



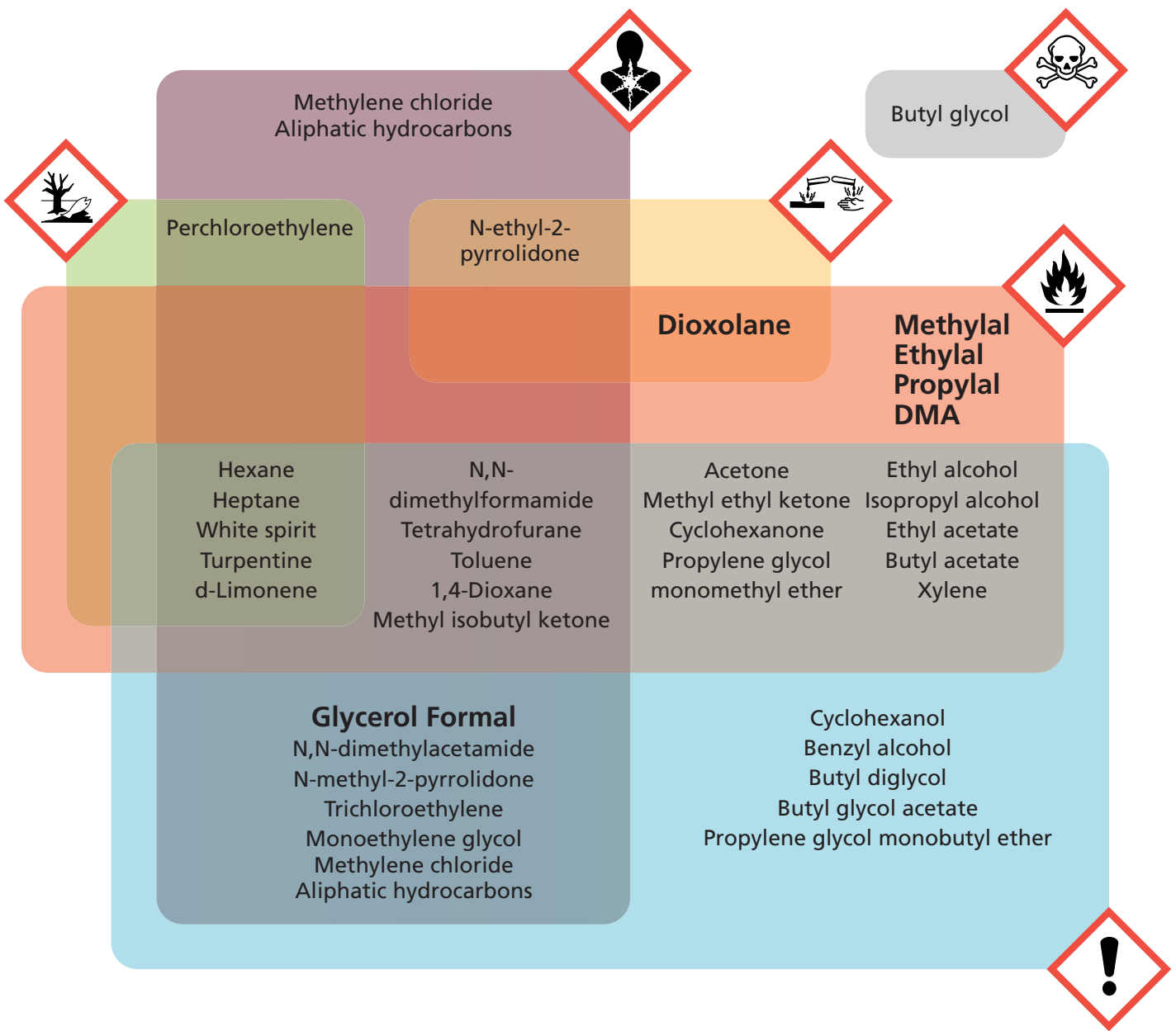
::: Acetals

Lambiotte
&Cie

Applications



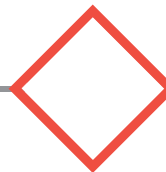
	Methylal	Ethylal	Propylal	Butylal	TOU	Elcosol DM	2-Ethylhexylal	Dioxolane	Glycerol formal
Coating									
Ink									
Adhesive									
Cleaning									
Aerosol									
Cosmetic									
Veterinary									
Agrochemistry									
Lubricant									
Textile & Leather									
Polyurethane	$\left[\text{R}-\text{N} \begin{array}{c} \text{H} \\ \\ \text{C}=\text{O} \\ \\ \text{O} \end{array} \right]_n$				$\left[\text{R}-\text{N} \begin{array}{c} \text{H} \\ \\ \text{C}=\text{O} \\ \\ \text{O} \end{array} \right]_n$			$\left[\text{R}-\text{N} \begin{array}{c} \text{H} \\ \\ \text{C}=\text{O} \\ \\ \text{O} \end{array} \right]_n$	
Synthesis, Extraction, Analytical Chemistry									



NO HAZARD PICTOGRAM



- PFAS-free
- Aromatics-free
- MOSH/MOAH-free
- Sulfur-free
- Heavy metals-free
- Plasticizers-free
- Bisphenols-free
- Microplastics-free
- Allergens-free
- Not from animal origin
- Not from GMOs
- Kosher-certified
- Halal-certified



- TOU**
- Butylal**
- Elcosol DM**
- 2-Ethylhexylal**

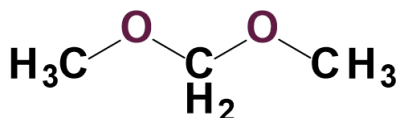
- Trippropylene glycol monobutyl ether
- Propylene carbonate
- Dimethyl sulfoxide
- Dibasic esters

Methylal



DESCRIPTION

CAS number	109-87-5	Molecular formula	C ₃ H ₈ O ₂
EC number	203-714-2	Molecular weight	76,09
IUPAC name	Dimethoxymethane		
EC name	Dimethoxymethane		

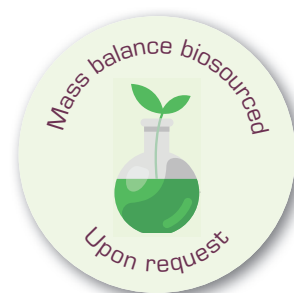


PROPERTIES

Boiling point (°C) at 1013 hPa			42,3
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	-30,5
Vapour pressure (kPa) at 20°C	ASTM D323 modified		40
Evaporation rate	ASTM D3539	Butyl acetate = 1	12,5
