Furfural

Other names:

.alpha.-furole
2-Formylfuran
2-Furaldehyde
2-Furanaldehyde
2-Furancarbonal
2-Furancarboxaldehyde
2-Furancarboxaldehyde (furfural)
2-Furankarbaldehyd
2-Furfural
2-Furfuraldehyde
2-Furil-metanale
2-Furylaldehyde
2-Furylcarboxaldehyde
2-Furylmethanal
2-furancarbaldehyde
2-furancarboxyaldehyde
Artificial ant oil
Artificial oil of ants
Fural
Furaldehyde
Furale
Furan-2-aldehyde
Furan-2-carbaldehyde
Furancarbonal
Furfuraldehyde
Furfurale
Furfurol
Furfurole
Furfurylaldehyde
Furol
Furole
NCI-C56177
NSC 8841
Pyromucic aldehyde
Qo furfural
Rcra waste number U125
furan-2-carboxaldehyde
furancarboxaldehyde (furfural)
furfural (2-furancarboxaldehyde)
«alpha»-Furole

	Â«alphaÂ»-Furole
Inchi:	InChI=1S/C5H4O2/c6-4-5-2-1-3-7-5/h1-4H
InchiKey:	HYBBIBNJHNGZAN-UHFFFAOYSA-N
Formula:	C5H4O2
SMILES:	O=Cc1ccco1
Mol. weight [g/mol]:	96.08
CAS:	98-01-1

Physical Properties

Property code	Value	Unit	Source
af	0.3830		KDB
chl	-2339.00 ± 0.08	kJ/mol	NIST Webbook
chl	-2344.00	kJ/mol	NIST Webbook
chl	-2338.00	kJ/mol	NIST Webbook
dm	3.60	debye	KDB
gyrad	3.1700		KDB
hf	-151.40	kJ/mol	NIST Webbook
hf	-144.30	kJ/mol	NIST Webbook
hf	-151.04	kJ/mol	NIST Webbook
hf	-149.60	kJ/mol	NIST Webbook
hfl	-202.00	kJ/mol	NIST Webbook
hfl	-200.20	kJ/mol	NIST Webbook
hfl	-194.90	kJ/mol	NIST Webbook
hvap	50.60 ± 0.40	kJ/mol	NIST Webbook
hvap	50.70 ± 0.20	kJ/mol	NIST Webbook
hvap	50.70 ± 0.20	kJ/mol	NIST Webbook
hvap	50.63 ± 0.42	kJ/mol	NIST Webbook
ie	9.22	eV	NIST Webbook
ie	9.21 ± 0.01	eV	NIST Webbook
ie	9.22 ± 0.01	eV	NIST Webbook
ie	9.22	eV	NIST Webbook
ie	9.50 ± 0.05	eV	NIST Webbook
ie	9.22	eV	NIST Webbook
log10ws	-0.10		Estimated Solubility Method
log10ws	-0.10		Aqueous Solubility Prediction Method
logp	1.092		Crippen Method
mcvol	69.290	ml/mol	McGowan Method
nfpaf	%!d(float64=2)		KDB
nfpah	%!d(float64=1)		KDB

nfpas	%!d(float64=1)		KDB
pc	5510.00 ± 98.06	kPa	NIST Webbook
pc	5890.00	kPa	KDB
rinpol	832.00		NIST Webbook
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ripol	1493.00	NIST Webbook
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ripol	1457.00	NIST Webbook
ripol	1462.00	NIST Webbook
ripol	1453.00	NIST Webbook
ripol	1493.00	NIST Webbook
ripol	1493.00	NIST Webbook
ripol	1470.00	NIST Webbook

