Fos-Choline-8
n = 2, Fos-Choline-9
n = 3, Fos-Choline-10
n = 4, Fos-Choline-11
n = 5, Fos-Choline-12
n = 6, Fos-Choline-13
n = 7, Fos-Choline-14
n = 8, Fos-Choline-15
n = 9, Fos-Choline-16

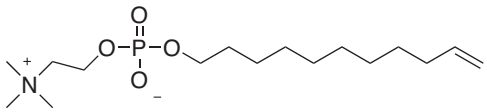
The lack of a complex glycerol ester chain and chiral centers allow these detergents to be prepared and offered at moderate prices. Fos-Choline-12 (n-Dodecylphosphocholine) micelles have proven to be extremely useful as a medium in which to conduct NMR studies of membrane proteins[1-4] and have also been shown to play a crucial role in refolding a misfolded membrane protein[5].

Fos-Choline-Iso-9, Fos-Choline-Iso-11
Fos-Choline-Iso-9 and Fos-Choline-Iso-11 possess split hydrophobic tails packing more hydrophobicity into a shorter effective chain length. These detergents may be useful for the stabilization of proteins during crystallization.

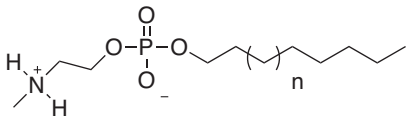




Fos-Choline-Unsat-11-10
Fos-Choline-Unsat-11-10 contains an eleven carbon alkyl tail with a double bond at the end of the chain:



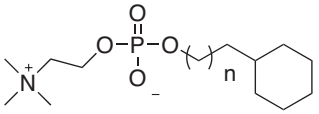
Fos-Mea Detergents
The Fos-Mea detergents have a secondary amine head group in lieu of the quaternary amine found in the Fos-Choline detergents:



n = 1, Fos-Mea-8
n = 3, Fos-Mea-10
n = 5, Fos-Mea-12

These detergents have a lower solubility than the Fos-Choline detergents.

Cyclofos Detergents
Cyclofos detergents combine the phosphocholine head group with an aliphatic tail containing a cyclohexyl group as present in the CYMAL series of detergents.



n = 1, Cyclofos-2
n = 2, Cyclofos-3
n = 3, Cyclofos-4
n = 4, Cyclofos-5
n = 5, Cyclofos-6
n = 6, Cyclofos-7

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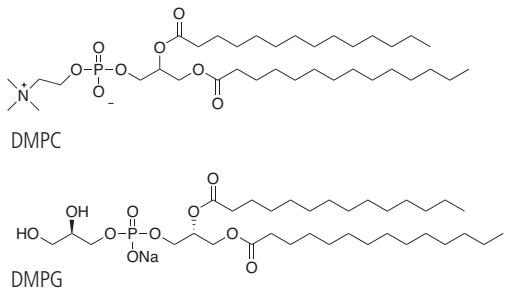
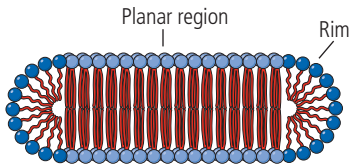
6. Developed through support of NIH SBIR 1R43DK49911-01, 2R44DK049911-02, and 5R44DK049911-03.

Bicelles

Bicelles are disk-shaped aggregates composed of long-chain phospholipids that make up a planar region and either detergent or short-chain phospholipids that compose flanking rims. The size of bicelles is regulated by adjusting the lipid/detergent ratio and the surface charge can be manipulated by replacing neutral long-chain lipids with phospholipids that have similar diacyl chain lengths but negatively charged headgroups.





Schema of bicelle scructure

Benefits of using bicelles

Bicelles are the next generation of biological membrane models that allow a closer look at the structure, dynamics and topology of membrane proteins. Bicelles have an advantage over micelles in their ability to mimic natural membranes and, therefore, capture membrane proteins in their biologically relevant orientation as demonstrated in structural studies of the transmembrane segment of Integrin β3[1] and functional studies of DAGK[2]. Since the introduction of bicelles for NMR studies of membrane-associated biomolecules[3], a wide variety of uses in membrane protein science including solution and solid-state NMR and crystallization studies have emerged.

The ability of bicelles to spontaneously align in a magnetic field has enabled their use in solid-state NMR studies to characterize GPCRs, the trans-membrane domain of Vpu from HIV-1, and cytochrome b(5) to name a few[4]. Bicelles can be made small to attain tumbling times suitable for solution NMR which has been used to investigate human dynorphin A' and B's positions and interaction features in the membrane[5]. More recently, bicelles were used to solve the solution NMR structure of the Bnip3 transmembrane domain dimer revealing that bicelles could facilitate analysis of proteins with more than a single transmembrane helices[6]. Bicelle crystallization was first demonstrated with bacteriorhodopsin from *H. salinarum*[7] and has since been used in studies with xanorhodopsin[8], the voltage gated anion channel and the β_2-adrenergic G-protein-coupled receptor[9].

Anatrace bicelle products

Affymetrix offers lipids and detergents that are highly purified to >99% and can be mixed to form bicelles for membrane protein applications. The zwitterionic long-chain phospholipid DMPC and negatively charged long-chain phospholipid DMPG are offered in addition to CHAPS and CHAPSO to support virtually any bicelle application. Both DMPC/CHAPS and DMPC/CHAPSO bicelles have been used directly in crystallization studies and the lipid/detergent bicelles have been shown to impart better stability and density definition in comparison to bicelles rimmed with short-chain phospholipids[8,10].

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β-Chobimalt

β-Chobimalt is a novel, water-soluble cholesterol derivative produced and offered exclusively by Affymetrix. Specifically, β-Chobimalt is comprised of two maltosyl units via α 1→6 β linkage in conjunction with a β linkage directly to cholesterol. The resulting cholesterol analog has significant water solubility and can be classified as a non-ionic detergent.

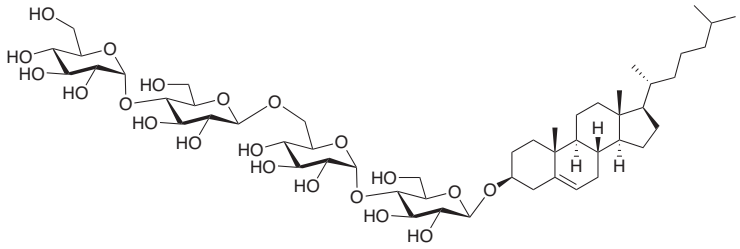


Figure 1. Chemical structure of β-Chobimalt

Cholesterol α-D-Glucopryanosyl-(1→4)-β-D-Glucopyranosyl-(1→6)-α-D-Glucopyranosyl-(1→4)-β -D-glucyopryanoside

Benefits of using β-Chobimalt

Cholesterol is a key component of eukaryotic cell membranes and plays a critical role in membrane organization, fluidity and function[1,2]. In cholesterol-rich lipid raft (also called detergent-resistant membranes, DRM), numerous membrane proteins and important membrane activities, including those involved in signal transduction, are found[3].

In addition to the effect of cholesterol on membrane structure and function, the interaction of membrane proteins with cholesterol have been reported[4]. Many membrane proteins, such as G-protein coupled receptors (GPCRs)[3], cholesterol binding proteins (NPC1 and NPC2)[5] and amyloid precursor protein (APP)[4] require cholesterol binding to have their proper biological function.

Recently, the structural studies by NMR on APP indicate a new binding pocket of cholesterol in transmembrane c-terminal domain when β-Chobimalt was added in protein-detergent micelles[4]. Further studies revealed that APP may serve as a cholesterol sensor that is linked to mechanisms for suppressing cellular cholesterol uptake[4].

Although cholesterol analogs, *e.g.* cholesterol sulfate and hemisuccinate, were made commercially available in effort to increase the effective solubility, laboratory tests indicate that these analogs are very difficult to dissolve alone in aqueous solution or even in a solution containing detergent micelles[4]. By contrast, β-Chobimalt is readily water-soluble, due to the innovative chemical design.

Our laboratory tests show that the aqueous solubility of β-Chobimalt is as much as 10%, superior to all current commercial cholesterol analogs.

β-Chobimalt is a water-soluble cholesterol derivative that mimics native cholesterol function in cell membrane systems[6]. This specificity will enable researchers to better understand the role of cholesterol in cell membranes and other membrane proteins.

References

1. Simons, K. *et al.* (2000) *Science* **290**,1721-6.
2. Mouritsen, O. G. *et. al.* (2004) *Lipids* **39**,1101-13.
3. Thomas, J. *et. al.* (2006) *Progress in Lipid Research* **45**, 295-333.
4. Beel, A. J. *et. al.* (2008) *Biochemistry* **47**, 9428-9446.
5. Liu, J. P. *et. al.* (2009) *Molecular and Cellular Endocrinology* **303**, 1-6.
6. Howell, S., Mittal, R., Huang, L., Travis, B., Breyer, R. M. and Sanders, C. R. (2010) *Biochemistry* **49**, 9572-9583.

LysoFos® Choline 10, Anagrade

[1-Decanoyl-2-Hydroxy-sn-Glycero-3-Phosphocholine / 1-Capryl-2-Hydroxy-sn-Glycero-3-Phosphocholine / 10:0 LysoPC]

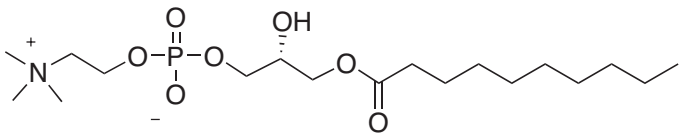
L210 0.5 gm, 1 gm

Chemical Properties:
FW: 411.5 [22248-63-1] $C_{18}H_{38}NO_7P$
CMC (H_2O): ~ 4.7 mM[1]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: > 10%
Conductance (10% solution): < 200 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.1
260 nm: < 0.12

Reference:
1. Stafford, R. E., Fanni, T., and Dennis, E. A. (1989) *Biochemistry* **28**, 5113-5120.



LysoFos Choline 12, Anagrade

[1-Lauroyl-2-Hydroxy-sn-Glycero-3-Phosphocholine / 1- Dodecanoyl-2-Hydroxy-sn-Glycero-3-Phosphocholine / 12:0 LysoPC]

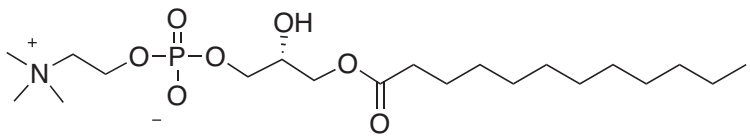
L212 0.5 gm, 1 gm

Chemical Properties:
FW: 439.5 [20559-18-6] $C_{20}H_{42}NO_7P$
CMC (H_2O): ~ 0.32 mM[1]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: > 10%
Conductance (10% solution): < 200 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.1
260 nm: < 0.12

Reference:
1. Stafford, R. E., Fanni, T., and Dennis, E. A. (1989) *Biochemistry* **28**, 5113-5120.



Lysofos Choline 14, Anagrade

[1-Myristoyl-2-Hydroxy-sn-Glycero-3-Phosphocholine / LMPC / 14:0 LysoPC]

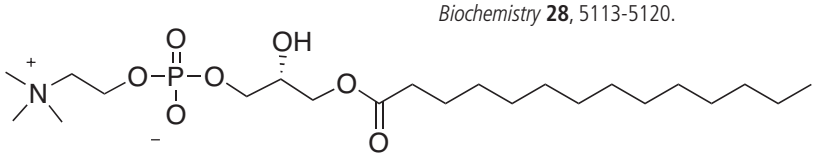
L214 0.5 gm, 1 gm

Chemical Properties:
FW: 467.6 [20559-16-4] $C_{22}H_{46}NO_7P$
CMC (H_2O): ~ 0.036 mM[1]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: > 10%
Conductance (10% solution): < 200 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.1
260 nm: < 0.12

Reference:
1. Stafford, R. E., Fanni, T., and Dennis, E. A. (1989) *Biochemistry* **28**, 5113-5120.



Lysofos Choline 16, Anagrade

[1-Palmitoyl-2-Hydroxy-sn-Glycero-3-Phosphocholine / 16:0 LysoPC]

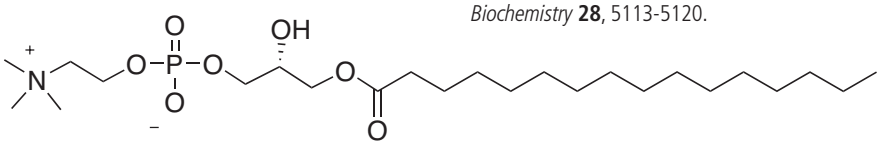
L216 0.5 gm, 1 gm

Chemical Properties:
FW: 495.6 [17364-16-8] $C_{24}H_{50}NO_7P$
CMC (H_2O): ~ 0.0032 mM[1]

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: > 10%
Conductance (10% solution): < 200 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.04
280 nm: < 0.1
260 nm: < 0.12

Reference:
1. Stafford, R. E., Fanni, T., and Dennis, E. A. (1989) *Biochemistry* **28**, 5113-5120.



Lysofos Choline 18, Anagrade

[1-Stearoyl-2-Hydroxy-sn-Glycero-3-Phosphocholine / 18:0 LysoPC]

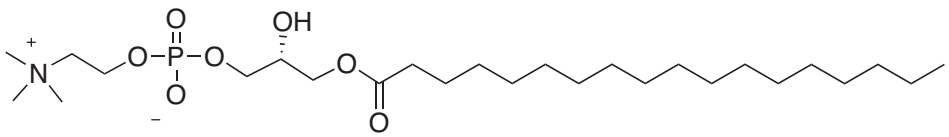
L218 0.5 gm, 1 gm

Chemical Properties:
FW: 523.7 [19420-57-6] $C_{26}H_{54}NO_7P$

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: > 1%
Conductance (10% solution): < 200 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.4
280 nm: < 0.1
260 nm: < 0.12

Reference:
1. Stafford, R. E., Fanni, T., and Dennis, E. A. (1989) *Biochemistry* **28**, 5113-5120.



LysoFos Choline Ether 10, Anagrade

[1-Decyl-2-Hydroxy-sn-Glycero-3-Phosphocholine]

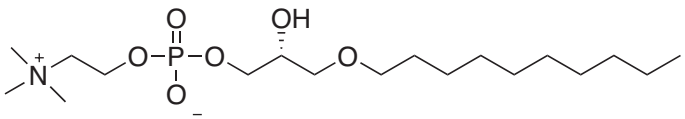
L410 0.5 gm, 1 gm

Chemical Properties:
FW: 397.5 $C_{18}H_{40}O_6PNa$

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: >10%
Conductance (10% solution): <200 µS

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20˚C



LysoFos Choline Ether 12, Anagrade

[1-Dodecyl-2-Hydroxy-sn-Glycero-3-Phosphocholine]

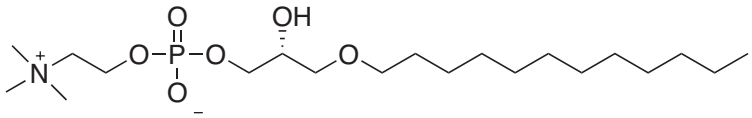
L412 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: >10%
Conductance (10% solution): <200 µS

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20˚C

Chemical Properties:
FW: 425.5 $C_{20}H_{44}O_6PNa$



LysoFos Choline Ether 14, Anagrade

[1-Tertadecyl-2-Hydroxy-sn-Glycero-3-Phosphocholine]

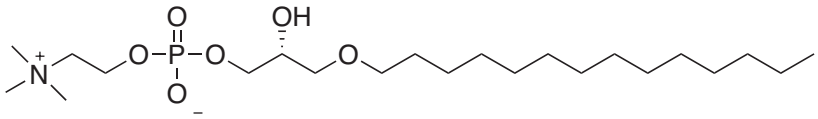
L414 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: >10%
Conductance (10% solution): <200 µS

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20˚C

Chemical Properties:
FW: 453.6 $C_{22}H_{48}O_6PNa$



LysoFos Choline Ether 16, Anagrade

[1-Heaxadecyl-2-Hydroxy-sn-Glycero-3-Phosphocholine]

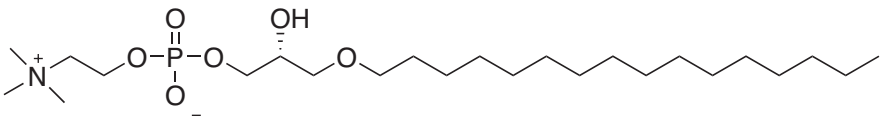
L416 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: >10%
Conductance (10% solution): <200 µS

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20˚C

Chemical Properties:
FW: 481.7 $C_{22}H_{48}O_6PNa$



LysoFos Choline Ether 18, Anagrade

[1-Octadecyl-2-Hydroxy-sn-Glycero-3-Phosphocholine]

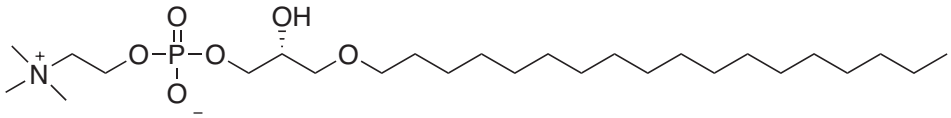
L418 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: >10%
Conductance (10% solution): <200 µS

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20˚C

Chemical Properties:
FW: 509.7 $C_{22}H_{56}O_6PNa$



LysoFos Glycerol 10, Anagrade

[1-Decanoyl-2-Hydroxy-sn-Glycero-3-Phospho-(1'-rac-Glycerol) (Sodium Salt)]

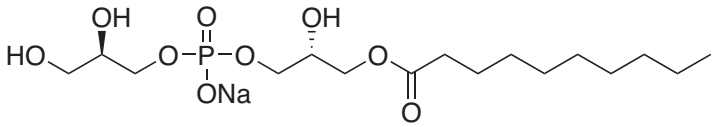
L310 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: >10%

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20˚C.