Relative density at 20°C	OECD 109		0,861
Surface tension (mN/m) at 25°C			21,2
Water solubility (g/L) at 20°C		Methylal in water	330
Kinematic viscosity (mm ² /s) at 25°C			0,371
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		17,20
	Dispersion δ_d		15,09
	Polarity δ_p		2,53
	Hydrogen bond δ_h		7,86

FEATURES

- High solvent power
 - Solubilizing a wide range of polymers, resins and rubbers
 - Dissolving oils, greases, silicone oils
- Very fast evaporation
 - Quick drying ideal for sprayed products
- Very low viscosity
 - Improving the flowability
- Excellent surface tension
 - Enhancing the wetting
- Partially water miscible
 - Easy to formulate water based references

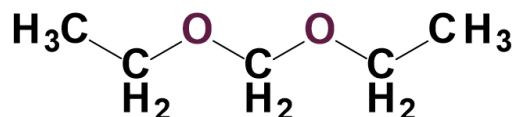




Ethylal

DESCRIPTION

CAS number	462-95-3	Molecular formula	C ₅ H ₁₂ O ₂
EC number	207-330-6	Molecular weight	104,15
IUPAC name	(Ethoxymethoxy)ethane		
EC name	Diethoxymethane		



PROPERTIES

Boiling point (°C) at 1013 hPa			88
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	-7
Vapour pressure (kPa) at 20°C	ASTM D323 modified		6,8
Evaporation rate	ASTM D3539	Butyl acetate = 1	1,82
Relative density at 20°C	OECD 109		0,83
Surface tension (mN/m) at 25°C			21,62
Water solubility (g/L) at 20°C		Ethylal in water	70
Kinematic viscosity (mm ² /s) at 25°C			0,507
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		16,87
	Dispersion δ_d		15,50
	Polarity δ_p		4,36
	Hydrogen bond δ_h		5,03

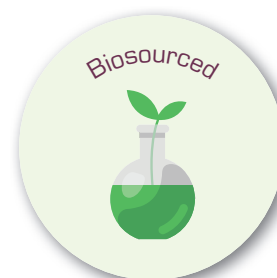
FEATURES

Among all its very good characteristics, such as its solubilizing property, its medium volatility, its low viscosity and partial water miscibility, Ethylal acts as a wetting improver for water based formulas.