ripol	1467.00	NIST Webbook
ripol	1478.00	NIST Webbook
ripol	1473.00	NIST Webbook
ripol	1474.00	NIST Webbook
ripol	1429.00	NIST Webbook
ripol	1460.00	NIST Webbook
ripol	1455.00	NIST Webbook
ripol	1454.00	NIST Webbook
ripol	1455.00	NIST Webbook
ripol	1445.00	NIST Webbook
ripol	1471.00	NIST Webbook
ripol	1469.00	NIST Webbook
ripol	1451.00	NIST Webbook
ripol	1457.00	NIST Webbook
ripol	1466.00	NIST Webbook
ripol	1465.00	NIST Webbook
ripol	1447.00	NIST Webbook
ripol	1467.00	NIST Webbook
ripol	1456.00	NIST Webbook
ripol	1456.00	NIST Webbook
ripol	1458.00	NIST Webbook
ripol	1472.00	NIST Webbook
ripol	1462.00	NIST Webbook
ripol	1455.00	NIST Webbook
ripol	1460.00	NIST Webbook
ripol	1472.00	NIST Webbook
ripol	1460.00	NIST Webbook
ripol	1447.00	NIST Webbook
ripol	1448.00	NIST Webbook
ripol	1452.00	NIST Webbook
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ripol	1471.00	NIST Webbook
ripol	1448.00	NIST Webbook
ripol	1456.00	NIST Webbook
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ripol	1451.00	NIST Webbook
ripol	1438.00	NIST Webbook
ripol	1439.00	NIST Webbook
ripol	1462.00	NIST Webbook
ripol	1447.00	NIST Webbook
ripol	1454.00	NIST Webbook
ripol	1471.00	NIST Webbook
ripol	1471.00	NIST Webbook
ripol	1474.00	NIST Webbook

ripol	1455.00		NIST Webbook
ripol	1445.00		NIST Webbook
ripol	1432.00		NIST Webbook
ripol	1462.00		NIST Webbook
ripol	1468.00		NIST Webbook
ripol	1458.00		NIST Webbook
ripol	1456.00		NIST Webbook
ripol	1469.00		NIST Webbook
ripol	1458.00		NIST Webbook
ripol	1462.00		NIST Webbook
ripol	1476.00		NIST Webbook
ripol	1480.00		NIST Webbook
ripol	1465.00		NIST Webbook
ripol	1439.00		NIST Webbook
ripol	1464.00		NIST Webbook
ripol	1460.00		NIST Webbook
ripol	1444.00		NIST Webbook
ripol	1445.00		NIST Webbook
ripol	1449.00		NIST Webbook
ripol	1448.00		NIST Webbook
ripol	1432.00		NIST Webbook
ripol	1425.00		NIST Webbook
ripol	1437.00		NIST Webbook
ripol	1437.00		NIST Webbook
ripol	1449.00		NIST Webbook
ripol	1459.00		NIST Webbook
ripol	1440.00		NIST Webbook
ripol	1467.00		NIST Webbook
ripol	1466.00		NIST Webbook
ripol	1468.00		NIST Webbook
ripol	1486.00		NIST Webbook
ripol	1467.00		NIST Webbook
ripol	1467.00		NIST Webbook
ripol	1473.00		NIST Webbook
ripol	1462.00		NIST Webbook
ripol	1495.00		NIST Webbook
sl	218.00	J/mol×K	NIST Webbook
tb	434.90 ± 0.50	K	NIST Webbook
tb	434.60 ± 0.50	K	NIST Webbook
tb	434.60 ± 0.50	K	NIST Webbook
tb	434.15 ± 1.50	K	NIST Webbook
tb	434.60 ± 0.50	K	NIST Webbook
tb	435.00 ± 2.00	K	NIST Webbook
tb	434.60 ± 0.50	K	NIST Webbook

tb	434.65 ± 1.00	K	NIST Webbook
tb	434.85 ± 0.50	K	NIST Webbook
tb	434.90	K	NIST Webbook
tb	435.15	K	Isobaric vapour-liquid equilibrium measurements and extractive distillation process for the azeotrope of (N,N-dimethylisopropylamine + acetone)
tb	435.00	K	Solubility and tie-line data for ternary aqueous mixtures of cyclopentanol with organic solvents at T = 298.2 K: Experiments and NRTL model
tb	434.90	K	KDB
tb	434.60 ± 0.50	K	NIST Webbook
tc	670.00 ± 2.00	K	NIST Webbook
tc	670.00	K	KDB
tf	234.50 ± 0.40	K	NIST Webbook
tf	236.60	K	KDB
tf	236.00	K	Aqueous Solubility Prediction Method
tt	235.10 ± 0.40	K	NIST Webbook
zra	0.26		KDB

