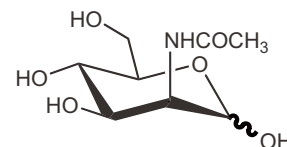


### Substrates

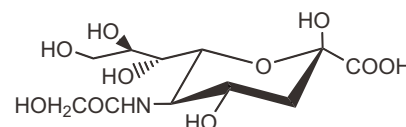
#### ***N*-Acetyl-D-mannosamine, Monohydrate [ManNAc]**

Origin	: Prepared by enzymatic hydrolysis of <i>N</i> -Acetylneuraminic Acid, and purified by crystallization.
Formula	: C <sub>8</sub> H <sub>15</sub> NO <sub>6</sub> · H <sub>2</sub> O (MW : 239.2)
Appearance	: White amorphous powder
Purity	: More than 99% by HPLC. Homogeneous by thin layer chromatographic analysis.
Storage	: Stable when stored on desiccated condition at 5°C.
References	: 1) K. Hotta, M. Kurokawa and S. Isaka, <i>Seikagaku</i> (in Japanese), <b>45</b> (10), 911-915 (1973) 2) S. Blayer, J. M. Woodley, M. J. Dawson and M. D. Lilly, <i>Biotechnology and Bioengineering</i> , <b>66</b> (2), 131-136 (1999)



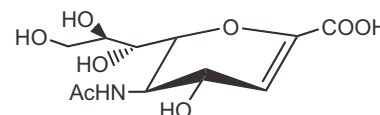
#### ***N*-Glycolylneuraminic Acid [NeuGc; Neu5Gc; NeuNGc]**

Origin	: Prepared by chemo-enzymatic synthesis from glucosamine and pyruvic acid.
Formula	: C <sub>11</sub> H <sub>19</sub> NO <sub>10</sub> (MW : 325.27)
Appearance	: White crystalline powder
Purity	: More than 98% by HPLC
Storage	: Stable when stored on desiccated condition below -20°C.



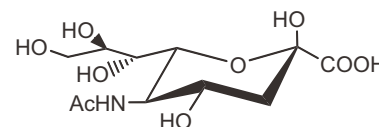
#### **2,3-Dehydro-2-deoxy-*N*-acetylneuraminic Acid [NeuAc2en; NeuNAc2en; Neu5Ac2en]**

Origin	: Prepared by chemical synthesis from <i>N</i> -acetylneuraminic acid. Purified by column chromatography and crystallization.
Formula	: C <sub>11</sub> H <sub>17</sub> NO <sub>8</sub> (MW : 291.25)
Appearance	: White crystalline powder
Purity	: More than 95% by HPLC
Use	: Neuraminidase (sialidase) inhibitor
Storage	: Stable when stored on desiccated condition at -20°C.



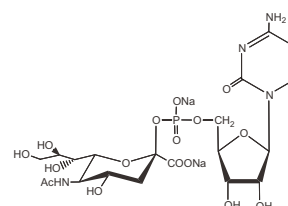
#### ***N*-Acetylneuraminic Acid [NANA; Sialic Acid; NeuAc]**

Origin	: Prepared by enzymatic hydrolysis of Colominic Acid <sup>1)</sup> , or enzymatic synthesis from <i>N</i> -Acetylglucosamine and Pyruvic Acid. <sup>2)</sup> Purified by ion-exchange column chromatography and crystallization.
Formula	: C <sub>11</sub> H <sub>19</sub> NO <sub>9</sub> (MW : 309.27)
Appearance	: White crystalline powder
Purity	: More than 99% by colorimetric determination and HPLC
Uses	: Authentic specimen of the highest purity, substrate for NANA Aldolase and starting material for preparing NANA derivatives.
Storage	: Stable for one year when stored on desiccated condition at 5°C.
References	: 1) Y. Uchida, Y. Tsukada and T. Sugimori, <i>Biochim. Biophys. Acta.</i> , <b>350</b> , 425 (1974) 2) I. Maru, J. Ohnishi, Y. Ohta, and Y. Tsukada, <i>Carbohydr. Res.</i> , <b>306</b> , 575 (1998)