Chemical	% weight in water	Surface tension (mN/m)
Ethylal	0,5	51,03
Ethanol	5	55,73
Ethyl Acetate	0,5	62,08

Listed in

 FL No 06.064

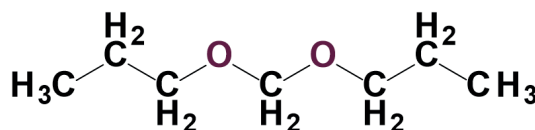


Propylal



DESCRIPTION

CAS number	505-84-0	Molecular formula	$C_7H_{16}O_2$
EC number	208-021-9	Molecular weight	132,2
IUPAC name	1-(propoxymethoxy)propane		
EC name	Dipropoxymethane		

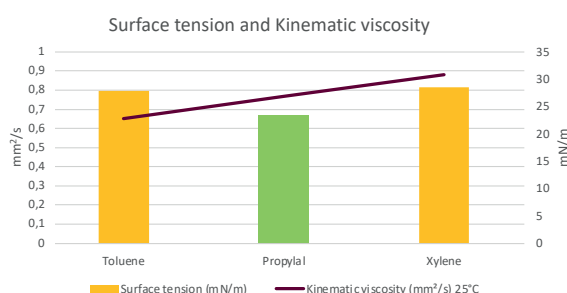
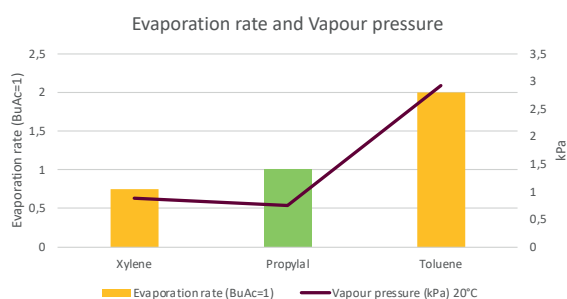


PROPERTIES

Boiling point (°C) at 1013 hPa			137,2
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	26
Vapour pressure (kPa) at 20°C	ASTM D323 modified		0,75
Evaporation rate	ASTM D3539	Butyl acetate = 1	1
Relative density at 20°C	OECD 109		0,8338
Surface tension (mN/m) at 25°C			23,43
Water solubility (g/L) at 20°C		Propylal in water	3,65
Kinematic viscosity (mm ² /s) at 25°C			0,77
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		16,86
	Dispersion δ_d		15,55
	Polarity δ_p		4,27
	Hydrogen bond δ_h		4,93

FEATURES

- Good solvent power for non polar ingredients
- Medium drying time (equivalent to Butyl acetate)
- Good wetting
- Low viscosity
- Ideal alternative to light hydrocarbons
 - Substitution of aromatics



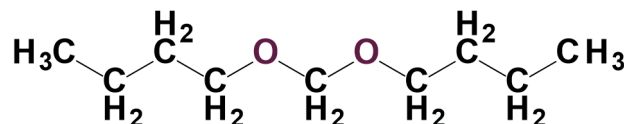
	Toluene	Propylal	Xylene
Hazard pictogram			
Classification	Asp. Tox. 1 Flam. Liq. 2 Skin Irrit. 2 STOT RE 2 STOT SE 3	Flam. Liq. 3	Acute Tox. 4 Skin Irrit. 2 Flam. Liq. 3 Acute Tox. 4



Butylal

DESCRIPTION

CAS number	2568-90-3	Molecular formula	$C_9H_{20}O_2$
EC number	219-909-0	Molecular weight	160,26
IUPAC name	1-(butoxymethoxy)butane		
EC name	1,1'-[methylenebis(oxy)]dibutane		