Chemical Properties:
FW: 422.4 $C_{16}H_{32}O_9PNa$



LysoFos Glycerol 12, Anagrade

[1-Lauroyl-2-Hydroxy-sn-Glycero-3-Phospho-(1'-rac-Glycerol) (Sodium Salt)]

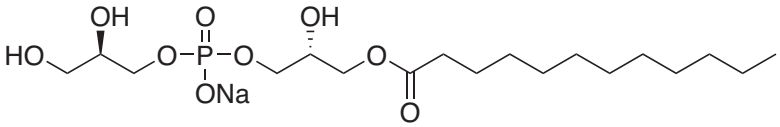
L312 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5˚C: >10%

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20˚C.

Chemical Properties:
FW: 450.4 $C_{18}H_{36}O_9PNa$



LysoFos Glycerol 14, Anagrade

[1-Myristoyl-2-Hydroxy-sn-Glycero-3-Phospho-(1'-rac-Glycerol) (Sodium Salt)]

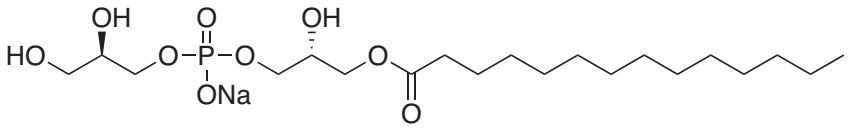
L314 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5°C: >10%

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20°C.

Chemical Properties:
FW: 478.5 $C_{20}H_{40}O_9PNa$



LysoFos Glycerol 16, Anagrade

[1-Palmitol-2-Hydroxy-sn-Glycero-3-Phospho-(1'-rac-Glycerol) (Sodium Salt)]

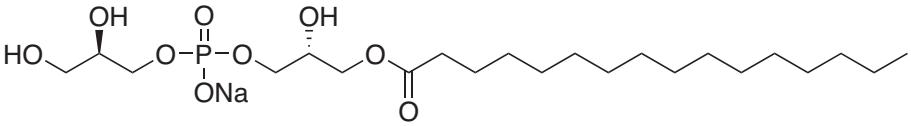
L316 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5°C: >10%

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20°C.

Chemical Properties:
FW: 506.5 [326495-22-1] $C_{22}H_{44}O_9PNa$



LysoFos Glycerol 18, Anagrade

[1-Octadecanoyl-2-Hydroxy-sn-Glycero-3-Phospho-(1'-rac-Glycerol) (Sodium Salt)]

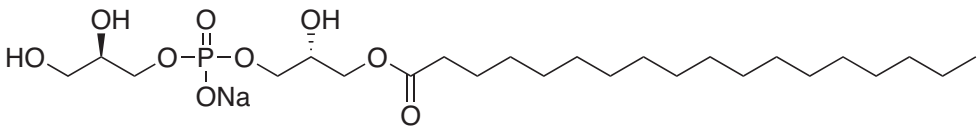
L318 0.5 gm, 1 gm

Product Specifications:
Purity: ≥99%
pH (1% solution): 5-8
Solubility in water at 0-5°C: >10%

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Storage: Store at -20°C.

Chemical Properties:
FW: 534.6 [326495-23-1] $C_{24}H_{48}O_9PNa$



Bicelle Kit

D399-BIC	1 kit

The kit contains the two lipids and two detergents listed below:
200 mg DMPC
200 mg DMPG
1 gm CHAPS
1 gm CHAPSO

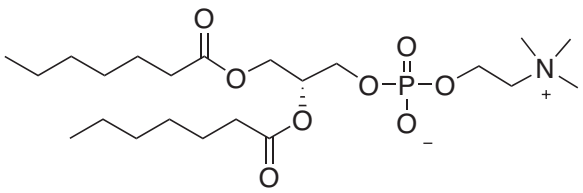
1,2-Diheptanoyl-sn-Glycero-3-Phosphocholine

[DHPC]

D607	250 mg 500 mg 1 gm

Product Specifications:
Form: White solid
Purity: ≥ 99%
Solubility: Methanol, Chloroform
NMR and MS conform to standard

Chemical Properties:
FW: 481.5 $C_{22}H_{44}NO_8P$



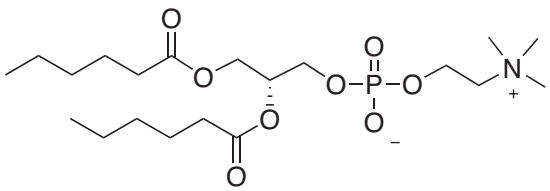
1,2-Dihexanoyl-sn-Glycero-3-Phosphocholine

[DHPC]

D606	250 mg 500 mg 1 gm

Product Specifications:
Form: White solid
Purity: ≥ 99%
Solubility: Methanol, Chloroform
NMR and MS conform to standard

Chemical Properties:
FW: 453.5 [34506-67-7] $C_{20}H_{40}NO_8P$



1,2-Dimyristoyl-sn-Glycero-3-[Phospho-rac-(1-Glycerol)] (Sodium Salt)

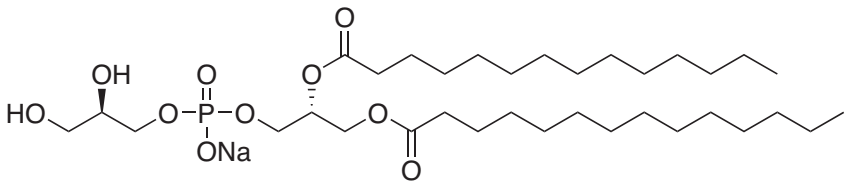
[DMPG]

D614 200 mg, 500 mg, 1 gm

Product Specifications:
Purity: >99%
pH (1% water): 5-8
Solubility: Water > 1%
MeOH soluble with heat

Absorbance (1% in water):
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Chemical Properties:
FW: 688.9 $C_{34}H_{66}NaO_{10}P$



1,2-Dimyristoyl-sn-Glycero-3-Phosphocholine

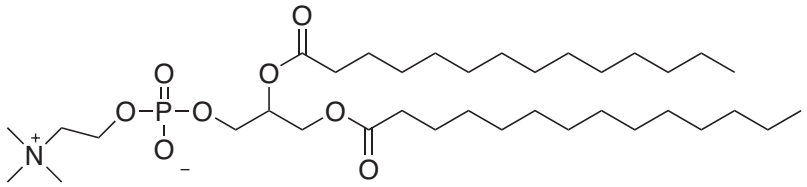
[DMPC]

D514 200 mg, 500 mg, 1 gm

Product Specifications:
Purity: >99%
pH (1% MeOH): 5-8
Solubility: MeOH > 20%
Water insoluble
Conductance (1% MeOH): <200 µS

Absorbance (1% in MeOH):
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Chemical Properties:
FW: 677.9 $C_{36}H_{72}NO_8P$



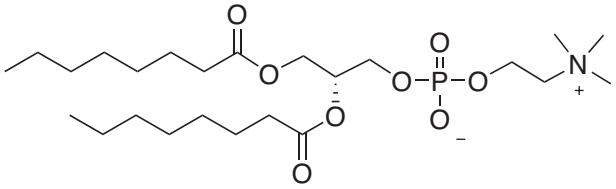
1,2-Dioctanoyl-sn-Glycero-3-Phosphocholine

[DOPC]

D608 250 mg, 500 mg, 1 gm

Product Specifications:
Form: White solid
Purity: ≥ 99%
Solubility: Methanol, Chloroform
NMR and MS conform to standard

Chemical Properties:
FW: 509.6 [19191-91-4] $C_{24}H_{48}NO_8P$



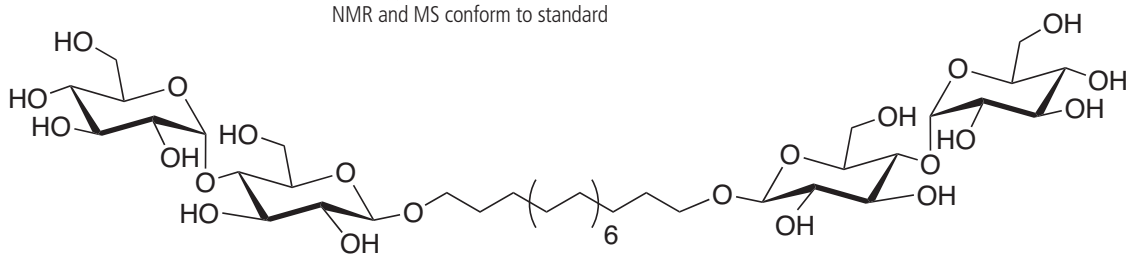
BisMalt-18

[1,18-bis-(β-D-Maltopyranosyl) Octadecane]
Bolalipid like detergent with 18-carbon atom acyl chain

B518 100 mg, 250 mg

Chemical Properties:
FW: 949.1 $C_{43}H_{80}O_{22}$

Product Specifications:
Purity: ≥ 95%
Form: White solid
Solubility: Water, Methanol
NMR and MS conform to standard



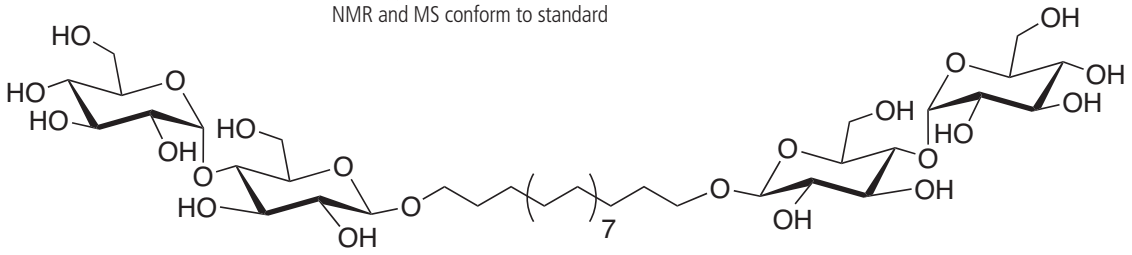
BisMalt-20

[1,20-bis-(β-D-Maltopyranosyl) Docosane]
Bolalipid like detergent with 20-carbon atom acyl chain

B520 100 mg, 250 mg

Chemical Properties:
FW: 977.1 $C_{45}H_{84}O_{22}$

Product Specifications:
Purity: ≥ 95%
Form: White solid
Solubility: Water, Methanol
NMR and MS conform to standard



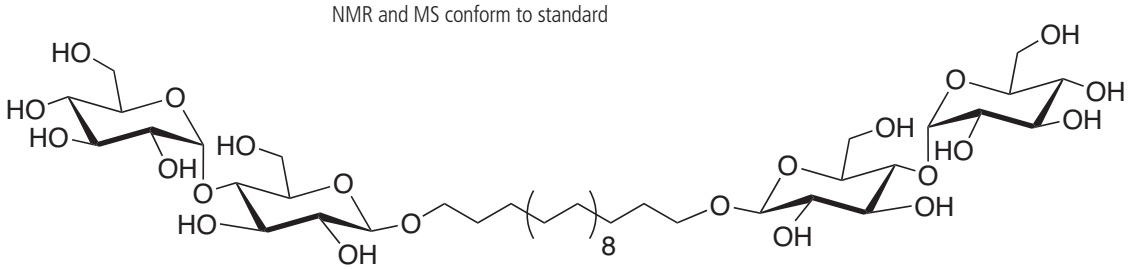
BisMalt-22

[1,22-bis-(β-D-Maltopyranosyl) Docosane]
Bolalipid like detergent with 22-carbon atom acyl chain

B522 100 mg, 250 mg

Chemical Properties:
FW: 1005.2 $C_{47}H_{88}O_{22}$

Product Specifications:
Purity: ≥ 95%
Form: White solid
Solubility: Water, Methanol
NMR and MS conform to standard



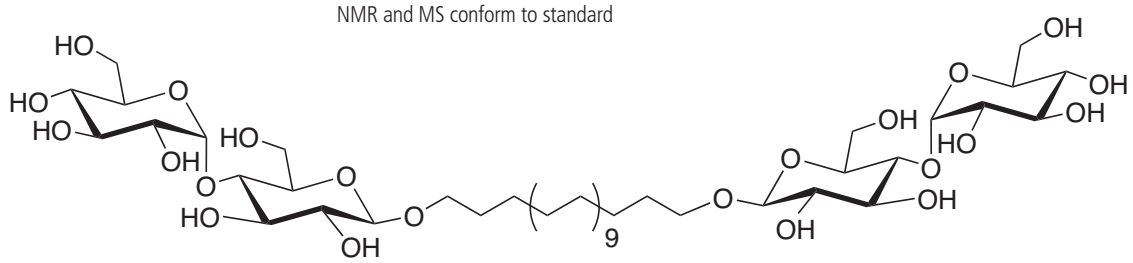
BisMalt-24

[1,24-bis-(β-D-Maltopyranosyl) Tetracosane] Bolalipid like detergent with 24-carbon atom acyl chain

B524 100 mg, 250 mg

Chemical Properties:
FW: 1033.2 $C_{49}H_{92}O_{22}$

Product Specifications:
Purity: ≥ 95%
Form: White solid
Solubility: Water, Methanol
NMR and MS conform to standard



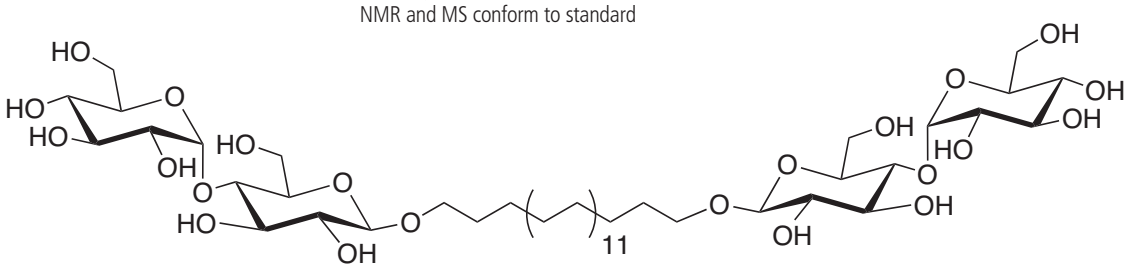
BisMalt-28

[1,28-bis-(β-D-Maltopyranosyl) Octacosane] Bolalipid like detergent with 28-carbon atom acyl chain

B528 100 mg, 250 mg

Chemical Properties:
FW: 1089.4 $C_{53}H_{100}O_{22}$

Product Specifications:
Purity: ≥ 95%
Form: White solid
Solubility: Methanol
NMR and MS conform to standard



Cyclofos™-2, Anagrade

[2-Cyclohexyl-1-Ethylphosphocholine]