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpl	159.50	J/mol×K	293.00	NIST Webbook
cpl	162.80	J/mol×K	298.15	NIST Webbook
cpl	158.20	J/mol×K	298.00	NIST Webbook
hfust	14.37	kJ/mol	235.10	NIST Webbook
hfust	14.37	kJ/mol	235.10	NIST Webbook
hvapt	44.70	kJ/mol	396.00	NIST Webbook
hvapt	48.20	kJ/mol	381.00	NIST Webbook
hvapt	47.60	kJ/mol	404.00	NIST Webbook
pvap	76.13	kPa	423.15	Vapor Liquid Equilibrium for Several Compounds Relevant to the Biofuels Industry Modeled with the Wilson Equation

pvap	13.60	kPa	373.40	Isothermal vapor liquid equilibrium for binary mixtures containing furfural and its derivatives
pvap	5.90	kPa	353.20	Isothermal vapor liquid equilibrium for binary mixtures containing furfural and its derivatives
pvap	101.30	kPa	435.15	Isobaric vapour-liquid equilibrium measurements and extractive distillation process for the azeotrope of (N,N-dimethylisopropylamine + acetone)
pvap	1.46	kPa	326.05	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa
pvap	2.03	kPa	331.85	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa
pvap	2.51	kPa	335.35	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa

pvap	3.01	kPa	338.85	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	3.62	kPa	342.35	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	4.02	kPa	344.55	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	4.52	kPa	346.85	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	5.19	kPa	349.75	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	

pvap	6.02	kPa	353.05	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa
pvap	7.04	kPa	356.45	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa
pvap	10.04	kPa	364.35	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa
pvap	15.06	kPa	375.75	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa
pvap	20.07	kPa	383.35	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa

pvap	30.10	kPa	394.25	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	39.87	kPa	402.55	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	49.80	kPa	409.55	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	59.74	kPa	415.15	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	
pvap	3.60	kPa	342.11	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa	

pvap	5.18	kPa	349.93	Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Systems of Furfural, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa
pvap	30.00	kPa	394.70	Isobaric Vapor-Liquid Equilibrium of Furfural + gamma-Valerolactone at 30 kPa and Isothermal Liquid-Liquid Equilibrium of Carbon Dioxide + gamma-Valerolactone + Water at 298 K
pvap	2.94	kPa	339.16	Separation of Furfural from Ternary Mixtures
pvap	3.49	kPa	342.70	Separation of Furfural from Ternary Mixtures
pvap	3.96	kPa	344.87	Separation of Furfural from Ternary Mixtures
pvap	4.99	kPa	349.71	Separation of Furfural from Ternary Mixtures
pvap	4.98	kPa	349.76	Separation of Furfural from Ternary Mixtures
pvap	5.97	kPa	353.68	Separation of Furfural from Ternary Mixtures
pvap	6.47	kPa	355.16	Separation of Furfural from Ternary Mixtures
pvap	49.34	kPa	409.50	Separation of Furfural from Ternary Mixtures
pvap	88.98	kPa	429.50	Separation of Furfural from Ternary Mixtures

pvap	0.05	kPa	276.70	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	0.07	kPa	281.50	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	0.10	kPa	285.40	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	0.13	kPa	288.40	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	0.15	kPa	290.60	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	

pvap	0.18	kPa	293.20	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol
pvap	0.21	kPa	295.50	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol
pvap	0.26	kPa	298.20	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol
pvap	0.30	kPa	300.50	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol
pvap	0.37	kPa	303.10	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol

pvap	0.49	kPa	308.20	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	0.62	kPa	312.20	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	0.74	kPa	315.10	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	0.91	kPa	317.90	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	
pvap	1.04	kPa	320.10	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol	

