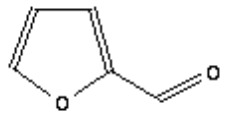
furfural

1050 metric tons per year



Chemical Name: Furfural

Chemical Formula: $C_5H_4O_2$

CAS Number: 98-01-1

Synonyms: Furfural;2-Furaldehyde;«alpha»-Furole;Artificial ant oil;Fural;Furaldehyde;Furale;Furancarbonal;Furfuraldehyde;Furfurole;Furfurylaldehyde;Furole;Pyromucic aldehyde;2-Formylfuran;2-Furanaldehyde;2-Furancarbonal;2-Furfural;2-Furfuraldehyde;2-Furylaldehyde; Furol;2-Furylmethanal;Artificial oil of ants;Furfurale;Furfurol;Nci-C56177;2-Furil-metanale;2-Furankarbaldehyd;Furfuralu;Rcra waste number U125;UN 1199;2-Furylaldehyde xypropane;2-Fury

Furfural is an organic compound derived from plant materials. The name *furfural* comes from the Latin word *furfur*, meaning bran, referring to its usual source.
Furfural is a heterocyclic aldehyde, with the ring structure shown. Its chemical formula is OC_4H_3CHO. It is a colorless oily liquid with the odor of almonds, but upon exposure to air, samples quickly become yellow.

Furfural is an important renewable, non-petroleum based, chemical feedstock. Hydrogenation of furfural provides furfuryl alcohol (FA), which is a useful chemical intermediate and which may be further hydrogenated to tetra-hydro-furfuryl alcohol (THFA). THFA is used as a nonhazardous solvent in agricultural formulations and as an adjuvant to help herbicides penetrate the leaf structure. Furfural is used to make other furan chemicals, such as furoic acid, via oxidation,[6] and furan itself via palladium catalyzed vapor phase de-carbonylation. Furfural is also an important chemical solvent.

Applications of Furfural

refining of lubricating oils & decolorizing agent

Furfural thanks several large scale applications to its solubility characteristics and its easy recuperation by steam distillation. Furfural has the unique property to dissolve aromatics and other unsaturated olefins. Today all major oil companies use furfural as selective solvent in the refining of lubricating oils. The first refining unit was built by a subsidiary of Texaco, the Indian Refining Company. This technology lead to production of high quality motor oil with improved temperature-viscosity properties. Aromatics, polar components, mercaptans are removed from petroleum by means of furfural extraction. Furfural can also be used as decolorizing agent to refine crude wood rosin.

purification technology for C_4 and C_5 hydrocarbons

During the Second World War the purification technology of butadiene was developed in the United States for the manufacture of synthetic rubber. By extractive distillation with furfural butadiene or isoprene can be separated from other C_4 and C_5hydrocarbons, respectively.

reactive solvent and good wetting agent

Furfural is unusually effective as a solvent for phenolic resins. In the manufacture of abrasive wheels, brake linings and refractory products for the steel industry furfural is known as a reactive solvent and excellent wetting agent.

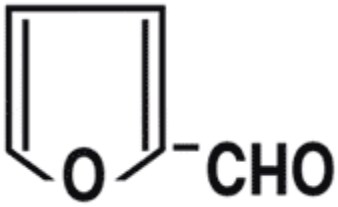
unique chemical feedstock for other furan derivatives

However, the main outlet of furfural is as chemical feedstock for the production of furfuryl alcohol and for other 5-membered oxygen-containing heterocycles, i.e. furan, methylfuran, acetylfuran, furfurylamine and furoic acid.

Furfural as Industrial Chemical Intermediate

The direct conversion into furfuryl alcohol, methylfuran and furan via metal-catalyzed hydrogenation, reduction and decarbonylation positions furfural as a strategic and ultimate industrial source for the production of a wide range of derivatives. Furfuryl amine, furoic acid, α-methylfurfuryl alcohol can be produced in one step from furfural. Other important fine chemicals are 2-acetylfuran, 2,5-dimethoxydihydrofuran and 5-dimethylaminomethylfurfuryl alcohol.

Specifications

Furfural	
Furfural, G.C. Assay, %	99 min
Moisture, wt %	0.2 max
Acidity, mEq/l	20 max
Residue, wt %	0.5 max

Psychical properties

General Properties	
Molecular weight	96.08
Boiling point at 101.3 kPa (1 atm), °C	161.7
Freezing point, °C	-36.5
Refractive index, nD • 20°C • 25°C	 1.5261 1.5235
Density, d4 at 20°C, g/cm3	1.1598
Vapor pressure	
Vapor density (air=1)	3.3
Critical pressure, Pc, MPa	5.502
Critical temperature, Tc, °C	397

Gibb's free energy of formation	
Solubility in, wt%	
water	8.3
alcohol; ether	8

Thermodynamic Properties	
Heat of vaporization (liq), kJ/mol	42.8
Heat capacity (liq), J/(g.K) 20-100°C	1.74
Heat of combustion (liq), kJ/mol	2344
Enthalpy of formation	

Fluid Properties	
Viscosity, mPa.s, 25°C	1.49
Surface tension, mN/m (=dyn/cm)	
29.9°C	40.7

Electrical Properties	
Dielectric constant 20°C	41.9

Flammability Properties	
Explosion limits (in air), vol%	2.1-19.3
Flash point, °C, tag closed cup	61.7
Auto ignition temperature, °C	315

Shipping & Handling

Furfural is shipped in tankers, steel tank trucks, aluminum tank trucks, ISO containers, IBC's and steel drums. Because furfural is an excellent solvent and penetrant, care must be taken that all joints are secure and that the pump and valve packing’s are in good condition. Drum lots may be stored for months without appreciable change in physical properties. Bulk storage under nitrogen is always recommended.