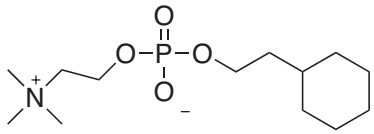
C508 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 293.8 [823796-65-2] $C_{13}H_{28}NO_4P$
CMC (H_2O): ~ 256 mM[1] (7.5%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Cyclofos-3, Anagrade

[3-Cyclohexyl-1-Propylphosphocholine]

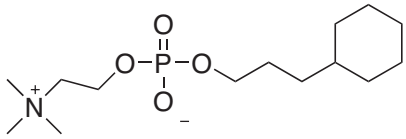
C510 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 306.9 [823796-66-3] $C_{14}H_{30}NO_4P$
CMC (H_2O): ~ 43 mM[1] (1.3%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Cyclofos-4, Anagrade

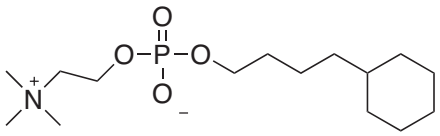
[4-Cyclohexyl-1-Butylphosphocholine]

C512 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 320.9 [675126-15-5] $C_{15}H_{32}NO_4P$
CMC (H_2O): ~ 8.45 mM (0.45%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1



Cyclofos-5, Anagrade

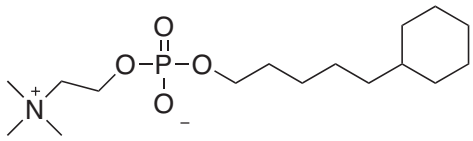
[5-Cyclohexyl-1-Pentylphosphocholine]

C514 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 335.0 [657393-64-1] $C_{16}H_{34}NO_4P$
CMC (H_2O): ~ 4.5 mM (0.15%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1



Cyclofos-6, Anagrade

[6-Cyclohexyl-1-Hexylphosphocholine]

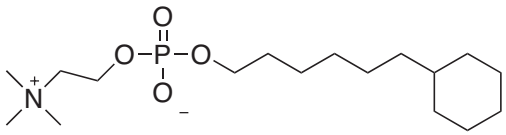
C516 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 349.2 [657393-65-2] $C_{17}H_{36}NO_4P$
CMC (H_2O): ~ 2.68 mM[1] (0.094%)

Product Specifications:
Purity: ≥ 98% by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 500 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Cyclofos-7, Anagrade

[7-Cyclohexyl-1-Heptylphosphocholine]

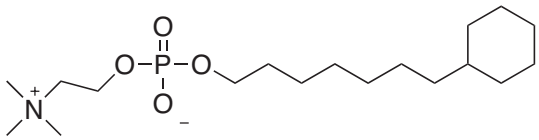
C518 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 363.3 [657393-66-3] $C_{18}H_{38}NO_4P$
CMC (H_2O): ~ 0.62 mM[1] (0.022%)

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
pH (1% solution): 5-9
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 500 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Fos-Choline®-8, Anagrade

[n-Octylphosphocholine]

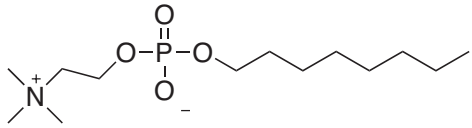
F300 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 295.4 [53255-89-3] $C_{13}H_{30}NO_4P$
CMC (H_2O): ~ 114 mM[1] (3.4%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

References:
1. Anatrace measurement.
2. Vinogradova, O., Sonnichsen, F., Sanders, C. R. (1998) *J. Biomol. NMR* **11**, 381-386.



Fos-Choline-8, Fluorinated, Anagrade

[1H, 1H, 2H, 2H-Perfluorooctyl)phosphocholine]

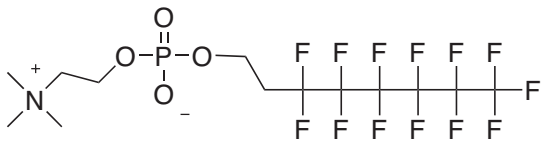
F300F 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 529.2 $C_{13}H_{17}F_{13}NO_4P$

Product Specifications:
CMC (H_2O): 2.2 mM[1]
Purity >99% by HPLC analysis
pH (1% solution): 5-8
Solubility in water at 20˚C: >10%
Conductance (10% solution): <200 µS

Absorbance of a 1% solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Krafft, M-P., Giulieri, F., Riess, J. G. (1993) *Angew Chem. Intl.* **32**, 741-743.



Fos-Choline-8, Sol-Grade

[n-Octylphosphocholine]

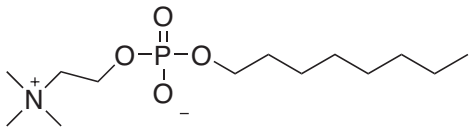
F300S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 295.4 [53255-89-3] $C_{13}H_{30}NO_4P$
CMC (H_2O): ~ 114 mM[1] (3.4%)

Product Specifications:
Purity: ≥ 97% by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F300 for references.



Fos-Choline-9, Anagrade

[n-Nonylphosphocholine]

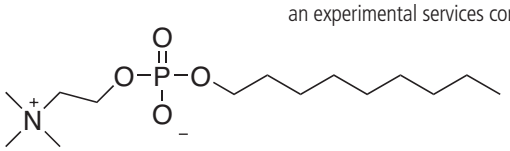
F302 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 309.4 [253678-64-7] $C_{14}H_{32}NO_4P$
CMC (H_2O): ~ 39.5 mM[1] (1.2%)
Aggregation number (H_2O)[2]: ~ 5
Specific volume (H_2O)[2]: 0.1416 ml/gm

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.



Fos-Choline-9, Sol-Grade

[n-Nonylphosphocholine]

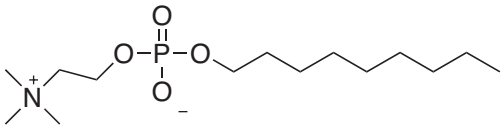
F302S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 309.4 [253678-64-7] $C_{14}H_{32}NO_4P$
CMC (H_2O): ~ 39.5 mM[1] (1.2%)
Aggregation number (H_2O)[2]: ~ 5
Specific volume (H_2O)[2]: 0.1416 ml/gm

Product Specifications:
Purity: ≥ 97% by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

Reference:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.



Fos-Choline-10, Anagrade

[n-Decylphosphocholine]

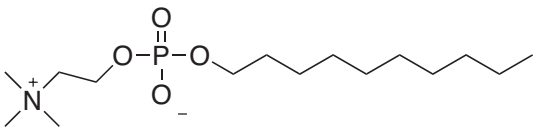
F304 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 323.4 [70504-28-8] $C_{15}H_{34}NO_4P$
CMC (H_2O): ~ 11 mM[1] (0.35%)
Aggregation number (H_2O)[2]: ~ 24
dn/dc (H_2O)[2]: 0.1347 ml/gm

Product Specifications:
Purity: ≥ 99% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

References:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Cortes, D. M. and Perozo, E. (1997) *Biochem*. **36**, 10343-10352.



Fos-Choline-10, Per Deuterated Head

[n-Decyl Phosphocholine-d13]

F304PDH
See page 126

Fos-Choline-10, Semi Deuterated Head

[n-Decyl Phosphocholine-d9]

F304SDH
See page 127

Fos-Choline-10, Sol-Grade

[n-Decylphosphocholine]

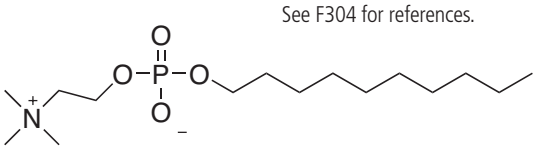
F304S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 323.4 [70504-28-8] $C_{15}H_{34}NO_4P$
CMC (H_2O): ~ 11 mM[1] (0.35%)
Aggregation number (H_2O)[2]: ~ 24
dn/dc (H_2O)[2]: 0.1347 ml/gm

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F304 for references.



Fos-Choline-11, Anagrade

[n-Undecylphosphocholine]

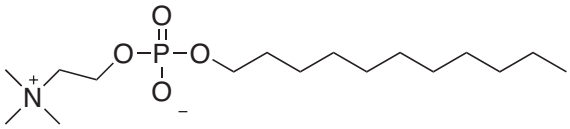
F306 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 337.4 [253678-65-8] $C_{16}H_{36}NO_4P$
CMC (H_2O): ~ 1.85 mM[1] (0.062%)
Aggregation number (H_2O)[2]: ~ 18
dn/dc (H_2O)[2]: 0.1387 ml/gm

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

References:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.



Fos-Choline-11, Per Deuterated Head

[n-Undecyl Phosphocholine-d13]

F306PDH
See page 127

Fos-Choline-11, Semi Deuterated Head

[n-Undecyl Phosphocholine-d9]

F306SDH
See page 127

Fos-Choline-11, Sol-Grade

[n-Undecylphosphocholine]

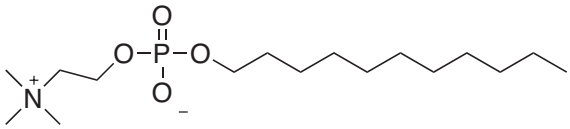
F306S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 337.4 [253678-65-8] $C_{16}H_{36}NO_4P$
CMC (H_2O): ~ 1.85 mM[1] (0.062%)
Aggregation number (H_2O)[2]: ~ 18
dn/dc (H_2O)[2]: 0.1387 ml/gm

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F306 for refrences.



Fos-Choline-12, Anagrade

[n-Dodecylphosphocholine]

F308 1 gm, 5 gm, 25 gm

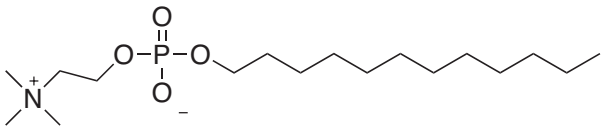
Chemical Properties:
FW: 351.5 [29557-51-5] $C_{17}H_{38}NO_4P$
CMC (H_2O): ~ 1.5 mM[1] (0.047%)
Aggregation number (H_2O)[6]: ~ 54
dn/dc (H_2O)[6]: 0.1398 ml/gm

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

References:

1. Anatrace measurement.
2. Fares, C., Libich, D. S., Harauz, G. (2006) *FEBS J.* **273**, 601-614.
3. Brunecky, R., Lee, S., Rzepecki, P. W., *et al.* (2005) *Biochemistry* **44**, 16064-16071.
4. Oxenoid K., Chou, J. J. (2005) *Proc. Natl. Acad. Sci. USA* **102**, 10870-10875.
5. Uteng, M., Hauge, H. H., Markwick, P. R. L., FimLand, G., Mantzilas, D., Nissen-Meyer, J., and Muhle-Goll, C. (2003) *Biochem.* **42**, 11417-11426.
6. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
7. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.



Fos-Choline-12, Deuterated

[n-Dodecylphosphocholine-d38]

F308D
See page 128

Fos-Choline-12, Per Deuterated Head

[n-Dodecyl Phosphocholine-d13]

F308PDH
See page 128

Fos-Choline-12, Per Deuterated Tail

[n-Dodecyl Phosphocholine-d25]

F308PDT
See page 128

Fos-Choline-12, Semi Deuterated Head

[n-Dodecyl Phosphocholine-d9]

F308SDH
See page 129

Fos-Choline-12, Sol-Grade

[n-Dodecylphosphocholine]

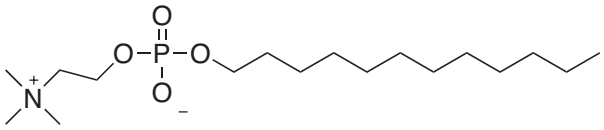
F308S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 351.5 [29557-51-5] $C_{17}H_{38}NO_4P$
CMC (H_2O): ~ 1.5 mM[1] (0.047%)
Aggregation number (H_2O)[6]: ~ 54
dn/dc (H_2O)[6]: 0.1398 ml/gm

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
pH (1% solution): 4-9
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F308 for references.



Fos-Choline-13, Anagrade

[n-Tridecylphosphocholine]

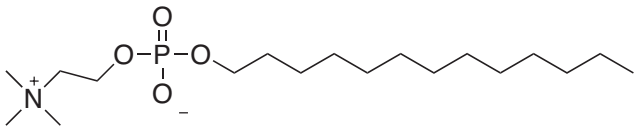
F310 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 365.5 [85775-42-4] $C_{18}H_{40}NO_4P$
CMC (H_2O): ~ 0.75 mM[1] (0.027%)
Aggregation number (H_2O)[2]:~ 87
dn/dc (H_2O)[2]: 0.1426 ml/gm

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

References:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.



Fos-Choline-13, Sol-Grade

[n-Tridecylphosphocholine]

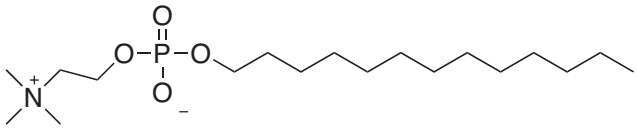
F310S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 365.5 [85775-42-4] $C_{18}H_{40}NO_4P$
CMC (H_2O): ~ 0.75 mM[1] (0.027%)
Aggregation number (H_2O)[2]:~ 87
dn/dc (H_2O)[2]: 0.1426 ml/gm

Product Specifications:
Purity: ≥ 97% by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F310 for references.



Fos-Choline-14, Anagrade

[n-Tetradecylphosphocholine]

F312 1 gm, 5 gm, 25 gm

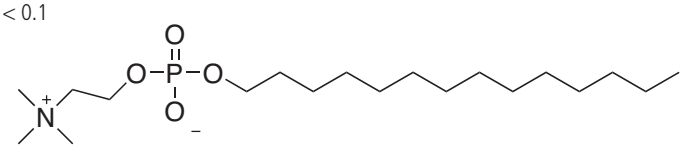
Chemical Properties:
FW: 379.5 [77733-28-9] $C_{19}H_{42}NO_4P$
CMC (H_2O): ~ 0.12 mM[1] (0.0046%)
Aggregation number (H_2O)[2]: ~ 108
dn/dc (H_2O)[2] 0.1416 ml/gm
Micelle Size[3]: 47 kDa

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

References:

1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
3. Strop, P. and Brunger, A.T. (2005) *Protein Sci.* **14**, 2207-2211.
4. Zeisig, R., Ress, A., Fichtner, I. Walther, W. (2003) *Cancer Gene Ther.* **10**, 302-311.



Fos-Choline-14, Deuterated

[n-Tetradecylphosphocholine-d42]

F312D
See page 129

Fos-Choline-14, Per Deuterated Head

[n- Tetradecyl Phosphocholine-d13]

F312PDH
See page 129

Fos-Choline-14, Semi Deuterated Head

[n- Tetradecyl Phosphocholine-d9]

F312SDH
See page 130

Fos-Choline-14, Sol-Grade

[n-Tetradecylphosphocholine]

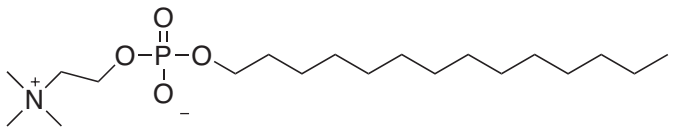
F312S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 379.5 [77733-28-9] $C_{19}H_{42}NO_4P$
CMC (H_2O): ~ 0.12 mM[1] (0.0046%)
Aggregation number (H_2O)[2]: ~ 108
dn/dc (H_2O)[2] 0.1416 ml/gm
Micelle Size[3]: 47 kDa

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F312 for references.



Fos-Choline-15, Anagrade

[n-Pentadecylphosphocholine]

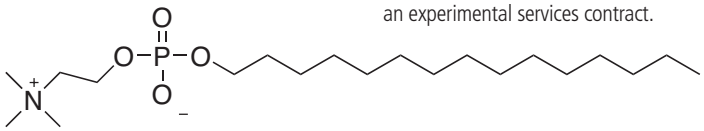
F314 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 393.5 [146801-07-2] $C_{20}H_{44}NO_4P$
CMC (H_2O): ~ 0.07 mM[1] (0.0027%)
Aggregation number (H_2O)[2]: ~ 131
dn/dc (H_2O)[2]: 0.1374 ml/gm

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5˚C: ≥ 20%
Conductance (10% solution): <200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

References:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.