pvap	1.26	kPa	323.40	Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol
pvap	14.62	kPa	373.15	Vapor Liquid Equilibrium for Several Compounds Relevant to the Biofuels Industry Modeled with the Wilson Equation
pvap	77.51	kPa	423.15	Vapor Liquid Equilibrium for Several Compounds Relevant to the Biofuels Industry Modeled with the Wilson Equation
pvap	14.65	kPa	373.15	Vapor Liquid Equilibrium for Several Compounds Relevant to the Biofuels Industry Modeled with the Wilson Equation
pvap	46.30	kPa	408.00	Isothermal vapor liquid equilibrium for binary mixtures containing furfural and its derivatives
rfi	1.40010		298.15	Liquid-Liquid Equilibria for Mixtures of (Furfural + a Chlorinated Aromatic Compound + an Alkane) at T = 298.15 K
rfi	1.52060		303.20	Experimental and calculated liquid-liquid equilibrium data for water + furfural + solvents

rfi	1.51330	318.20	Experimental and calculated liquid-liquid equilibrium data for water + furfural + solvents
rfi	1.52640	293.15	Liquid-liquid equilibria of water + solutes (acetic acid/ acetol/furfural/guaiacol/methanol/phenol/propanal) + solvents (isopropyl acetate/toluene) ternary systems for pyrolysis oil fractionation
rfi	1.52260	298.15	Ternary and binary LLE measurements for solvent (2-methyltetrahydrofuran and cyclopentyl methyl ether) + furfural + water between 298 and 343 K
rfi	1.52364	298.00	Quaternary and ternary LLE measurements for solvent (2-methyltetrahydrofuran and cyclopentyl methyl ether) + furfural + acetic acid + water between 298 and 343 K
rfi	1.52263	298.15	Ternary and Binary LLE Measurements for Solvent (4-Methyl-2-pentanone and 2-Methyl-2-butanol) + Furfural + Water between 298 and 401 K
rfi	1.52263	298.15	Quaternary, Ternary, and Binary LLE Measurements for 2-Methoxy-2-methylpropane + Furfural + Acetic Acid + Water at Temperatures between 298 and 307 K

rfi	1.52263		298.15	Quaternary, Ternary and Binary LLE Measurements for 2-Methoxy-2-methylbutane + Furfural + Acetic Acid + Water at Temperatures between 298 and 341 K
rfi	1.52800		288.20	Experimental and calculated liquid-liquid equilibrium data for water + furfural + solvents
rfi	1.40010		298.15	Liquid-liquid equilibria for mixtures of (Furfural + an Aromatic hydrocarbon + an alkane) at T=298.15 K
rhol	1148.69	kg/m3	303.15	Effects of alkyl group and temperature on the interactions between furfural and alcohol: Insight from density and sound velocity studies
rhol	1159.00	kg/m3	293.00	KDB
rhol	1154.81	kg/m3	298.15	Self-aggregation of liquids from biomass in aqueous solution
rhol	1169.93	kg/m3	283.15	Effects of alkyl group and temperature on the interactions between furfural and alcohol: Insight from density and sound velocity studies
rhol	1159.33	kg/m3	293.15	Effects of alkyl group and temperature on the interactions between furfural and alcohol: Insight from density and sound velocity studies

rhol	1138.01	kg/m3	313.15	Effects of alkyl group and temperature on the interactions between furfural and alcohol: Insight from density and sound velocity studies
rhol	1159.16	kg/m3	293.15	Liquid-Liquid Phase Equilibria for Quinary, Quaternary, and Ternary Systems {Water + Furfural + Acetic Acid + Cyclopentyl Methyl Ether + CaCl2}: Measurement, Effect of Salt ,and Comparative Study
rhol	1155.45	kg/m3	298.15	Excess volumes and partial molar volumes of binary liquid mixtures of furfural or 2-methylfuran with alcohols at 298.15 K
sfust	61.10	J/mol×K	235.10	NIST Webbook

Pressure Dependent Properties

Property code	Value	Unit	Pressure [kPa]	Source
tbrp	363.20	K	8.70	NIST Webbook

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.46545e+01
Coeff. B	-3.52022e+03
Coeff. C	-8.39460e+01

