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.