Fos-Choline-15, Sol-Grade

[n-Pentadecylphosphocholine]

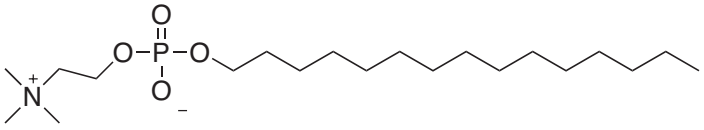
F314S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 393.5 [146801-07-2] $C_{20}H_{44}NO_4P$
CMC (H_2O): ~ 0.07 mM[1] (0.0027%)
Aggregation number (H_2O)[2]: ~ 131
dn/dc (H_2O)[2]: 0.1374 ml/gm

Product Specifications:
Purity: ≥ 97% by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): <500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F314 for references.



Fos-Choline-16, Anagrade

n-Hexadecylphosphocholine

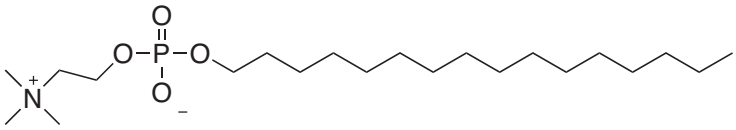
F316 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 407.5 [58066-85-6] $C_{21}H_{46}NO_4P$
CMC (H_2O): ~ 0.013 mM[1] (0.00053%)
Aggregation number (H_2O)[2]: ~ 178
dn/dc (H_2O)[2]: 0.1327 ml/gm

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): <200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

References:
1. Anatrace measurement.
2. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.



Fos-Choline-16, Sol-Grade

n-Hexadecylphosphocholine

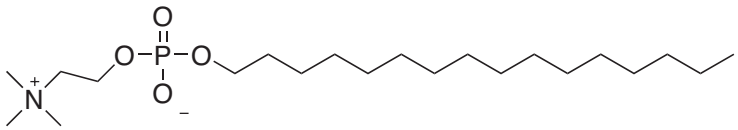
F316S 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 407.5 [58066-85-6] $C_{21}H_{46}NO_4P$
CMC (H_2O): ~ 0.013 mM[1] (0.00053%)
Aggregation number (H_2O)[2]: ~ 178
dn/dc (H_2O)[2]: 0.1327 ml/gm

Product Specifications:
Purity: ≥ 97% by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20°C: ≥ 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

References:
See F316 for references.



Fos-Choline-ISO-9, Anagrade

[2,6-Dimethyl-4-Heptylphosphocholine]

FCI09 1 gm, 5 gm, 25 gm

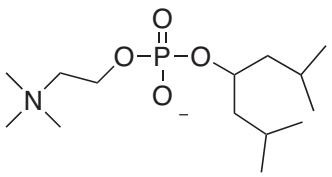
Chemical Properties:
FW: 309.0 [869646-90-2] $C_{14}H_{32}NO_4P$
CMC (H_2O): ~ 32 mM[1] (0.99%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 300 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.10

Reference:
1. Anatrace measurement.

Note: This product is a mixture of closely related dimethylheptylphosphocholines. The major component is 2,6-Dimethyl-4-heptylphosphocholine (95-99%) and the minor component is 4,6-Dimethyl-4-heptylphosphocholine (0-5%).



Fos-Choline-ISO-11, Anagrade

[2,8-Dimethyl-5-Nonylphosphocholine]

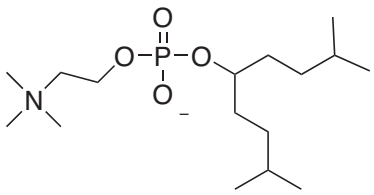
FCI11 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 337.4 [869647-65-4] $C_{16}H_{36}NO_4P$
CMC (H_2O): ~ 26.6 mM[1] (0.9%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Fos-Choline-Unsat-11-10, Anagrade

[10-Undecylenyl-1-Phosphocholine]

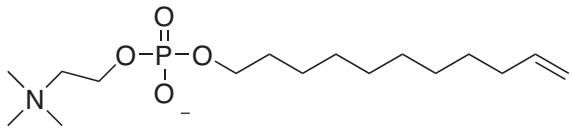
FCU110 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 335.4 [121045-77-0] $C_{16}H_{34}NO_4P$
CMC (H_2O): ~ 6.2 mM[1] (0.21%)

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 20%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Fos-Mea®-8, Anagrade

[Octylphospho-N-Methylethanolamine]

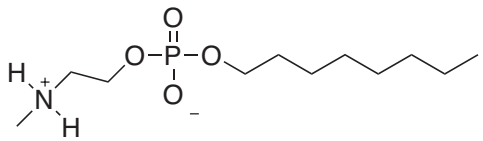
F208 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 267.0 [104702-33-2] $C_{11}H_{26}NO_4P$
CMC (H_2O): ~ 22.0 mM[1] (0.59%)

Product Specifications:
Purity: ≥ 99% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 0-5°C: ≥ 1%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Fos-Mea-10, Anagrade

[Decylphospho-N-Methylethanolamine]

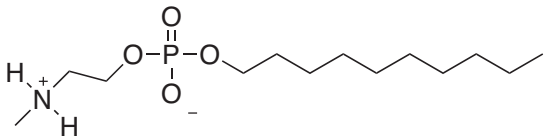
F210 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 295.0 [557788-85-9] $C_{13}H_{30}NO_4P$
CMC (H_2O): ~ 5.25 mM[1] (0.15%)

Product Specifications:
Purity: ≥ 99% pure by HPLC analysis.
pH (1% solution): 3-8
Solubility in water at 20˚C: ≥ 1%
Conductance (1% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Fos-Mea-12, Anagrade

[Dodecylphospho-N-Methylethanolamine]

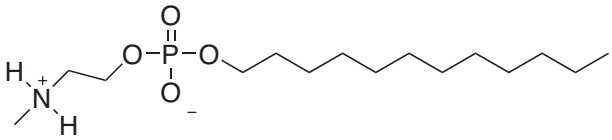
F212 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 323.0 [129274-39-1] $C_{15}H_{34}NO_4P$
CMC (H_2O): ~ 0.43 mM[1] (0.014%)

Product Specifications:
Purity: ≥ 99% pure by HPLC analysis.
pH (0.1% solution): 3-8
Solubility in water at 20˚C: ≥ 0.01%
Conductance (0.1% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 0.1% detergent solution:
340 nm: < 0.05
280 nm: < 0.08
260 nm: < 0.1

Reference:
1. Anatrace measurement.



Chobimalt, Anagrade

[Cholestrol α-D-Glucopryanosyl-(1→4)-β-D-Glucopyranosyl-(1→6)-α-D-Glucopyranosyl-(1→4)-β-D-Glucyopryanoside]

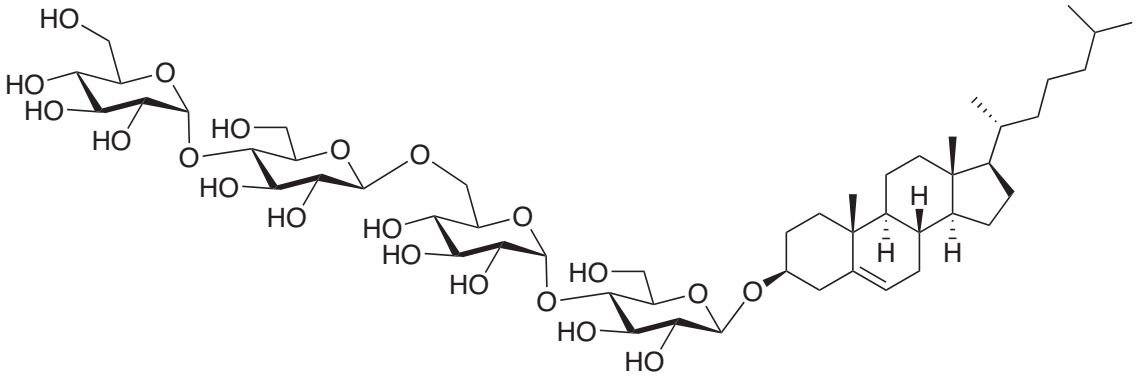
CH220	100 mg 250 mg 500 mg

Product Specifications:
Form: White powder
Purity: >99.0% by HPLC analysis
Solubility in water: Up to 20%

Storage:
Store at -20˚C.

Reference:
1. Howell, S., Mittal, R., Huang, L., Travis, B., Breyer, R. M. and Sanders, C. R. (2010) *Biochemistry* **49**, 9572-9583.

Chemical Properties:
FW: 1035.2 $C_{51}H_{86}O_{21}$
CMC (H_2O): 0.004 mM[1]

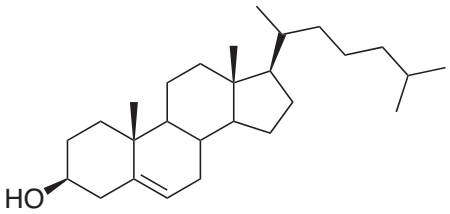


Cholesterol

[3β-Hydroxy-5-Cholestene / 5-Cholesten-3β-ol]

CH200	50 gm 250 gm 1 kg

Product Specifications:
Melting Point: 147-150˚C
Loss in drying < 0.3%
Residue on ignition < 0.1%
Solubility in alcohol 1%
IR spectrum conforms to specifications.



Chemical Properties:
FW: 386.6 [57-88-5] $C_{27}H_{46}O$

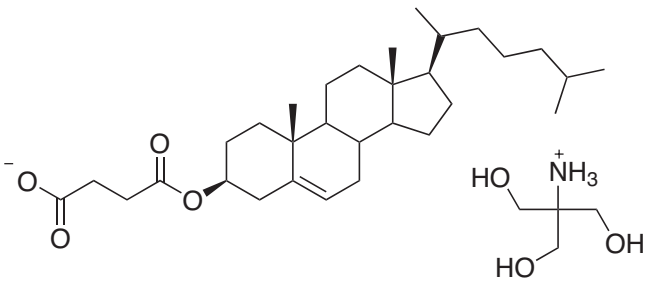
Cholesteryl Hemisuccinate Tris Salt

CH210	1 gm 5 gm 25 gm 100 gm

References:
1. Klein, B., Kleinman, N. B. and Foreman, J. A. (1974) *Clin. Chem.* **20**, 482-485.
2. Weiss, H. M. and Grisshammer, R. (2002) *Eur. J. Biochem.* **269**, 82-92.
3. Tucker, J. and Grisshammer, R. (1996) *Biochem. J.* **317**, 891-899.
4. Brown, P. J. and Schonbrunn, A. (1993) *J. Biol. Chem.* **268**, No. 9, 6668-6676.

Chemical Properties:
FW: 607.9 [102601-49-0] $C_{31}H_{50}O_4 \cdot C_4H_{11}NO_3$

Product Specifications:
Form: White powder
Solubility (6% aqueous CHAPS): 1.2%
IR spectrum conforms to specifications.
DSC conforms to standard.
Water soluble cholesterol standard[1]



Additive Chemistries for Structural Biology

Solving even the toughest research challenges
is easier when tackled one piece at a time.

Introducing new Anatrace Additive Chemistries

The field of Additive Chemistries is an exciting new arena and Affymetrix is proud to be the first to make additive components commercially available for membrane protein work. A variety of chemistries are now available which allow covalent linkages of molecules derivatized with appropriate functional groups. First, specific functional groups are synthesized into chemical molecules or incorporated into proteins using appropriately modified amino acids during expression. Then, in the presence of the correct catalyst(s) or reaction conditions, the two functional groups will react to form a covalent linkage between the two original molecules. Examples of possible functional groups are azide, amine, phosphine, alkene, cycloalkyne and alkyne moieties.

For biologists, this capability opens up the door to many novel applications. The usage of Additive Chemistries is only bound by your imagination and creativity. Here are just a few suggestions:

- Covalently link a Fos-Choline or a Maltoside surfactant directly to a membrane protein to enhance stability and solubility outside of the native lipid bi-layer. This way you can be sure that the stabilizer is firmly attached to your protein.
- Dimerize a modified detergent with long non-polar chains and a polar head in an aqueous solution to create a novel new lipid bicelle. Bicelles mimic natural lipid bilayer membranes and, thus, capture membrane proteins more accurately in their biologically relevant orientation.
- Surface immobilize a protein to a nitrocellulose membrane or to an assay plate.
- If you discover a new molecule that works better than existing structures – call our Anatrace R&D department. We'd love to hear from you!

Maltoside derivatives
Currently we offer several modified derivatives of the following Maltosides:

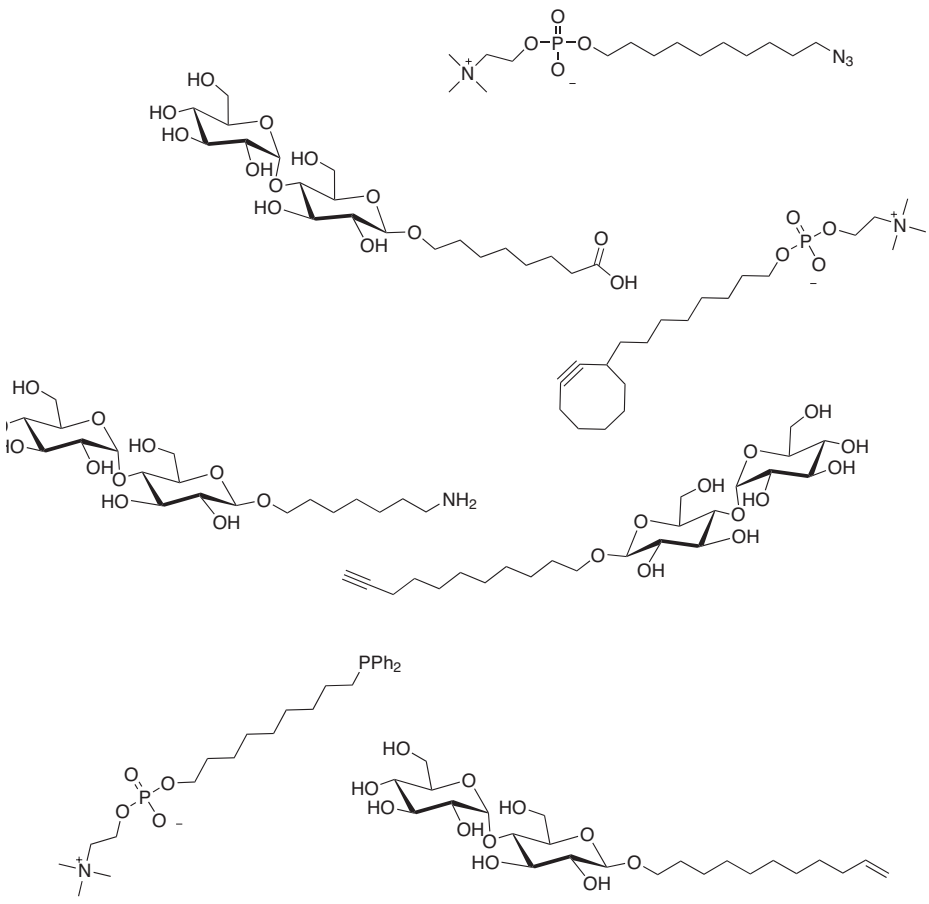
- n-Hexadecyl-β-D-Maltoside (H320)
- n-Undecyl-β-D-Maltoside (U300)
- n-Decyl-β-D-Maltoside (D322)
- n-Tridecyl-β-D-Maltoside (H320)

Since this is a rapidly growing field, please visit our website, anatrace.affymetrix.com, for the latest additive chemistry modifications available for the Maltoside line.

Fos-Choline derivatives
Currently we offer several modified derivatives of the following Fos-Cholines:

- Fos-Choline-10 (F304)
- Fos-Choline-11 (F306)

Since this is a rapidly growing field, please visit our website, anatrace.affymetrix.com, for the latest additive chemistry modifications available for the Fos-Choline line.



Specialty Detergents for Crystallography

Product information

- Neopentyl Glycol (NG) class detergents
- Lipidic Cubic Phase (LCP) products

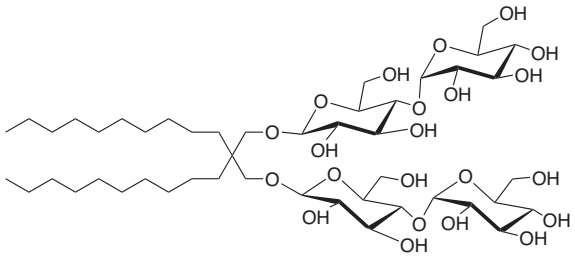
NG class detergents

Crystallization aids

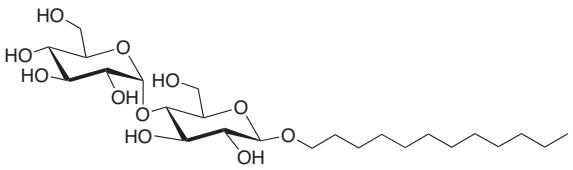
Nature renews through evolution.
We keep pace with innovation.