Temperature range (K), min.	328.97
Temperature range (K), max.	460.72

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/T + C*ln(T) + D*T^2
Coeff. A	6.59497e+01
Coeff. B	-7.83040e+03
Coeff. C	-7.23773e+00
Coeff. D	3.55203e-06
Temperature range (K), min.	236.65
Temperature range (K), max.	657.00

Sources

Excess volumes and partial molar volumes of binary liquid mixtures of furfural or 2-methylfuran with alcohols at 298.15 K:	https://www.doi.org/10.1016/j.jct.2019.02.027
Liquid Liquid Equilibria of Formic Acid and Furfural in a Biphasic Aqueous Organic System: Optimization of Solvent and Amine Extractant:	https://www.doi.org/10.1021/acs.jced.8b00335
Liquid-liquid solubility in furfural and 2-propanol: Experiments and modeling:	https://www.doi.org/10.1016/j.jct.2017.04.004
Quaternary, Ternary and Binary LLE Measurements for 2-Methoxy-2-methylbutane + Furfural + Water at Temperatures between 298 and 341 K:	https://www.doi.org/10.1021/acs.jced.6b00150
Liquid Liquid Equilibria Measurement of Systems Involving Alkanes (Heptane or Cyclohexane), Aromatics (Benzene or Toluene), and Furfural:	https://www.doi.org/10.1021/je100908f
Estimated Solubility Method:	http://pubs.acs.org/doi/suppl/10.1021/ci034243x/suppl_file/ci034243xsi20040112_053635.txt
Liquid-liquid equilibria for the extraction of furfural from aqueous solutions using different solvents:	https://www.doi.org/10.1016/j.fluid.2016.06.040
Experimental and calculated liquid-liquid equilibrium data for water + furfural + solvents:	https://www.doi.org/10.1016/j.fluid.2012.07.032
Measurement and Modeling of Phase Equilibria in Systems Containing Water, Xylose, Furfural, and Acetic Acid:	https://www.doi.org/10.1021/acs.jced.9b00095
Quaternary, Ternary, and Binary LLE Measurements for 2-Methoxy-2-methylpropane + Furfural + Acetic Acid + Water at Temperatures between 288 and 328 K:	https://www.doi.org/10.1021/acs.jced.6b00149
Solubilities of Hexanal, Benzaldehyde, 2-Furfural, 2-Phenylethanol, 2-Phenylethanol, and Nonanal in Water at Temperatures between 283 and 313 K:	https://www.doi.org/10.1021/je700122y
Isothermal vapor liquid equilibrium and excess molar enthalpies of the binary mixtures furfural + methyl isobutyl ketone (MIBK) or 2-methyl-1-butanol and 2-methyl-2-butanol:	https://www.doi.org/10.1016/j.jct.2018.03.019
Vapor Pressure and Isobaric Vapor-Liquid Equilibrium for Binary Mixtures of 2-Methyl-2-butanol, 2-Acetylfuran, and 5-Methylfurfural at 3.60 and 5.18 kPa:	https://www.doi.org/10.1016/j.fluid.2014.03.033
NIST Web Book:	https://www.doi.org/10.1021/acs.jced.7b00574
Aqueous Solubility Prediction Method:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C98011&Units=SI
Vapor Pressures, Enthalpies of Vaporization, and Limiting Activity Coefficients in Water at 100 deg C of 2-Furanaldehyde, Benzaldehyde, Phenylethanal, and 2-Phenylethanol:	http://onschallenge.wikispaces.com/file/view/AqueousDataset002.xlsx/351826032/AqueousDa
McGowan Method:	https://www.doi.org/10.1021/je060406c
KDB:	http://link.springer.com/article/10.1007/BF02311772
Isothermal vapor liquid equilibrium for binary mixtures containing furfural and its derivatives:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1253
Ternary and Binary LLE Measurements for Solvent (4- Methyl-2-pentanone and 2-Methyl-2-butanol) + Furfural + Water Liquids in Water and in Furfural:	https://www.doi.org/10.1016/j.fluid.2014.10.037
Solubility of Benzothiazolium Ionic Liquids in Water between 298 and 343 K:	https://www.doi.org/10.1021/acs.jced.5b00738
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Crippen Method:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1253
Vapor Liquid Equilibrium for Several Compounds Relevant to the Biofuels Industry Modeled with the Wilson Equation:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
	https://www.doi.org/10.1021/je400885z

