Xylitol

From Sciencemadness Wiki

Xylitol is a sugar alcohol used as a sweetener. It has the chemical formula $\mathbf{C_5H_{12}O_5}$.

Contents

Xylitol

Store-grade xylitol

Names	
IUPAC name	(2R,4S)-Pentane-1,2,3,4,5-pentol
Other names	1,2,3,4,5-Pentahydroxypentane Xylite
Identifiers	
Jmol-3D images	Image (http://chemapps.stolaf.edu/jmol/jmol.php?model=O%5BC%40H%5D%28CO%29%5BC%40H%5D%28O%29%5BC%40%40H%5D%28O%29CO)
SMILES	O[C@H](CO)[C@H](O)[C@@H](O)CO
Properties	
Chemical formula	$C_5H_{12}O_5$
Molar mass	152.15 g/mol
Appearance	White crystalline solid
Density	1.52 g/cm^3
Melting point	92–96 °C (198–205 °F; 365–369 K)
Boiling point	345.39 °C (653.70 °F; 618.54 K)
Solubility in water	200 g/100 ml (25 °C)
Solubility	Soluble in ethanol, methanol, pyridine, tetrahydrofuran Insoluble in diethyl ether, benzene, chloroform
Solubility in ethanol	1.2 g/100ml
Solubility in methanol	6 g/100ml
Vapor pressure	~0 mmHg
Thermochemistry	
Std enthalpy of formation ($\Delta_f H^\circ_{298}$)	1,100.99 kJ/mol[1]
Hazards	
Safety data sheet	Fischer Scientific (http://ehsrms.uaa.alaska.edu/CMS/Laboratory/MSDS/MSDS%20by%20Vendor/Fisher/Xylitol.pdf)
Related compounds	
Related compounds	Arabitol Ribitol
Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F], 100 kPa).	
Infobox references	

Properties

Chemical

Xylitol will react with nitric acid to yield xylitol nitrates.

Physical

Xylitol is a white crystalline solid, with a sweet taste similar to that of sugar, though it has a slight fruity flavor. It is soluble in water (200 g/100 ml at 25 °C)[2], methanol (6 g/100 ml), ethanol (1.2 g/100 ml) and pyridine. It is insoluble in ether.[3] Its melting point is between 92 to 96 °C, and the boiling point has been determined to be 345.39 °C. Xylitol has a density of 1.52 g/cm^3.

Availability

Xylitol is available in most hypermarkets and health food stores, usually as 99-99.9% pure. The price depends on the brand.

Preparation

Xylitol can be extracted from various fruits, though this process is intensive and is much cheaper to just buy it from stores.

It can also be prepared through the hydrolysis of xylan, a polysaccharide found in wood. This gives xylose, which can be reduced to xylitol.

Projects

- Sugar substitute
- Make xylitol pentanitrate

Handling

Safety

Xylitol has no known toxicity or carcinogenicity, and is considered safe by the FDA. It has an extremely low glycemic index of 7 (glucose GI is 100) and has been shown to be useful in reducing tooth cavities. Xylitol does however have laxative effects, though it's possible to

build up resistance after several weeks of consuming it.

Xylitol however may be fatal to dogs and birds.

Storage

In closed containers.

Disposal

Xylitol does not pose any danger to the environment and can be poured down the drain or dumped in the soil or trash.

References

1. Tewari, Yadu B.; Goldberg, Robert N.; Journal of Chemical Thermodynamics; vol. 28; nb. 10; (1996); p. 1127 - 1144
2. Bakery Products: Science and Technology, Y. H. Hui, 2006, pag. 32 (https://books.google.ro/books?id=GYauJOMebo4C&pg=PA32&lpg=PA32&dq=xylitol+water+solubility+20+degrees&source=bl&ots=W0biJJBGrQ&sig=xMLMRlSftflGrl-agenu_c8Q84g&hl=en&sa=X&ved=0CDUQ6AEwBTgUahUKEwi5wMjix7jIAhWFOxQKHdKwD8k#v=onepage&q=xylitol%20water%20solubility%2020%20degrees&f=false)
3. http://www.scbt.com/datasheet-280193-xylitol.html

Relevant Sciencemadness threads

- xylitol manufacture techniques (http://www.sciencemadness.org/talk/viewthread.php?tid=8359)