Neopentyl Glycol (NG) Class Detergents

The new Anatrace Neopentyl Glycol (NG) class detergents are revolutionary new amphiphiles which have already shown great utility in membrane protein studies[1]. NG class detergents are a more effective detergent for extracting and solubilizing/stabilizing proteins, and are particularly beneficial in the crystallization process due to some unique properties conferred by a revolutionary new architecture. The amphiphilic molecule consists of a central quaternary carbon with two hydrophilic heads and two lypophilic tails, generating subtle constraints on overall conformational flexibility that allows the molecule to pack densely when forming a micelle. This dense packing increases thermal stability of the detergent/protein complex and most importantly, produces exceptionally low critical micelle concentrations and extreme water solubility.



CMC Value: ~10 µM
(0.001 wt %)



CMC Value: ~170 µM
(0.0087 wt %)

Most significantly, the Neopentyl Glycol amphiphiles are substitute products for three of today's most popular detergents: lauryl maltoside (dodecyl maltoside), octyl glucoside and decyl maltoside. There are remarkable differences in CMC between the new NG class and their counterparts, where approximately 17-fold less of the NG class detergent achieves the same critical micelle concentration as the equivalent maltoside or glucoside (see below). Presumably, this results from the larger total hydrophobic surface of this new class of amphiphiles.

Product Number	Products	CMC
NG310 D310	Lauryl Maltose Neopentyl Glycol Lauryl Maltoside	.01 mM 0.17 mM
NG311 O311	Octyl Glucose Neopentyl Glycol Octyl Glucoside	1.02 mM 18-20 mM
NG322 D322	Decyl Maltose Neopentyl Glycol Decyl Maltoside	.036 mM 1.8 mM

The low CMC values of the NG class detergents is an advantageous feature in membrane protein studies. These low CMC values reduce the often detrimental effects of excess solubilizing agent on crystallization. Additionally, NG class detergents also demonstrate a superior ability to solubilize expressed proteins without interfering with the protein expression mechanics of cell free protein expression systems.

Reference:

1. Chae, P. S., Rasmussen, S. G. F., Rana, R. R., Gotfryd, K., Chandra, R., Goren, M. A., Kruse, A. C., Nurva, S., Loland, C. J., Pierre, Y., Drew, D., Popot, J-L., Picot, D., Fox, B. G., Guan, L., Gether, U., Byrne, B., Kobilka, B., Gellman, S. H. (2010) *Nature Methods* **7**(12), 1003-1008.

Lipidic Cubic Phase (LCP) Products

Crystallization is usually the bottleneck in membrane protein work. Temperature, salt and detergent concentrations all affect the crystallization process. Determining the conditions necessary to crystallize one protein provides very little insight into the conditions needed to crystallize another. The process is truly more of an art than a science.

Lipidic Cubic Phase (LCP) promises to remove the crystallization bottleneck. The Anatrace LCP product range includes both monoolein and monopalmitolein products. Both molecules have the ability in aqueous solution to self-assemble into a lattice structure. Conceptually, the lattice is comprised of a quasi lipid phase and channels. While the quasi lipid component suspends proteins and is chemically similar to a lipid bi-layer, the channels allow water-soluble material to pass through the lattice.

The multi-layered lattice structure itself acts as a trap and constrains any membrane protein which slips or diffuses into it. Inside of the lattice, proteins can diffuse laterally through the structure and this process helps separate out water-soluble impurities which affect crystallization. Once proteins are suspended in the lattice the aqueous solution is allowed to evaporate, and the trapped proteins eventually reach the needed supersaturated state. At this point, the lattice structure contributes one last important service. The LCP limits protein movement and creates the order needed for crystal growth to begin.

Decyl Maltose Neopentyl Glycol

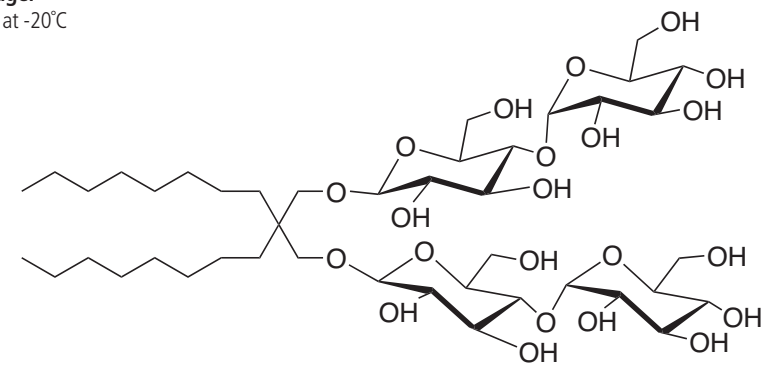
[2,2-Dioctylpropane-1,3-bis-β-D-Maltopyranoside]

NG322 1 gm, 5 gm, 25 gm

Storage:
Store at -20˚C

Chemical Properties:
FW: 949.1 $C_{43}H_{80}O_{22}$

Product Specifications:
Form: White solid
Solubility: Water



Lauryl Maltose Neopentyl Glycol

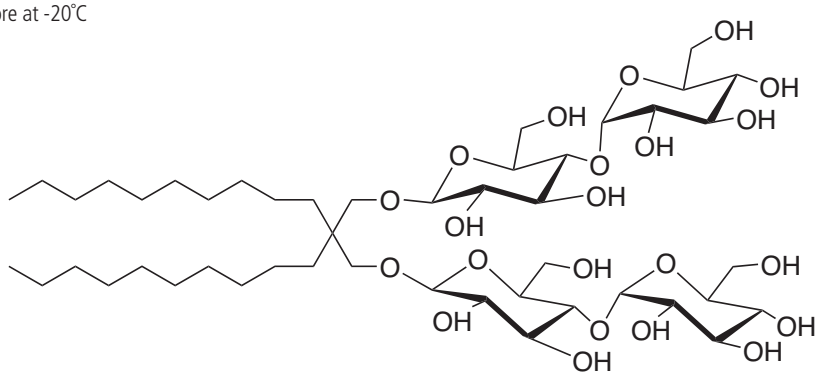
[2,2-Didecylpropane-1,3-bis--D-Maltopyranoside]

NG310 1 gm, 5 gm, 25 gm

Storage:
Store at -20˚C

Chemical Properties:
FW: 1005.2 $C_{47}H_{88}O_{22}$

Product Specifications:
Form: White solid
Solubility: Water



Octyl Glucose Neopentyl Glycol

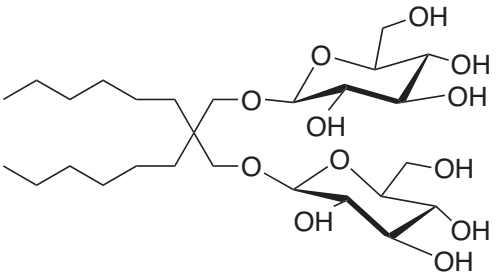
[2,2-Dihexylpropane-1,3-bis-β-D-Glucopyranoside]

NG311 1 gm, 5 gm, 25 gm

Storage:
Store at -20˚C

Chemical Properties:
FW: 568.7 $C_{27}H_{52}O_{12}$

Product Specifications:
Form: White solid
Solubility: Water



Cy-Tripglu

[N-(1,3-bis(Glucopyranoside)propan-2-yl)-3-Butyl-3-Cyclohexylheptanamide]

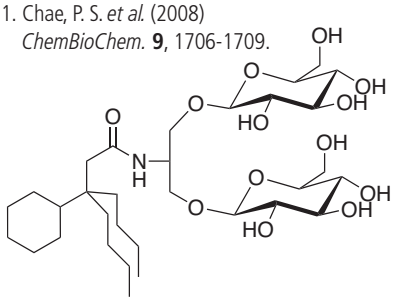
T385	500 mg 1 gm 5 gm

Chemical Properties:
FW: 655.8 $C_{32}H_{59}NO_{13}$

Product Specifications:
CMC (H_2O): 1.8 mM
Purity: > 97% pure by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: > 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2
260 nm: < 0.2

Reference:
1. Chae, P. S. *et al.* (2008) *ChemBioChem.* **9**, 1706-1709.



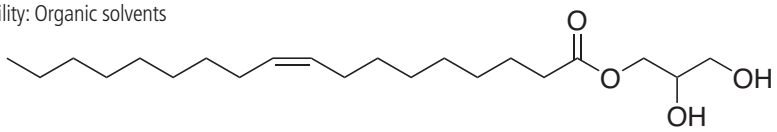
MonoOlein

LCP18	100 mg 500 mg 1 gm

Chemical Properties:
FW: 378.5 [111-03-5] $C_{21}H_{40}O_4$

Product Specifications:
Form: Clear liquid to waxy solid at room temperature
Solubility: Organic solvents

Storage:
Store at -20°C



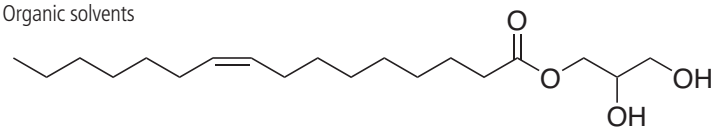
MonoPalmitolein

LCP16	100 mg 500 mg 1 gm

Chemical Properties:
FW: 328.4 [37515-61-0] $C_{19}H_{36}O_4$

Product Specifications:
Form: Clear liquid to waxy solid at room temperature
Solubility: Organic solvents

Storage:
Store at -20°C



Tripao

[3-(3-Butyl-3-Phenylheptanamido)-N,N-Dimethylpropan-1-Amine Oxide]

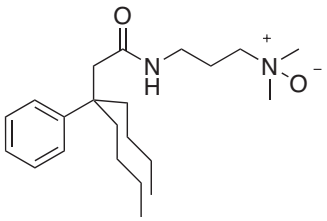
T370	1 gm 5 gm 25 gm

Chemical Properties:
FW: 362.5 $C_{22}H_{38}N_2O_2$
CMC (H_2O): ~ 4.5 mM[1]

Product Specifications:
Purity: ≥ 95% by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: ≥ 2%
Conductance (1% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.2
280 nm: < 0.3

References:
1. McQuade, D. T., Quinn, M. A., Yu, S. M., *et al.* (2000) *Angew Chem Int Ed.* **39**, 758-761.
2. Yu, S. M., McQuade, D. T., Quinn, M. A., *et al.* (2000) *Protein Sci.* **9**, 2518-2527.
3. Theisen, M. J., Potocky, T. B., McQuade, D. T., *et al.* (2005) *Biochim Biophys Acta.* **1751**, 213-216.



Ph-Tripglu

[N-(1,3-bis(Glucopyranoside)propan-2-yl)-3-Butyl-3-Phenylheptanamide)]

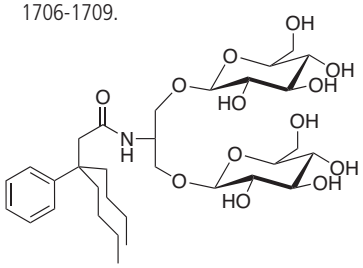
T380	500 mg 1 gm 5 gm

Chemical Properties:
FW: 659.8 $C_{32}H_{53}NO_{13}$

Product Specifications:
CMC (H_2O): 3.6 mM[1]
Purity: > 97% pure by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: > 10%
Conductance (10% solution): < 500 µS

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.2

Reference:
1. Chae, P. S. *et al.* (2008) *ChemBioChem.* **9**, 1706-1709.



Heavy Atom Detergents

Product information
Deuterated detergents
Selenium detergents
Selenomethionine

A new heavy-weight solution to
your resolution challenge.

Product Information

Deuterated Detergents

Affymetrix now offers both fully (perdeuterated) and semi-deuterated detergents for increased robustness and ease of use in NMR. NMR studies of membrane and other hydrophobic or lipophilic proteins often require the use of a lipid or lipid-like detergent to maintain solubility and stability[1-3]. However, this can create NMR signal interference from the increased concentration of hydrogen atoms added by the densely packed detergent.

Deuterated detergents have the benefit of being NMR silent and thereby reduce interference caused by increases in the concentration of hydrogen atoms from densely packed detergent. By replacing the hydrogen atoms in the detergent with deuterium atoms the interference is silenced and it is easier to resolve the protein structure.

In addition, partially deuterated molecules can be used to improve the visualization of specific regions of protein detergent interaction such as putative binding sites[4]. A recent study also indicates the potential for deuterium itself to provide enough additional density in a crystal structure that resolution is improved. Check out these unique tools and re-evaluate how you resolve solution or solid phase membrane protein studies.

Selenium Detergents

New Anatrace selenium-based detergents can help improve your crystal phasing during X-ray diffraction. A selenium atom is very dense and in X-ray diffraction studies these dense atoms are used as points of reference to overcome crystal phasing problems. Historically, selenium has been incorporated into protein crystals either by leaching selenium into formed crystals or by proteins selenated via expression in media containing selenomethionine compounds.

Replacing your current detergent that previously produced poor X-ray diffraction results with an equivalent selenium-based Anatrace product will create reference points and help to resolve your protein. In addition, recent membrane protein studies have suggested that detergents can bind at putative lipid binding sites on membrane proteins. Anatrace detergents offer analogs of Lauryl Maltoside, Decyl Maltoside, and Octyl Glucoside as seleniated detergents.

References:

1. Jun Kim, H., Howell, S. C., Van Horn, W. D., Ho Jeon, Y., Sanders, C. R. (2009) *Prog. Nucl. Magn. Reson. Spectrosc.* **55**, 335-360.
2. Sanders, C. R., So, F. (2006) *Magn Reson Chem* **44**, S24-40.
3. Varga, K., Aslimovska, L., Parrot, I., Dauvergne, M.-T., Haertlein, M., Forsyth, V. T., Watts, A. (2007) *Biochimica er Biophysica Acta (BBA) - Biomembranes* **1768**, 3029-3035.
4. Catoire, L. J., Damian, M., Giusti, F., Martin, A., van Heijenoort, C., Popt, J.-L., Guittet, R., Baneres, J.-L. (2010) *J. Am. Chem. Soc.* **132**, 9049-9057.

n-Dodecyl-d25–β–D-Maltopyranoside

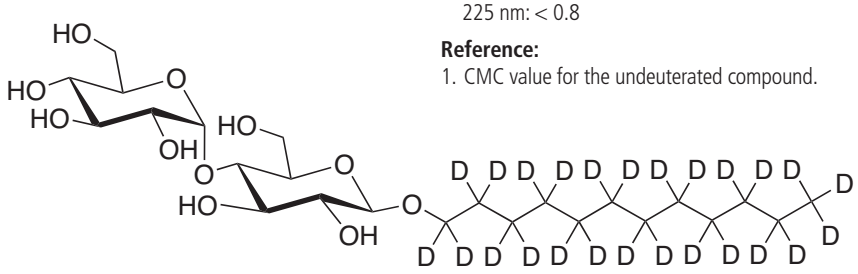
(n-Dodecyl-d25–β–D-Maltoside, Lauryl Maltoside)

D310T	100 mg 250 mg 500 mg

Chemical Properties:
FW: 535.8 [849110-74-3] $C_{24}D_{25}H_{21}O_{11}$
CMC (H_2O): ~ 0.2 mM[1]

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 15 (HPLC)
Percent dodecanol: < 0.05 (HPLC)
pH (1% solution): 5-8

Solubility in water at 20˚C: ≥ 10%
Conductance (1% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10



Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.25
260 nm: < 0.25
225 nm: < 0.8

Reference:
1. CMC value for the undeuterated compound.