Equilibrium data and GC-PC SAFT predictions for furanic extraction:	https://www.doi.org/10.1016/j.fluid.2016.09.019
Liquid-liquid equilibria of water + solutes (acetic acid/ acetol/furfural/guaiacol/methanol/phenol/propanal) + solvents (isopropyl acetate/toluene) ternary systems for pyrolysis oil fractionation:	https://www.doi.org/10.1016/j.fluid.2018.04.016
KDB Pure (Korean Thermophysical Properties Databank):	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1253
Liquid-Liquid Phase Equilibria for Quinary, Quaternary, and Ternary Systems (Water + Furfural + Acetic Acid + Cyclopentyl Methyl Ether + CaCl2): Measurement, Effect of Salt and Comparative Study:	https://www.doi.org/10.1021/acs.jced.8b00222
Liquid-Liquid Equilibria for Mixtures of (Furfural + a Chlorinated Aromatic Compound or an Alkane) at T = 298.15 K:	https://www.doi.org/10.1021/je020107x
Volumetric and acoustic properties of binary systems (furfural or furfuryl alcohol + toluene) and (furfuryl alcohol + ethanol) at different temperatures:	https://www.doi.org/10.1016/j.tca.2015.04.032
Infinite Dilution Binary Diffusion Coefficients for Compounds Derived from Biomass in Water at 0.1 MPa and Temperatures from (298.2 to 353.2) K:	https://www.doi.org/10.1021/je301060a
Mutual Influence of Furfural and Furancarboxylic Acids on Their Solubility in Aqueous Solutions: Experiments and Perturbed-Chain Statistical Associating Fluid Theory (PC-SAFT) Predictions:	https://www.doi.org/10.1021/acs.jced.7b01039
Determination of infinite dilution activity coefficients using HS-SPME/GC/FID for hydrocarbons in furfural at temperatures of (298.15, 308.15, and 318.15) K:	https://www.doi.org/10.1016/j.jct.2012.01.016
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Liquid-liquid equilibria for mixtures of (Furfural + an Aromatic hydrocarbon + an Alkane) at T = 298.15 K:	https://www.doi.org/10.1021/je010317u
The determination of activity coefficients at infinite dilution using g.l.c. for hydrocarbons in furfural at T = 278.15 K and T = 298.15 K:	https://www.doi.org/10.1016/j.jct.2003.09.011
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Legend

af:	Acentric Factor
chl:	Standard liquid enthalpy of combustion
cpl:	Liquid phase heat capacity
dm:	Dipole Moment
gyrad:	Radius of Gyration
hf:	Enthalpy of formation at standard conditions
hfl:	Liquid phase enthalpy of formation at standard conditions
hfust:	Enthalpy of fusion at a given temperature
hvap:	Enthalpy of vaporization at standard conditions
hvapt:	Enthalpy of vaporization at a given temperature
ie:	Ionization energy
log10ws:	Log10 of Water solubility in mol/l
logp:	Octanol/Water partition coefficient
mcvol:	McGowan's characteristic volume
nfpaf:	NFPA Fire Rating

nfpah:	NFPA Health Rating
nfpas:	NFPA Safety Rating
pc:	Critical Pressure
pvap:	Vapor pressure
rfi:	Refractive Index
rhol:	Liquid Density
rinpol:	Non-polar retention indices
ripol:	Polar retention indices
sfust:	Entropy of fusion at a given temperature
sl:	Liquid phase molar entropy at standard conditions
tb:	Normal Boiling Point Temperature
tbrp:	Boiling point at reduced pressure
tc:	Critical Temperature
tf:	Normal melting (fusion) point
tt:	Triple Point Temperature
zra:	Rackett Parameter