#### **Cytidine-5'-monophospho-*N*-acetylneuraminic Acid, Disodium Salt [CMP-Neu5Ac · 2Na]**

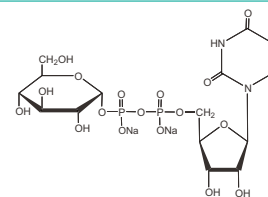
Origin	: Prepared by enzymatic synthesis from <i>N</i> -Acetylneuraminic Acid and CTP. Purified by ion-exchange column chromatography and lyophilization.
Formula	: C <sub>20</sub> H <sub>29</sub> N <sub>4</sub> O <sub>16</sub> PNa <sub>2</sub> (MW : 658)
Appearance	: White lyophilized powder
Purity	: More than 97% by HPLC
Storage	: Stable when stored on desiccated condition below -20°C.



## Substrates

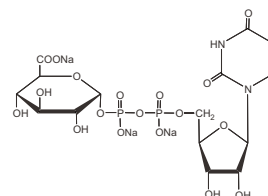
### Uridine-5'-diphosphoglucose, Disodium Salt

Formula	: C <sub>15</sub> H <sub>22</sub> N <sub>2</sub> O <sub>17</sub> P <sub>2</sub> Na <sub>2</sub> (MW : 610.3)
Appearance	: White crystalline powder
Purity	: More than 98% (Moisture : approx. 7%)
Storage	: Stable when stored on desiccated condition at 5°C.



### Uridine-5'-diphosphoglucuronic Acid, Trisodium Salt

Formula	: C <sub>15</sub> H <sub>19</sub> N <sub>2</sub> O <sub>18</sub> P <sub>2</sub> Na <sub>3</sub> (MW : 646.3)
Appearance	: White crystalline powder
Purity	: More than 98% (Moisture : approx. 12%)
Storage	: Stable when stored on desiccated condition at 5°C.



## Enzymes

### **N-Acetylneuraminic Acid Aldolase**    **N-Acetylneuraminate Pyruvate Lyase [EC 4.1.3.3]**

Origin	: <i>Escherichia coli</i>
Reaction	: N-Acetylneuraminate ⇌ N-Acetyl-D-mannosamine + Pyruvate
Appearance	: White amorphous powder
Activity	: More than 30 units/mg protein
Unit definition	: One unit is the amount of enzyme required to liberates 1 μmol of N-Acetylmannosamine (or Pyruvic Acid) per minute at pH 7.7 at 37°C, using N-Acetylneuraminic Acid (NANA) as a substrate.
Storage	: Stable for one year when stored below 5°C. For prolonged storage, keep at -20°C.
Contaminant	: Free from NADH oxidase
Properties <sup>1) 2)</sup> :	
Molecular weight	... Approx. 98,000 Da (gel filtration)
Optimum pH	... 7.5 ~ 8.0
pH stability	... 6.0 ~ 9.0
Thermal stability	... below 65°C (pH 7.0, 20 min)
Substrate specificity	... N-Glycolylneuraminic Acid (NGNA) is cleaved as well as NANA. Km = 3.6 mM (NANA), 4.3 mM (NGNA)
Uses	: Enzymatic determination of Sialic Acid and enzymatic syntheses of novel Sialic Acid derivatives.
References	1) Y. Uchida, Y. Tsukada and T. Sugimori, <i>J. Biochem.</i> , <b>96</b> , 507 (1984) 2) Y. Ohta, M. Shimosaka, K. Murata, Y. Tsukada and A. Kimura, <i>Appl. Microbiol. Biotechnol.</i> , <b>24</b> , 386 (1986)

