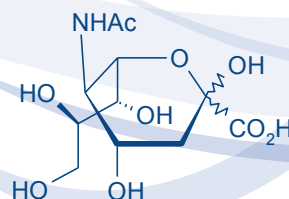


N-Acetylneuraminic acid

Product Code: **MA00746**
 CAS Number: **131-48-6**
 Chemical Formula: **C₁₁H₁₉NO₉**
 Molecular Weight: **134.13**

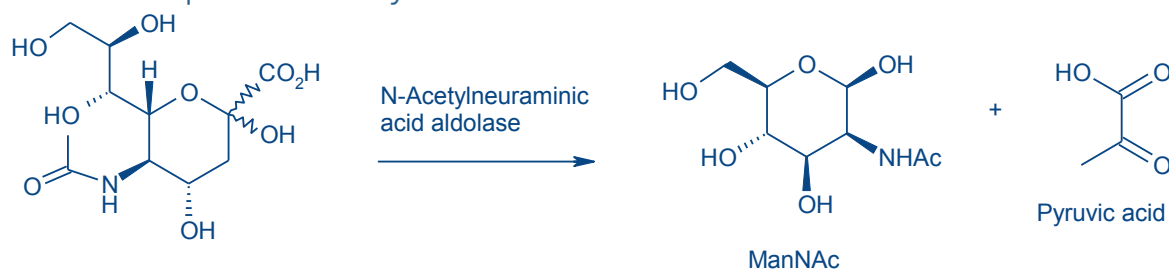


Synonyms: *Sialic acid*
Neu5Ac

Sialic acid is a commonly used generic term for *O*- or *N*-substituted derivatives of the nine-carbon monosaccharide neuraminic acid. N-Acetylneuraminic acid is the most common derivative found in mammalian cells, and sialic acid is often used to refer specifically to this molecule. The abbreviations Neu5Ac or NANA are also used.

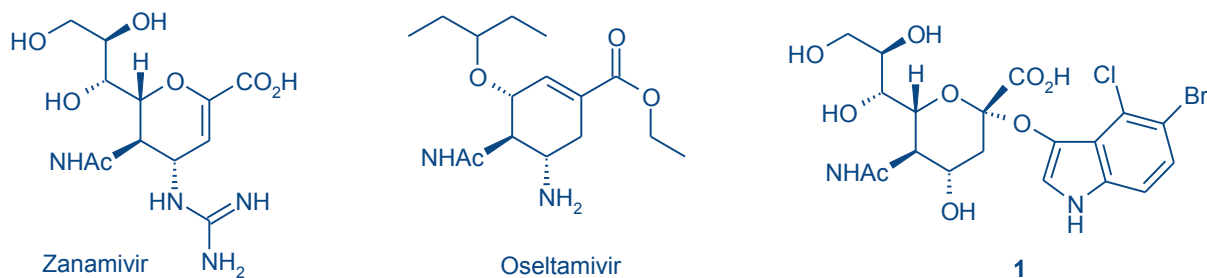
N-Acetylneuraminic acid is widely distributed in human tissues and is found in glycoproteins on cell membranes and in glycolipids such as gangliosides, and is involved in diverse biological functions including neurotransmission, leukocyte extravasation, viral or bacterial infections and carbohydrate-protein recognition events leading to cell adhesion.^{1,2} N-Acetylneuraminic acid is also found in several body fluids such as saliva, urine, amniotic fluid and cerebrospinal fluid.

As a negatively charged, non-reducing sugar, N-Acetylneuraminic acid is more difficult to analyse directly than reducing sugars such as glucose or lactose. Enzymatic methods for detection in fluids such as serum have been developed, which rely upon the cleavage of pyruvic acid from the molecule by N-acetylneuraminic acid aldolase (also known as N-acetylneuraminate pyruvate lyase), forming N-acetylmannosamine (ManNAc), Scheme 1.^{3,4} Subsequent oxidation of pyruvic acid to hydrogen peroxide by pyruvate oxidase and colourimetric detection, or reduction of pyruvic acid by lactate dehydrogenase in the presence of NADH and photometric detection form the basis of the quantitative analytical methods.