Fos-Choline-10, Per Deuterated Head

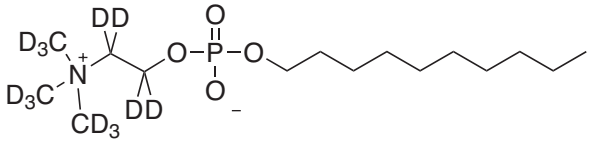
[n-Decyl Phosphocholine-d13]

F304PDH	100 mg 500 mg 1 gm

Chemical Properties:
FW: 336.5 $C_{15}H_{21}D_{13}NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Fos-Choline-10, Semi Deuterated Head

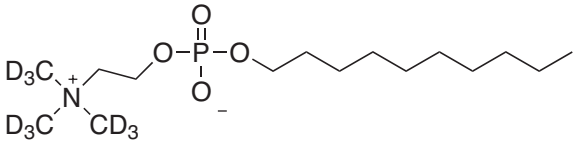
[n-Decyl Phosphocholine-d9]

F304SDH 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 332.5 $C_{15}H_{25}D_9NO_4P$

Product Specifications:
Form: White solid
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Fos-Choline-11, Per Deuterated Head

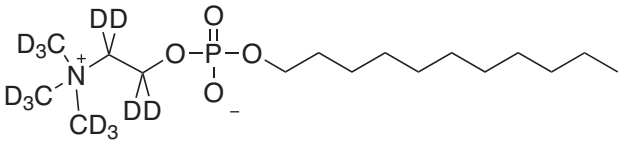
[n-Undecyl Phosphocholine-d13]

F306PDH 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 350.5 $C_{16}H_{23}D_{13}NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Fos-Choline-11, Semi Deuterated Head

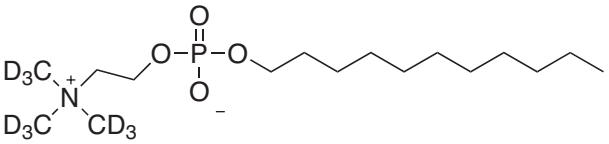
[n-Undecyl Phosphocholine-d9]

F306SDH 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 346.5 $C_{16}H_{27}D_9NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Deuterated Detergents

Fos-Choline-12, Deuterated

[n-Dodecylphosphocholine-d38]

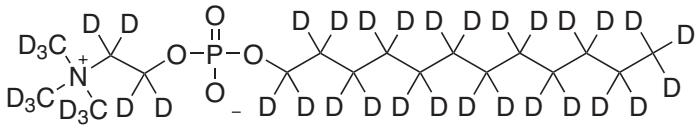
F308D 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 389.8 [130890-78-7] $C_{17}D_{38}NO_4P$
CMC (H_2O): ~ 1.5 mM[1] (0.047%)
Aggregation number (H_2O)[2]: ~54
dn/dc (H_2O)[8]: 0.1398 ml/gm

Product Specifications:
Purity: ≥ 90% pure by HPLC analysis.
pH (1% solution): 4-9

References:

1. Anatrace measurement – CMC value for the undeuterated compound.
2. Aggregation number for the undeuterated compound.
3. Fares C., Libich D. S., Harauz G. (2006) *FEBS J.* **273**, 601-614.
4. Brunecky, R., Lee, S., Rzepecki, P. W., *et al.* (2005) *Biochemistry* **44**, 16064-16071.
5. Oxenoid K., Chou, J. J. (2005) *Proc. Natl. Acad. Sci. USA* **102**, 10870-10875.
6. Uteng, M., Hauge, H. H., Markwick, P. R. L., FimLand, G., Mantzilas, D., Nissen-Meyer, J., and Muhle-Goll, C. (2003) *Biochem.* **42**, 11417-11426.
7. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.
8. dn/dc for the undeuterated compound.



Fos-Choline-12, Per Deuterated Head

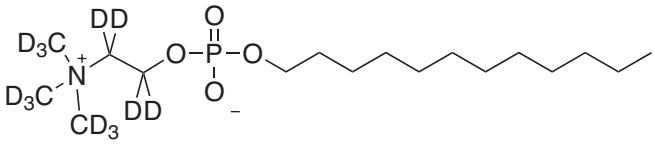
[n-Dodecyl Phosphocholine-d13]

F308PDH 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 364.5 $C_{17}H_{25}D_{23}NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Fos-Choline-12, Per Deuterated Tail

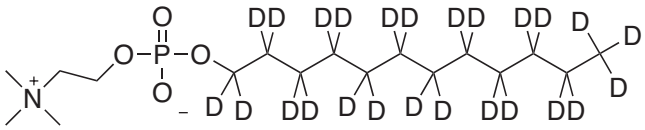
[n-Dodecyl Phosphocholine-d25]

F308PDT 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 376.6 $C_{17}H_{13}D_{25}NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Fos-Choline-12, Semi Deuterated Head

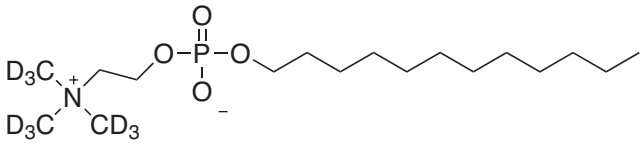
[n-Dodecyl Phosphocholine-d9]

F308SDH 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 360.5 $C_{17}H_{29}D_9NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Fos-Choline-14, Deuterated

[n-Tetradecylphosphocholine-d42]

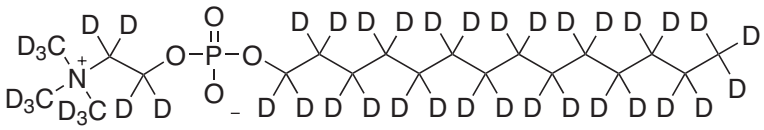
F312D 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 421.5 [869638-98-2] $C_{19}D_{42}NO_4P$
CMC (H_2O): ~ 0.12 mM[1] (0.0051%)
Aggregation number (H_2O)[2]: ~108
dn/dc (H_2O)[3]: 0.1416 ml/gm

Product Specifications:
Purity: ≥ 90% pure by HPLC analysis.
pH (1% solution): 4-9
Solubility in water at 20˚C: > 1%

References:

1. Anatrace measurement – CMC value for the undeuterated compound.
2. Aggregation number for the undeuterated compound.
3. dn/dc for the undeuterated compound.
4. Strop, P. and Brunger, A. T. (2005) *Protein Sci.* **14**, 2207-2211.
5. Zeisig, R., Ress, A., Fichtner, I. Walther, W. (2003) *Cancer Gene Ther.* **10**, 302-311.



Fos-Choline-14, Per Deuterated Head

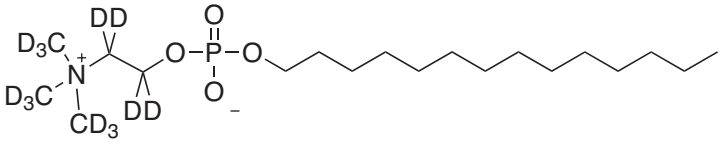
[n-Tetradecyl Phosphocholine-d13]

F312PDH 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 392.6 $C_{19}H_{29}D_{13}NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



Fos-Choline-14, Semi Deuterated Head

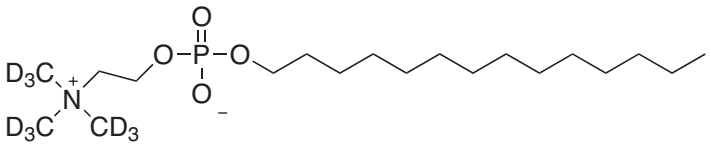
[n-Tetradecyl Phosphocholine-d9]

F312SDH 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 388.6 $C_{19}H_{33}D_9NO_4P$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 99%
Conductance (10% solution): < 200 µS
pH (1% solution): 5-9
Percent fluoresence due to a 0.1% detergent solution at 345 nm: <10

Absorbance of 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.08
260 nm: < 0.1



n-Octyl-d17–β–D-Glucopyranoside-d7

[n-Octyl-d17–β–D-Glucoside-d7]

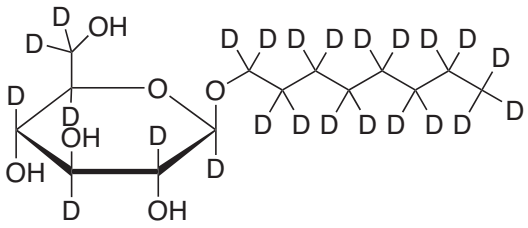
O311D 100 mg, 250 mg, 500 mg

Chemical Properties:
FW: 316.5 [869666-57-9] $C_{14}D_{24}H_4O_6$
CMC (H_2O): ~ 19 mM[1]

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
Percent alpha: < 2 (HPLC)
Percent octanol: < 0.05 (HPLC)
Conductance (1% solution): < 40 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.1
280 nm: < 0.15
260 nm: < 0.15
225 nm: < 0.5

Reference:
1. CMC value for the undeuterated compound.



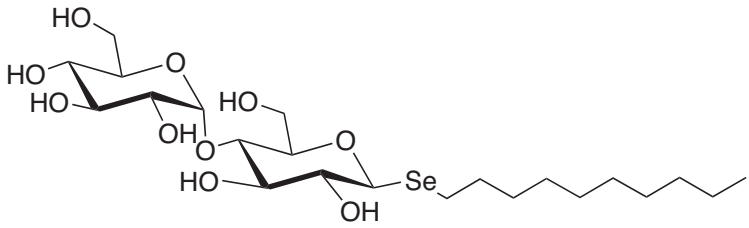
Decyl-β-D-Selenomaltoside

D910 500 mg
1 gm

Chemical Properties:
FW: 545.5 $C_{22}H_{42}O_{10}Se$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 97%

Solubility in water at 20˚C: ≥10%
Conductance (10% solution): < 100 µS
pH (1% solution): 5-9



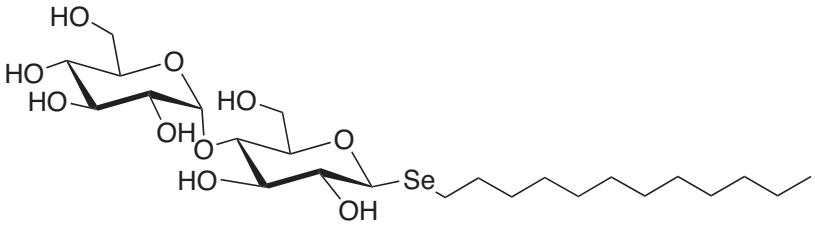
Dodecyl-β-D-Selenomaltoside

D912 500 mg
1 gm

Chemical Properties:
FW: 573.6 $C_{24}H_{46}O_{10}Se$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 97%

Solubility in water at 20˚C: ≥10%
Conductance (10% solution): < 100 µS
pH (1% solution): 5-9



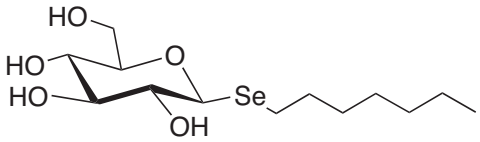
Heptyl-β-D-Selenoglucoside

H907 500 mg
1 gm

Chemical Properties:
FW: 341.3 $C_{13}H_{26}O_5Se$

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 97%

Solubility in water at 20˚C: ≥ 1%
Conductance (10% solution): < 100 µS
pH (1% solution): 5-9



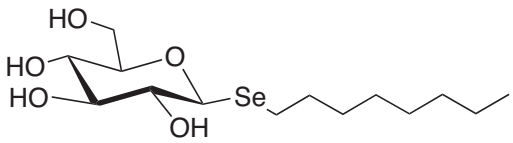
Selenium Detergents

Octyl-β-D-Selenoglucoside

O908 500 mg, 1 gm

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 97%
Solubility in water at 20˚C: ≥ 0.1%
Conductance (10% solution): < 100 µS
pH (1% solution): 5-9

Chemical Properties:
FW: 355.3 $C_{14}H_{28}O_5Se$

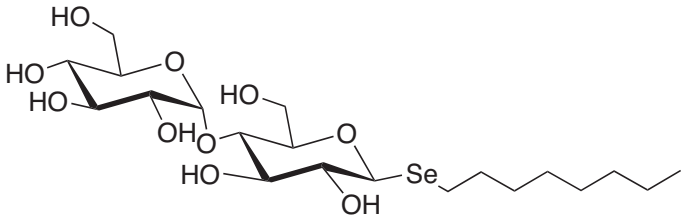


Octyl-β-D-Selenomaltoside

O918 500 mg, 1 gm

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 97%
Solubility in water at 20˚C: ≥ 1%
Conductance (10% solution): < 100 µS
pH (1% solution): 5-9

Chemical Properties:
FW: 517.5 $C_{20}H_{38}O_{10}Se$

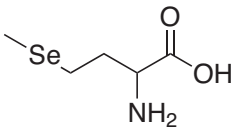


L-(+)-Selenomethionine, Anagrade

[(S)-2-Amino-4-(Methylseleno)butyric Acid]

S2000 250 mg, 1 gm, 5 gm

Product Specifications:
Purity: ≥ 98% pure by HPLC analysis.
Specific Rotation: $[\alpha]_D^{20}$ (C=0.5 in 2 N HCl) +18.5˚ ± 1.5˚
Melting Point: 258-262˚C
Solubility: Soluble in water, slightly soluble in methanol
IR spectrum conforms to specifications.



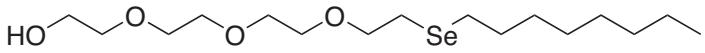
Chemical Properties:
FW: 196.1 [3211-76-5] $C_5H_{11}NO_2Se$

12-Selenotetraethyleneglycol Mono Octyl Ether

T908	500 mg 1 gm

Product Specifications:
Form: White solid
Purity: ≥ 97%
NMR and MS conform to standard

Chemical Properties:
FW: 369.4 $C_{16}H_{34}O_4Se$

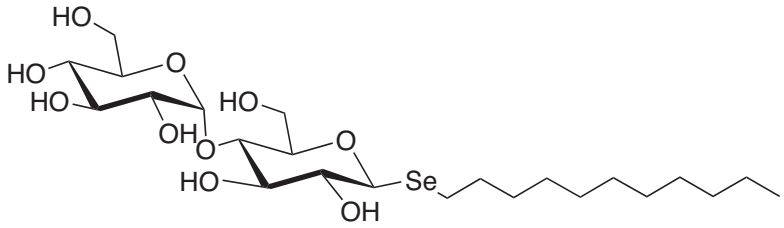


Undecyl-β-D-Selenomaltoside

U911	500 mg 1 gm

Product Specifications:
Form: White solid
Solubility: Water
Purity: ≥ 97%
Solubility in water at 20˚C: ≥10%
Conductance (10% solution): < 100 µS
pH (1% solution): 5-9

Chemical Properties:
FW: 573.6 $C_{23}H_{44}O_{10}Se$



Molecular Biology Detergents

Common detergents for molecular biology

Research can be difficult.
Finding the right product
doesn't have to be.

2-Aminoethyl Methane Thiosulfonate Hydrobromide

[MTSEA]

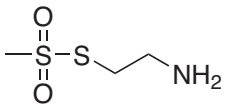
A110MT 100 mg, 500 mg, 1 gm

Chemical Properties:
FW: 236.2 [16599-33-0] $C_3H_9NO_2S_2 \cdot HBr$

Product Specifications:
Positively charged reagent that reacts very rapidly and specifically with cysteine groups.

Half-life (pH 7.0, 20˚C): ~ 12.0 minutes[2]
Half-life (pH 6.0, 20˚C): ~ 92.0 minutes[2]
Half-life (pH 7.0, 4˚C): ~ 116.0 minutes[2]

References:
1. Karlin, A. and Akabas, M. H. (1998) *Methods Enzymol.* **293**, 123-136.
2. Sobszak, I. and Lolkema, J. S. (2003) *Biochem.* **42**, 9789-9796.



Big Chap, Analytical Grade

[N,N'-bis-(3-D-Gluconamidopropyl)Cholamide]

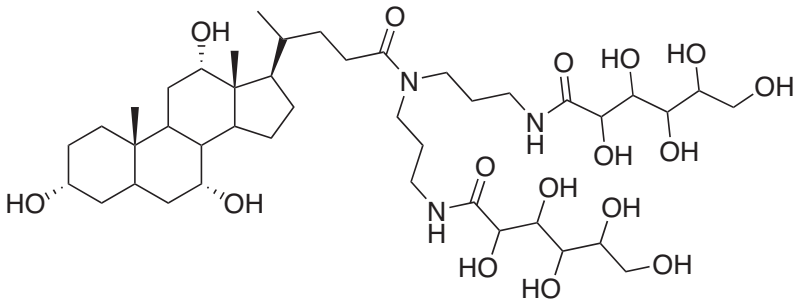
B300 1 gm, 5 gm, 25 gm

Chemical Properties:
FW: 878.1 [86303-22-2] $C_{42}H_{75}N_3O_{16}$
CMC (H_2O): ~ 2.9 mM[1] (0.25%)
Aggregation number (H_2O)[1]: ~ 10

Product Specifications:
Purity: ≥ 95% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.30
260 nm: < 0.40

Reference:
1. Hjelmeland, L. M., Klee, W. A. and Osborne, J. C. (1983) *Anal. Biochem.* **130**, 485-490.