### **Neuraminidase (Sialidase)**    **Acylneuraminyl Hydrolase [EC 3.2.1.18]**

Origin	: <i>Arthrobacter ureafaciens</i>
Reaction	: Sialyl compound → Sialic Acid + Asialocompound
Appearance	: White amorphous powder
Activity	: More than 80 units/mg protein for N-Acetylneuraminyllactose (NANA-lactose)
Unit definition	: One unit is the amount of enzyme required to liberate 1 μmol of N-Acetylneuraminic Acid (NANA) per minute at pH 5.0 at 37°C.
Storage	: Stable for one year when stored below 5°C. For prolonged storage, keep at -20°C.
Contaminations	: Enzyme activities mentioned below cannot be detected. <sup>1)</sup> Protease, N-Acetylneuraminic Acid Aldolase, Glycosidase such as α-Glucosidase, β-Glucosidase, α-Galactosidase, β-Galactosidase, α-Mannosidase, α-Fucosidase, N-Acetyl-α-glucosaminidase, N-Acetyl-β-glucosaminidase, N-Acetyl-α-galactosaminidase, N-Acetyl-β-galactosaminidase, N-Acetyl-α-mannosaminidase and N-Acetyl-β-mannosaminidase.
Properties <sup>2) 3)</sup> :	
Molecular weight	... Approx. 52,000 Da, 66,000 Da and 88,000 Da (gel filtration, SDS-PAGE)
Optimum pH	... 4.5 ~ 5.5 (NANA-lactose as a substrate)
pH stability	... 4.5 ~ 9.5
Thermal stability	... below 60°C (pH 5.0, 20 min)
Substrate specificity	... The α-ketosidic linkage of N-Glycolylneuraminic Acid (NGNA) can be hydrolyzed as well as that of NANA. This enzyme cleaves α(2→3), α(2→6) and α(2→8) linkages of N-Acetylneuraminic Acid in glycoconjugates. The activity is independent on Ca <sup>2+</sup> and is not inhibited by EDTA, which is in striking contrast to <i>Vibrio cholerae</i> Neuraminidase, and is not or slightly inhibited by inhibitors such as Monoiodoacetate, p-Chloromercuribenzoate and HgCl <sub>2</sub> , which is in striking contrast to <i>Clostridium perfringens</i> Neuraminidase.
References	1) Y. Uchida, Y. Tsukada and T. Sugimori, <i>J. Biochem.</i> , <b>82</b> , 1425 (1977) 2) Y. Uchida, Y. Tsukada and T. Sugimori, <i>J. Biochem.</i> , <b>86</b> , 1573 (1979), 3) Y. Ohta, Y. Tsukada and T. Sugimori, <i>J. Biochem.</i> , <b>106</b> , 1086 (1989)

### 3 $\alpha$ -Hydroxysteroid Dehydrogenase    3 $\alpha$ -Hydroxysteroid: NAD(P)<sup>+</sup> Oxidoreductase [EC 1.1.1.50]

Origin	: <i>Pseudomonas testosteroni</i>
Reaction	: 3 $\alpha$ -hydroxysteroid + NAD(P) <sup>+</sup> $\rightleftharpoons$ 3-Oxosteroid + NAD(P)H+H <sup>+</sup>
Appearance	: White amorphous powder
Activity	: More than 90 units/mg protein
Unit definition	: One unit is the amount of enzyme required to oxidize 1 $\mu$ mol of Androsterone as a substrate per minute in the presence of NAD at pH 8.9 at 25°C.
Storage	: Stable for one year when stored below 5°C and also stable at room temperature for at least one week. For prolonged storage, keep at -20°C.
Contaminants	: Malate Dehydrogenase < 0.01% Lactate Dehydrogenase < 0.01% Alcohol Dehydrogenase < 0.01% $\beta$ -Hydroxysteroid dehydrogenase < 0.5 %
Properties :	
Molecular weight	... Approx. 37,000 Da
Optimum pH	... 10.2 ~ 10.5
Optimum temperature	... 50°C
pH stability	... 6.0 ~ 9.5 (30°C, 17 hr)
Thermal stability	... below 50°C (pH 7.2, 10 min)
Michaelis constant	... 6.7x10 <sup>-6</sup> M (Androsterone) 8.3x10 <sup>-6</sup> M (Na-cholate) 6.7x10 <sup>-5</sup> M (NAD)
Uses	: Determination of bile acids