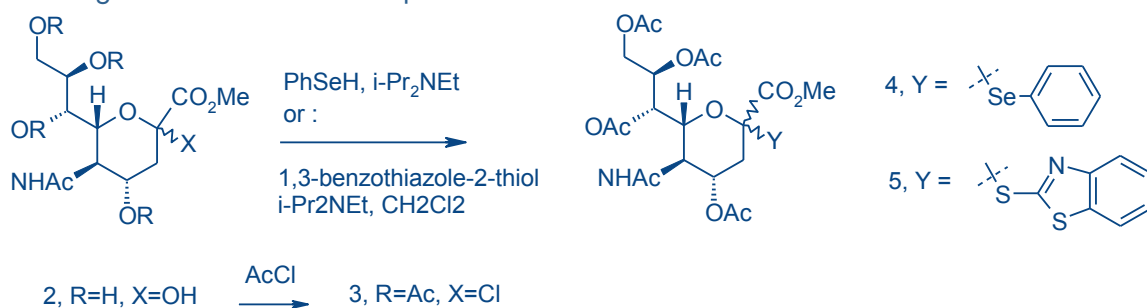
Scheme 1

Neuraminidase enzymes (sialidases) cleave N-Acetylneuraminic acid and related sialic acids from glycoproteins and glycolipids. Influenza viruses require neuraminidase activity to degrade cell-surface receptors, facilitating release of viral particles from infected cells.⁵ Neuraminidase inhibitors such as Zanamivir and Oseltamivir (Scheme 2) are effective influenza treatments.^{6,7} A colourimetric assay for sialidase activity using the Neu5Ac derivative 5-bromo-4-chloro-3-indolyl- α -D-N-acetylneuraminic acid **1** (Product code EB02506) has been reported as a test for bacterial vaginosis, a condition associated with endometriosis and pre-term labour.⁸

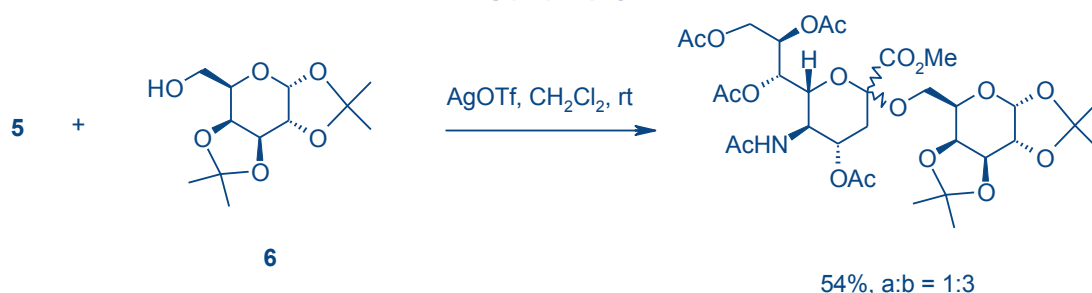


Scheme 2

The utility of N-acetylneuraminic acid in synthetic carbohydrate chemistry has proved challenging, and the development of new methodology for *O*-sialations is an active field of research.^{9,10} Ikeda and co-workers have reported the synthesis of phenyl 2- α -selenoglycosides (**4**) and glycosyl thioimidates (**5**) of N-acetylneuraminic acid, readily formed in two steps from the methyl ester of Neu5Ac (**2**), Scheme 3.^{11,12} Derivatives **4** and **5** are subsequently used as glycosyl donors in glycosylation reactions, as shown in Scheme 4 for the coupling of **5** with protected galactose **6** as the acceptor.



Scheme 3



Scheme 4

References:

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