Big Chap, Deoxy, Analytical Grade

[N,N'-bis-(3-D-Gluconamidopropyl) Deoxycholamide]

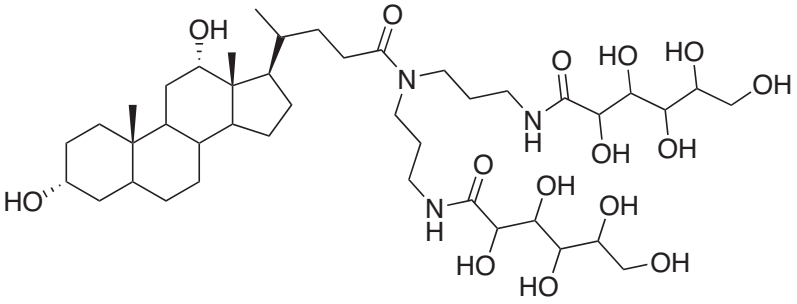
B310 1 gm, 5 gm

Chemical Properties:
FW: 862.1 [86303-23-3] $C_{42}H_{75}N_3O_{15}$
CMC (H_2O): ~ 1.4 mM[1] (0.12%)
Aggregation number (H_2O)[1]: ~ 8-16

Product Specifications:
Purity: ≥ 95% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water at 20˚C: ≥ 10%
Conductance (10% solution): < 200 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.30
260 nm: < 0.40

Reference:
1. Hjelmeland, L. M., Klee, W. A. and Osborne, J. C. (1983) *Anal. Biochem.* **130**, 485-490.



Brij® 35

[Polyoxyethylene Lauryl Ether]

B035	100 gm
	500 gm
	1 kg
	5 kg

Chemical Properties:
FW: avg. 1198.0 [9002-92-0]
$(C_2H_4O)_nC_{12}H_{26}O$, n ~ 23

Product Specifications:
Form: White waxy solid
Acid number: ≤5.0
Hydroxyl number: 40-60
Moisture: ≤3.0%
Flash Point: ≥300˚F
Pour Point: Approx. 33˚C
Specific Gravity (25˚C): Approx. 1.05
Detergent for Stein-Moore chromatography.

$$CH_3(CH_2)_{11}O(CH_2CH_2O)_{23}H$$

CHAPS, Anagrade

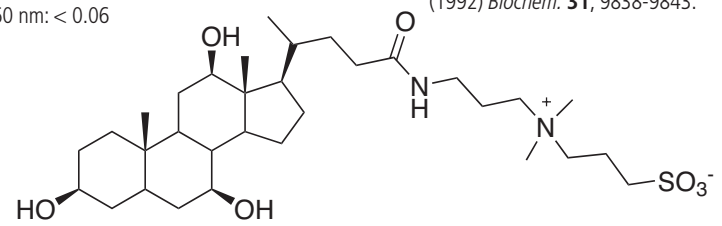
[3-[(3-Cholamidopropyl)-Dimethylammonio]-1-Propane Sulfonate] / N,N-Dimethyl-3-Sulfo-N-[3-[[3α,5β,7α,12α)-3,7,12-Trihydroxy-24-Oxocholan-24-yl] Amino]propyl]-1-Propanaminium Hydroxide, Inner Salt]

C316	1 gm
	5 gm
	10 gm
	25 gm

Chemical Properties:
FW: 614.9 [75621-03-3] $C_{32}H_{58}N_2O_7S$
CMC (H_2O): ~ 8 mM[1] (0.49%)
Aggregation number (H_2O)[2]:~ 10
dn/dc (H_2O)[3]: 0.1323 ml/gm

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water: ≥ 0.5 M
Conductance (0.5 M solution): < 50 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06



References:

1. Hjelmeland, L. M., Nebert, D. W. and Osborne, Jr., J. C. (1983) *Anal. Biochem.* **130**, 72-82.
2. Womack, M. D., Kendall, D. A. and MacDonald, R. C. (1983) *Biochim. Biophys. Acta* **733**, 210-215.
3. Measurement obtained in collaboration with Professor Mark Foster (University of Akron) under an experimental services contract.
4. Bellis, S. L., Kass-Simon, G. and Rhoads, D. E. (1992) *Biochem.* **31**, 9838-9843.

CHAPS, Sol-Grade

[3-[(3-Cholamidopropyl)-Dimethylammonio]-1-Propane Sulfonate] / N,N-Dimethyl-3-Sulfo-N-[3-[[3α,5β,7α,12α)-3,7,12-Trihydroxy-24-Oxocholan-24-yl] Amino]propyl]-1-Propanaminium Hydroxide, Inner Salt]

C316S	5 gm
	25 gm
	100 gm

Chemical Properties:
FW: 614.9 [75621-03-3] $C_{32}H_{58}N_2O_7S$
CMC (H_2O): ~ 8 mM[1] (0.49%)
Aggregation number (H_2O)[2]:~ 10
dn/dc (H_2O)[3]: 0.1323 ml/gm

Product Specifications:
Purity: ≥ 97% pure by HPLC analysis.
pH (1% solution): 5-8
Solubility in water: ≥ 0.5 M
Conductance (0.5 M solution): < 200 µS
Absorbance of a 1% detergent solution:
340 nm: < 0.05
280 nm: < 0.1
260 nm: < 0.2

References:
See C316 for references and structure.

CHAPSO, Anagrade

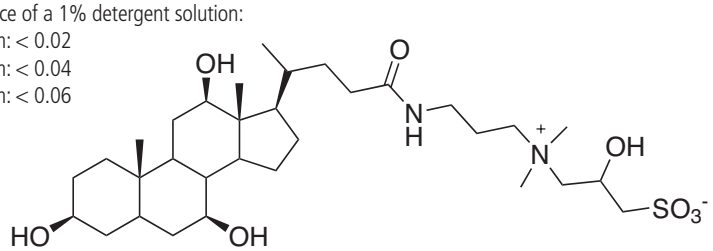
[3-[(3-Cholamidopropyl)dimethylammonio]-2-Hydroxy-1-Propanesulfonate]

C317	1 gm
	5 gm
	5x10 ml
	25 gm

Chemical Properties:
FW: 630.9 [82473-24-3] $C_{32}H_{58}N_2O_8S$
CMC (H_2O): ~ 8 mM[1] (0.50%)
Aggregation number (H_2O)[1]: ~ 11

Product Specifications:
Purity: ≥ 99% by HPLC analysis.
pH (1% solution): 5-8
Solubility in water: ≥ 0.5 M
Conductance (0.5 M solution): < 100 µS
Percent fluorescence due to a 0.1% detergent solution at 345 nm: < 10

Absorbance of a 1% detergent solution:
340 nm: < 0.02
280 nm: < 0.04
260 nm: < 0.06



References:

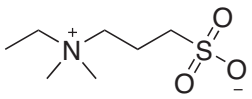
1. Hjelmeland, L. M., Nebert, D. W. and Osborne, Jr., J. C. (1983) *Anal. Biochem.* **130**, 72-82.
2. Cladera, J., Rigaud, J., Villaverde, J. and Dunach, M. (1997) *Eur. J. Biochem.* **243**, 798-804.
3. Sanders, C. R. II and Prestegard, J. H. (1990) *Biophys. J.* **58**, 447-460.

NDSB-195

[Dimethylethylammoniumpropanesulfonate]

ND195 5 gm, 25 gm, 100 gm

Product Specifications:
Solubility in water: ≥ 10%
IR spectrum conforms to specifications.
Elemental analysis supplied with each lot (C,H,N).



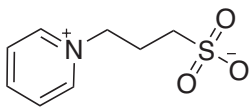
Chemical Properties:
FW: 195.3 [160255-06-1] $C_7H_{17}NO_3S$

NDSB-201

[(3-1-Pyridino)-1-Propane Sulfonate / 1-(3-Sulfopropyl)-Pyridinium Hydroxide, Inner Salt]

ND201 25 gm, 100 gm, 500 gm

Product Specifications:
Solubility in water: ≥ 10%
IR spectrum conforms to specifications.
Elemental analysis supplied with each lot (C,H,N).



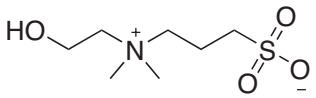
Chemical Properties:
FW: 201.2 [15471-17-7] $C_8H_{11}NO_3S$

NDSB-211

[Dimethyl(2-Hydroxyethyl)Ammonium-1-Propanesulfonate]

ND211 1 gm, 5 gm, 25 gm

Product Specifications:
Solubility in water: ≥ 10%
IR spectrum conforms to specifications.
Elemental analysis supplied with each lot (C,H,N).



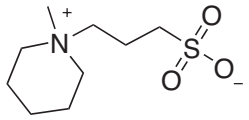
Chemical Properties:
FW: 211.3 [38880-58-9] $C_7H_{17}NO_4S$

NDSB-221

[3-(1-Methylpiperidinium)-1-Propane Sulfonate]

ND221 5 gm, 25 gm, 100 gm

Product Specifications:
Solubility in water: ≥ 10%
IR spectrum conforms to specifications.
Elemental analysis supplied with each lot (C,H,N).



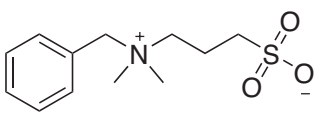
Chemical Properties:
FW: 221.3 [160788-56-7] $C_9H_{19}NO_3S$

NDSB-256

[Dimethylbenzylammoniumpropanesulfonate]

ND256 5 gm, 25 gm, 100 gm

Product Specifications:
Solubility in water: ≥ 10%
IR spectrum conforms to specifications.
Elemental analysis supplied with each lot (C,H,N).



Chemical Properties:
FW: 257.4 [81239-45-4] $C_{12}H_{19}NO_3S$

Nonidet P40 Substitute

[Igepal CA-630 / Octylphenoxy] Polyethoxyethanol]

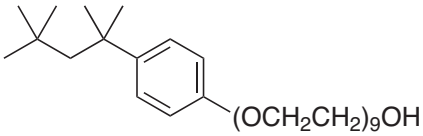
NIDP40	500 ml 1 lt

Chemical Properties:
FW avg.: 603.0 [2497-59-8]
CMC (50 mM Na^+): ~ 0.05-0.3 mM[1]
Aggregation number (H_2O)[1]: ~ 100-155
Density: 1.060 + 0.005

Product Specifications:
Form: Clear, slightly yellow-green viscous liquid.
Chemically indistinguishable from Nonidet P40, which is no longer commercially available.

References:

1. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.



Pluronic® F-68

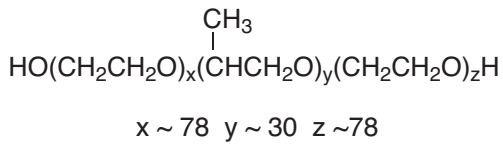
[Polyoxyethylene-Polyoxypropylene Block Copolymer / Methyl-Oxirane, Polymer with Oxirane, (C_3H_6O•C_2H_4O)x / Poloxamer 188]

P300	100 gm 500 gm

Chemical Properties:
FW: ~ 8400.0 [9003-11-6] $EO_{78}PO_{30}EO_{78}$
CMC (H_2O, 27°C): ~ 17.9 mM[1,2]

References:

1. Alexandridis, P., Holzwarth, J. F. and Hatton, T. A. (1994) *Macromolecules* **27**, 2414-2425.
2. Alexandridis, P., Athanassiou, V., Fukuda, S. and Hatton, T. A. (1994) *Langmuir* **10**, 2604-2612.



Pluronic F-127

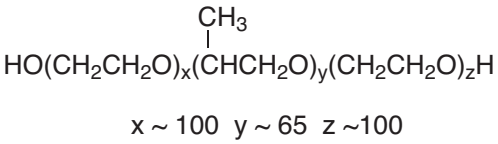
[Polyoxyethylene-Polyoxypropylene Block Copolymer / Methyl-Oxirane, Polymer with Oxirane, (C_3H_6O•C_2H_4O)x / Poloxamer 407]

P305	100 gm 500 gm

Chemical Properties:
FW: ~ 12600.0 [9003-11-6] $EO_{100}PO_{65}EO_{100}$
CMC (H_2O, 19.5°C): ~ 3.97 mM[1,2]

References:

1. Alexandridis, P., Holzwarth, J. F. and Hatton, T. A. (1994) *Macromolecules* **27**, 2414-2425.
2. Alexandridis, P., Athanassiou, V., Fukuda, S. and Hatton, T. A. (1994) *Langmuir* **10**, 2604-2612.



Sodium (2-Sulfonatoethyl) Methanethiosulfonate

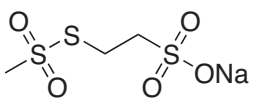
[MTSES / Methanesulfonothioic Acid, Sodium Salt]

S110MT	100 mg 500 mg 1 gm

Chemical Properties[1, 3, 4]**:**
FW: 242.3 [1950-85-2] $C_3H_7NaO_5S_3$
Negatively charged reagent that reacts very rapidly and specifically with cysteine groups.
Half-life (pH 7.0, 20°C): ~ 370.0 minutes[2]

References:

1. Akabas, M. H., Stauffer, D. A., Xu, M. and Karlin, A. (1992) *Science* **258**, 307-310.
2. Karlin, A. and Akabas, M. H. (1998) in *Methods Enzymol.* **293**, 123-136.
3. Stauffer, D. A. and Karlin, A. (1994) *Biochem.* **33**, 6840-6849.
4. Sobszak, I. and Lolkema, J. S. (2003) *Biochem.* **42**, 9789-9796.



[2-(Trimethylammonium)Ethyl] Methane Thiosulfonate Bromide

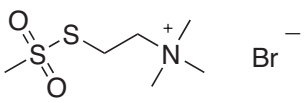
[MTSET]

T110MT 100 mg, 500 mg, 1 gm

Chemical Properties[1–3]**:**
FW: 278.2 [91774-25-3] $C_6H_{16}BrNO_2S_2$
Positively charged reagent that reacts very rapidly and specifically with cysteine groups.
Half-life (pH 7.0, 20˚C): ~ 11.2 minutes[1]
Half-life (pH 6.0, 20˚C): ~ 55.0 minutes[1]

References:

1. Karlin, A. and Akabas, M. H. (1998) *Methods in Enzymol.* **293**, 123-136.
2. Stauffer, D. A. and Karlin, A. (1994) *Biochem.* **33**, 6840-6849.
3. Sobszak, I. and Lolkema, J. S. (2003) *Biochem.* **42**, 9789-9796.



Triton® X-100

[α–[4-(1,1,3,3-Tetramethylbutyl)phenyl]–ω–Hydroxy-Poly(Oxy-1-2-Ethanediyl)]

T1001 500 ml, 1 ga

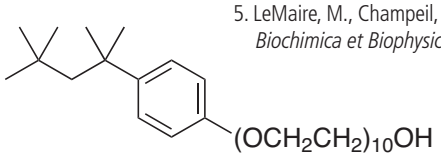
Chemical Properties:
FW avg.: 647.0 [9002-93-1]
t-Oct-C_6H_4-$(OCH_2CH_2)_X$OH, x = 9-10
CMC (H_2O): ~ 0.010 - 0.016%[1-4] (w/v) (0.015%)
Aggregation number (H_2O)[5] ~ 75-165
Density: 1.070

See also Anapoe-X-100, page 78

Product Specifications:
Form: Clear viscous liquid
IR spectrum conforms to specifications.
Precautions: Store at room temperature. Protect from moisture.

Reference:

1. Vendittis, E., Paumbo, G., Parlata, G., and Borchini, U. (1981) *Anal.Biochem.* **115**, 278-286.
2. Ross, S. and Oliver, J. P. (1959) *J. Phys.Chem.* **63**, 1671-1674.
3. Mankovich, A. M. (1964) *J. Amer. Oil Chem. Soc.* **41**, 449-452.
4. Rosenthal, K. S. and Koussale F. (1983) *Anal. Chem.* **55**, 1115-1117.
5. LeMaire, M., Champeil, P. and Moller, J. V. (2000) *Biochimica et Biophysica Acta* **1508**, 86-111.



