Furfural Encyclopedia Article

Furfural

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Furfural

Furfural—also called furfuraldehyde, fural, 2-furaldehyde, pyromucic aldehyde, or 2-furancarboxaldehyde--is a viscous, colorless liquid with a freezing point of-37.6°F (-3.11°C) and a **boiling point** of 323°F (161°C). Exposed to air, it turns dark brown. A highly reactive aldehyde, **furfural** is derived from corn cobs, hulls of rice, cottonseeds, or oats that have been treated with hot **hydrochloric acid**. It is useful as an intermediate in the manufacture of many polymers and to dissolve impurities in petroleum compounds and vegetable and lubricating oils. Furfural is a selective solvent meaning that it dissolves only some materials.

Johann Doebereiner, (1780-1849), a German chemist accidentally discovered furfural in 1832 when he treated sugar with **sulfuric acid** and **manganese** dioxide. Large-scale manufacturing techniques were developed in the early 1920s. Furfural consists of a string of **carbon** atoms connected in a ring-shaped structure which contains both an aldehyde group (R-COH) and an **ether** bond (C-O-C). Because the bonds in furfural alternate between double and single bonds, there are several **bonding** sites which makes furfural highly reactive. The **ring** is usually opened at the ether linkage. Furfural reacts with phenols, **ketones**, and esters as an aldehyde; removal of the aldehyde group yields furan, which is converted to tetrahydrofuran (THF), used in the manufacture of **nylon**. Butadiene is a derivative of THF, as well. Furfural is also used in the manufacture of several synthetic resins contained in plastic products. Additionally, it is used in **fungicide** s, germicides, **herbicides**, and insecticides, and as a catalyst in the vulcanization process. Today furfural is used to produce furfuryl alcohols which are used used in foundry sand binders.

Under the Clean **Water** Act, furfural is listed as a hazardous substance. Because it is a skin irritant, protective measures such as gloves, goggles, protective clothing, or engineering controls must be used to prevent contact.