### NADH Oxidase

Origin	: <i>Bacillus licheniformis</i>
Reaction	: NADH + H <sup>+</sup> + O <sub>2</sub> $\rightleftharpoons$ NAD <sup>+</sup> + H <sub>2</sub> O <sub>2</sub>
Appearance	: White amorphous powder
Activity	: More than 50 units/mg protein
Unit definition	: One unit is the amount of enzyme required to oxidize 1 $\mu$ mol of NADH per minute at pH7.0 at 30°C.
Storage	: Stable for one year when stored below 5°C and also stable at room temperature for at least one week. For prolonged storage, keep at -20°C.
Contaminants	: Sometimes, trace amount of catalase might be detected. Therefore, the addition of 10 mM NaN <sub>3</sub> into the reaction mixture is recommended when the complete elimination of catalase is needed.
Properties :	
Molecular weight	... Approx. 240,000 Da
Optimum pH	... 6.5 ~ 7.5
Optimum temperature	... 45°C
pH stability	... 7.0 ~ 8.5
Thermal stability	... below 30°C (pH 7.5, 10 min) and below 40°C (in the coexistence of 0.1% bovine serum albumin, pH 7.5, 10 min)
Michaelis constant	... 3.2x10 <sup>-5</sup> M (NADH), 6.7x10 <sup>-6</sup> M (FAD)
Substrate specificity	: In the absence of added FAD both NADH and NADPH are oxidized equally, but by the addition of FAD (about 30 $\mu$ M) to reaction mixture the reaction velocity to NADH is accelerated about 20 ~ 30 times in contrast to 2 ~ 3 times of NADPH. Accordingly, the substrate specificity of NADH is about 10 times larger than that of NADPH in the presence of added FAD.

### Ordering Information

#### • Substrates

Product Name	Grade	Storage	Product No.	PKG Size
N-Acetyl-D-mannosamine Monohydrate	SP	R	05425-84	10 g
N-Glycolylneuraminic Acid	SP	F	05435-54	50 mg
2,3-Dehydro-2-deoxy-N-acetylneuraminic Acid	SP	F	05457-74	5 mg
			05457-32	25 mg
N-Acetylneuraminic Acid [NANA, Sialic Acid]	SP	R	08371-36	10 g
			08371-94	100 g
N-Acetylneuraminic Acid, dimer( $\alpha$ ,2 $\rightarrow$ 8) [DP2]	SP	F	00640-46	100 mg
N-Acetylneuraminic Acid, trimer( $\alpha$ ,2 $\rightarrow$ 8)[DP3]	SP	F	00641-52	25 mg
N-Acetylneuraminic Acid, tetramer( $\alpha$ ,2 $\rightarrow$ 8)[DP4]	SP	F	00642-42	25 mg
N-Acetylneuraminic Acid, pentamer( $\alpha$ ,2 $\rightarrow$ 8)[DP5]	SP	F	00643-74	5 mg
			00643-32	25 mg
N-Acetylneuraminic Acid, hexamer( $\alpha$ ,2 $\rightarrow$ 8)[DP6]	SP	F	00644-22	25 mg
Cytidine-5'-monophospho-N-acetylneuraminic Acid Disodium Salt	SP	F	10432-24	10 mg
Uridine-5'-diphosphoglucose Disodium Salt	GR	R	36001-64	100 mg
			36001-51	1 g
Uridine-5'-diphosphoglucuronic Acid Trisodium Salt	GR	R	36002-54	100 mg
			36002-41	1 g

## Ordering Information

### • Enzymes

Product Name	Grade	Storage	Product No.	PKG Size
N-Acetylneuraminic Acid Aldolase	SP	F	00628-84	10 units
Neuraminidase from <i>Arthrobacter ureafaciens</i> , highly purified	SP	R	24229-61	1 unit
			24229-74	5 units
3 $\alpha$ -Hydroxysteroid Dehydrogenase from <i>Pseudomonas testosteroni</i>	GR	R	18949-34	10 units
			18949-76	50 units
NADH Oxidase from <i>Bacillus licheniformis</i>	GR	F	23626-94	5 units
			23626-52	25 units

(Storage) R = Refrigerator, F = Freezer

For research use only, not intended for diagnostic or drug use.



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