Triton X-114

[α–[(1,1,3,3-Tetramethylbutyl)phenyl]–ω–Hydroxy-Poly(Oxy-1-2-Ethanediyl)]

T1002 500 ml

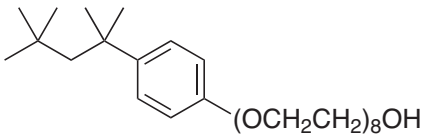
Chemical Properties:
FW avg.: 536.0 [9036-19-5]
t-Oct-C_6H_4-$(OCH_2CH_2)_X$OH, x = 7-8
CMC (H_2O): ~ 0.009%[1] (w/v) (0.011%)

See also Anapoe-X-114, page 79

Product Specifications:
Form: Clear viscous liquid
IR spectrum conforms to specifications.
Precautions: Store at room temperature. Protect from moisture.

Reference:

1. Rosenthal, K. S. and Koussale F. (1983) *Anal. Chem.* **55**, 1115-1117.



Tween® 20

[Polyoxyethylene(20)sorbitan Monolaurate] Poly(oxy-1,2-Ethanediyl) Derivs., Sorbitan Monododecanoate

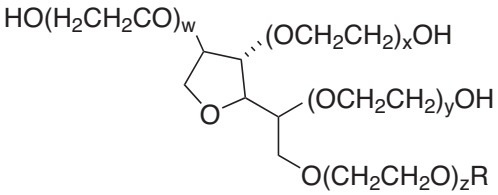
T1003 500 ml, 1 ga

Chemical Properties:
FW avg.: 1228.0 [9005-64-5]
CMC (H_2O): ~ 0.059 mM[1] (0.0072%)

See also Anapoe-20, page 75

Product Specifications:
Form: Clear viscous liquid
IR spectrum conforms to specifications.
Precautions: Store at room temperature. Protect from moisture.

References:
1. Helenius, A., McCauslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 743-749.
2. Wu, G., Kulmacz, R. J., and Tsai, A. (2003) *Biochemistry* **42**, 13772-13777.



Sum of w+x+y+z=20
$R=C_{11}H_{23}C(O)$

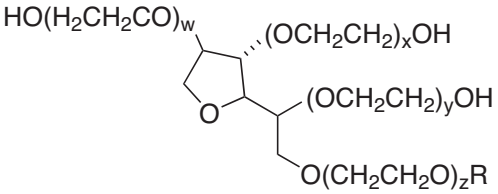
Tween 40

[Polyoxyethylene Sorbitan Monolaurate]

T1005 1 ga

Chemical Properties:
FW avg.: 1284.0 [9005-66-7] $C_{62}H_{122}O_{26}$

Product Specifications:
Form: Yellow liquid



Sum of w+x+y+z=20
$R=C_{15}H_{31}C(O)$

Tween 80

[Polyoxyethylene(80)sorbitan Monolaurate / Poly(oxy-1,2-Ethanediyl) Derivs. (Z)-Sorbitan Mono-9-Octadecenoate]

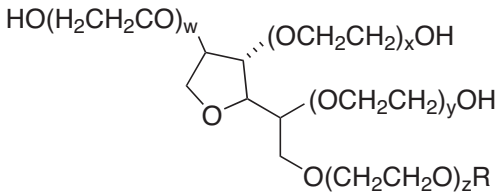
T1004 500 ml, 1 ga

Chemical Properties:
FW avg.: 1310.0 [9005-65-6]
CMC (H_2O): ~ 0.012 mM[1] (0.0016%)
Aggregation number (H_2O)[2]: ~ 58

See also Anapoe-80, page 76

Product Specifications:
Form: Golden-yellow viscous liquid
IR spectrum conforms to specifications.
Precautions: Store at room temperature. Protect from moisture.

References:
1. Helenius, A., McCauslin, D. R., Fries, E. and Tanford, C. (1979) *Methods Enzymol.* **56**, 743-749.
2. Black, Shaun D.: http://psyche.uthct.edu/shaun/SBlack/detergnt.html.



Sum of w+x+y+z=20
$R=C_{17}H_{33}C(O)$

Detergent Kits

Solid kits

Solution kits

Start with the convenience of our kits.
End with the clarity of your results.

Detergent Kits

To select the optimum detergent or combination of detergents and reagents for a particular membrane protein application, oftentimes multiple detergents must be tested. Moreover, a detergent which is suitable for extraction may not be useful for storage of the purified protein or for biochemical studies conducted on the purified protein. To aid in the detergent selection process, we offer a wide variety of solid and solution based detergent kits.

D399-BIC	**Bicelle Kit** Kit contains two lipids and two detergents: 200 mg DMPC, 200 mg DMPG, 1 gm CHAPS, and 1 gm CHAPSO.
D399-C14	**CYMAL Detergent Kit (1-4)** Kit contains 1 gm of each of the following: CYMAL-1, 2, 3, and 4.
D399-F812	**Fos-Choline Detergent Kit** Kit contains 1 gm of each of the following: Fos-Choline 8, 9, 10, 11, 12, 13, 14, 15, and 16.
D399-G	**Glucopyranoside Detergent Kit** Kit contains 1 gm of each of the following: n-Hexyl–β–D-Glucopyranoside, n-Heptyl–β–D-Glucopyranoside, n-Octyl–β–D-Glucopyranoside, n-Nonyl–β–D-Glucopyranoside, n-Decyl–β–D-Glucopyranoside, and n-Dodecyl–β–D-Glucopyranoside.
D399-IDK	**Ionic Master Detergent Kit** Kit contains 1 gm of each of the 38 detergents listed below:

Anzergent 3-8	Cyclofos-6	Fos-Choline-13	PMAL-C8
Anzergent 3-10	Cyclofos-7	Fos-Choline-14	PMAL-C12
Anzergent 3-12	n-Decyl-N,N-Dimethylglycine	Fos-Choline-15	PMAL-C16
Anzergent 3-14	Deoxycholic Acid, Sodium Salt	Fos-Choline-16	Sodium Dodecanoyl Sarcosine
CHAPS	n-Dodecyl-N,N-Dimethylglycine	Fos-Choline-ISO-9	Sodium Dodecyl Sulfate
CHAPSO	Fos-Choline-8	Fos-Choline-ISO-11	Sodium Taurocholate
Cyclofos-2	Fos-Choline-9	Fos-Choline-UNSAT-11-10	n-Tetradecyl-N,N-Dimethylglycine
Cyclofos-3	Fos-Choline-10	Fos-Mea-8	
Cyclofos-4	Fos-Choline-11	Fos-Mea-10	
Cyclofos-5	Fos-Choline-12	Fos-Mea-12	

D399-M611	**Maltopyranoside Detergent Kit (6-11)** Kit contains 1 gm of each of the following: n-Hexyl–β–D-Maltopyranoside, n-Octyl–β–D-Maltopyranoside, n-Nonyl-β-D-Maltopyranoside, n-Decyl–β–D-Maltopyranoside and n-Undecyl–β–D-Maltopyranoside.
D399-M1216	**Maltopyranoside Detergent Kit (12-16)** Kit contains 1 gm of each of the following: n-Dodecyl–β–D-Maltopyranoside, n-Tridecyl–β–D-Maltopyranoside, n-Tetradecyl–β–D-Maltopyranoside and n-Hexadecyl–β–D-Maltopyranoside.

PLEASE NOTE—While components of the kit are subject to change at any time due to discontinuation etc. of individual items, we endeavor to keep our website up to date to reflect changes in kit configuration.

D399-NDK **Nonionic Master Detergent Kit**

Contains 1 gm of each of the 55 detergents listed below:

- Anameg-7
- Big CHAP
- Big CHAP, Deoxy
- CYGLU-3
- CYGLU-4
- CYMAL-1
- CYMAL-2
- CYMAL-3
- CYMAL-4
- CYMAL-5
- CYMAL-6
- CYMAL-7
- n-Decyl–α–D-Maltopyranoside
- n-Decyl–β–D-Glucopyranoside
- n-Decyl–β–D-Maltopyranoside
- n-Decyl–β–D-Thioglucopyranoside
- n-Decyl–β–D-Thiomaltopyranoside
- 2,6-Dimethyl-4-Heptyl–β–D-Maltopyranoside
- n-Dodecyl–α–D-Maltopyranoside
- n-Dodecyl–β–D-Glucopyranoside
- n-Dodecyl–β–D-Maltopyranoside
- n-Dodecyl–β–D-Thiomaltopyranoside
- n-Dodecyl-N,N-Dimethylamine-N-Oxide (DDAO)
- n-Heptyl–β–D-Glucopyranoside
- n-Heptyl–β–D-Thioglucopyranoside
- n-Hexadecyl–β–D-Maltopyranoside
- Hexaethylene Glycol Monooctyl Ether (C_8E_6) (50% w/w), 2 ml
- n-Hexyl–β–D-Glucopyranoside
- n-Hexyl–β–D-Maltopyranoside
- MEGA-8
- MEGA-9
- MEGA-10
- n-Nonyl–β–D-Glucopyranoside
- n-Nonyl–β–D-Maltopyranoside
- n-Nonyl–β–D-Thioglucopyranoside
- n-Nonyl–β–D-Thiomaltopyranoside
- Octaethylene Glycol Monododecyl Ether ($C_{12}E_8$) (25% w/w), 4 ml
- n-Octyl–α–D-Glucopyranoside
- n-Octyl–β–D-Galactopyranoside
- n-Octyl–β–D-Glucopyranoside
- n-Octyl–β–D-Maltopyranoside
- n-Octyl–β–D-Thioglucopyranoside
- n-Octyl–β–D-Thiomaltopyranoside
- Pentaethylene Glycol Monooctyl Ether (C_8E_5) (50% w/w), 2 ml
- Pentaethylene Glycol Monodecyl Ether ($C_{10}E_5$) (50% w/w), 2 ml
- 2-Propyl-1-Pentyl–β–D-Maltopyranoside
- Sucrose Monododecanoate
- n-Tetradecyl–β–D-Maltopyranoside
- n-Tetradecyl-N,N-Dimethylamine-N-Oxide (TDAO)
- Tetraethylene Glycol Monooctyl Ether (C_8E_4) (50% w/w), 2 ml
- n-Tridecyl–β–D-Maltopyranoside
- n-Undecyl–α–D-Maltopyranoside
- n-Undecyl–β–D-Maltopyranoside
- n-Undecyl–β–D-Thiomaltopyranoside
- ω–Undecylenyl–β–D-Maltopyranoside

D399-POP **Popular Detergent Kit**

Kit contains 1 gm of each of the following: CHAPS, CYMAL-5, Fos-Choline-12, n-Decyl–β–D-Maltopyranoside, n-Dodecyl–β–D-Maltopyranoside and n-Octyl–β–D-Glucopyranoside.

D399-PM816 **Amphipols Refold Detergent Kit**

Kit contains 50 mg of the following: PMAL-C8, PMAL-C12, PMAL-C16, and Amphipol A8-35.

PLEASE NOTE—While components of the kit are subject to change at any time due to discontinuation etc. of individual items, we endeavor to keep our website up to date to reflect changes in kit configuration.

Soluble Detergent Kits Save Time and Money

Anatrace detergents are available in kits as ampuled 10% solutions stored under argon. These solution kits cost a fraction of the one gram detergent kits, making the selection of the right detergent for extraction of a membrane protein less expensive. The master kit listed below contains nearly every detergent offered by Affymetrix that possesses sufficient solubility to prepare a 10% solution.

DSOL-ANP10	**Anapoe Master Kit (10 ml size)** Kit contains 10 ml of all 15 Anapoe detergents: Anapoe-20 Anapoe-35 Anapoe-58 Anapoe-80 Anapoe-$C_{10}E_6$ Anapoe-$C_{10}E_9$ Anapoe-$C_{12}E_8$ Anapoe-$C_{12}E_9$ Anapoe-$C_{12}E_{10}$ Anapoe-$C_{13}E_8$ Anapoe-NID-P40 Anapoe-X-100 Anapoe-X-114 Anapoe-X-305 Anapoe-X-405
DSOL-C57	**CYMAL Detergent Kit (5–7)** Kit contains CYMAL 5, 6, and 7.
DSOL-F812	**Fos-Choline Detergent Kit** Kit contains 1 ml of the following: Fos-Choline 8, 9, 10, 11, 12, 13, 14, 15, and 16.
DSOL-POP	**Popular Detergent Kit** Kit contains CHAPS, CYMAL, n-Decyl–β–D-Maltopyranoside, n-Dodecyl–β–D-Maltopyranodise, Fos-Choline 12, and n-Octyl–β–D-Glycopyranoside.

PLEASE NOTE—While components of the kit are subject to change at any time due to discontinuation etc. of individual items, we endeavor to keep our website up to date to reflect changes in kit configuration.

DSOL-MK **Solution Master Detergent Kit**

Contains one ampule (1 ml of a 10% solution) of each detergent listed below:

Anameg-7
Anapoe-20
Anapoe-35
Anapoe-58
Anapoe-80
Anapoe-$C_{10}E_6$
Anapoe-$C_{10}E_9$
Anapoe-$C_{12}E_8$
Anapoe-$C_{12}E_9$
Anapoe-$C_{12}E_{10}$
Anapoe-$C_{13}E_8$
Anapoe-X-100
Anapoe-X-114
Anapoe-X-305
Anapoe-X-405
Anzergent 3-8
Anzergent 3-10
Anzergent 3-12
Anzergent 3-14
Big CHAP
Big CHAP, Deoxy
CHAPS
CHAPSO
Cyclofos-2
Cyclofos-3
Cyclofos-4
Cyclofos-5
Cyclofos-6
Cyclofos-7
CYGLU-3
CYMAL-1
CYMAL-2
CYMAL-3
CYMAL-4
CYMAL-5
CYMAL-6
CYMAL-7
n-Decyl–α–D-Maltopyranoside
n-Decyl–β–D-Maltopyranoside
n-Decyl–β–D-Thiomaltopyranoside
n-Decyl-N,N-Dimethylglycine
Deoxycholic Acid, Sodium Salt
2,6-Dimethyl-4-Heptyl–β–D-Maltopyranoside
n-Dodecyl–α–D-Maltopyranoside
n-Dodecyl–β–D-Maltopyranoside
n-Dodecyl–β–D-Thiomaltopyranoside
n-Dodecyl-N,N-Dimethylamine-N-Oxide (DDAO)
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Fos-Choline-14
Fos-Choline-15
Fos-Choline-16
Fos-Choline-ISO-9
Fos-Choline-ISO-11
Fos-Choline-Unsat-11-10
Fos-Mea-8
Fos-Mea-10
n-Heptyl–β–D-Glucopyranoside
n-Heptyl–β–D-Thioglucopyranoside
Hexaethylene Glycol Monooctyl Ether (C_8E_6)
n-Hexyl–β–D-Glucopyranoside
n-Hexyl–β–D-Maltopyranoside
MEGA-8
n-Nonyl–β–D-Glucopyranoside
n-Nonyl–β–D-Maltopyranoside
n-Nonyl–β–D-Thiomaltopyranoside
Octaethylene Glycol Monododecyl Ether ($C_{12}E_8$)
n-Octyl–β–D-Glucopyranoside
n-Octyl–β–D-Maltopyranoside
n-Octyl–β–D-Thiomaltopyranoside
Pentaethylene Glycol Monodecyl Ether ($C_{10}E_5$)
PMAL-C8
2-Propyl-1-Pentyl Maltopyranoside
Sodium Cholate
Sodium Dodecanoyl Sarcosine
Sucrose Monododecanoate
n-Tetradecyl–β–D-Maltopyranoside
n-Tetradecyl-N,N-Dimethylamine-N-Oxide (TDAO)
Tetraethylene Glycol Monooctyl Ether (C_8E_4)
n-Tridecyl–β–D-Maltopyranoside
n-Undecyl–α–D-Maltopyranoside
n-Undecyl–β–D-Maltopyranoside
n-Undecyl–β–D-Thiomaltopyranoside

PLEASE NOTE—While components of the kit are subject to change at any time due to discontinuation etc. of individual items, we endeavor to keep our website up to date to reflect changes in kit configuration.

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There's a big difference
between visible
and crystal clear.

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