PROPERTIES

Boiling point (°C) at 1013 hPa			182,5
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	62,4
Vapour pressure (kPa) at 20°C	ASTM D323 modified		0,066
Evaporation rate	ASTM D3539	Butyl acetate = 1	0,192
Relative density at 20°C	OECD 109		0,8354
Surface tension (mN/m) at 25°C			25,2
Water solubility (g/L) at 20°C		Butylal in water	0,223
Kinematic viscosity (mm ² /s) at 25°C			1,264
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		16,74
	Dispersion δ_d		15,68
	Polarity δ_p		4,03
	Hydrogen bond δ_h		4,26

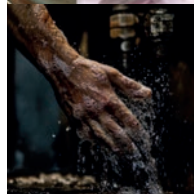
FEATURES

- No hazard pictogram
- Excellent degreaser for greases, oils, waxes (vegetable and mineral)
- Removing easily sap, silicone, tar, bitumen
- Optimal rubber solubilizer such as EVA, EPDM, NR, SBR, SBS, SEBS, SEPS, CR

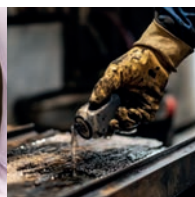
Polymer solubilization



Household & Cosmetic



Metal degreasing



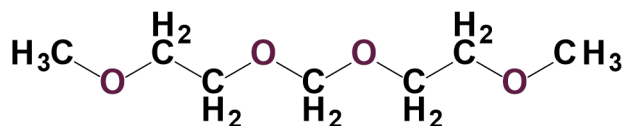
Bitumen removal





DESCRIPTION

CAS number	4431-83-8	Molecular formula	C ₇ H ₁₆ O ₄
EC number	224-631-8	Molecular weight	164,2
IUPAC name	1-methoxy-2(2-methoxyethoxymethoxy)ethane		
EC name	2,5,7,10-Tetraoxaundecane		



PROPERTIES

Boiling point (°C) at 1013 hPa			201,5
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	88
Vapour pressure (kPa) at 20°C	ASTM D323 modified		0,0142
Evaporation rate	ASTM D3539	Butyl acetate = 1	0,038
Relative density at 20°C	OECD 109		0,9544
Surface tension (mN/m) at 25°C			31,5
Water solubility (g/L) at 20°C			Fully miscible
Kinematic viscosity (mm ² /s) at 25°C			1,532
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		18,01
	Dispersion δ_d		15,89
	Polarity δ_p		5,51
	Hydrogen bond δ_h		6,44

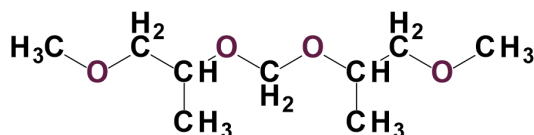
FEATURES

- Non flammable
- Slow drying
- High solvent power
- Fully water miscible
- Used as
 - Coalescing agent
 - Adhesion promoter on some plastics



DESCRIPTION

CAS number	59039-15-5	Molecular formula	C ₉ H ₂₀ O ₄
EC number	813-999-0	Molecular weight	192,25
IUPAC name	1-methoxy-2-[(2-methoxy-1-methylethoxy)methoxy]propane		
EC name	4,8-dimethyl-2,5,7,10-tetraoxaundecane		



PROPERTIES

Boiling point (°C) at 1013 hPa			209,1
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	88
Vapour pressure (kPa) at 20°C	ASTM D323 modified		0,0069
Evaporation rate	ASTM D3539	Butyl acetate = 1	0,0341
Relative density at 20°C	OECD 109		0,95
Surface tension (mN/m) at 25°C	Ring method		29,5
Water solubility (g/L) at 20°C		Elcosol DM in water	370
Kinematic viscosity (mm ² /s) at 25°C			1,63
Hansen Solubility parameters (MPa ^{1/2})	Total δ _T		19,73
	Dispersion δ _d		16
	Polarity δ _p		7,8
	Hydrogen bond δ _h		8,5

FEATURES

- Non-VOC according to EU directive 1999/13/EC
- Alternative to hazardous substances
- Not labeled under the terms of CLP
- Non flammable
- Slow evaporation
- Partially water miscible
- Amphiphilic behaviour: hydrophilic and lipophilic (degreaser)
- Used as
 - Coalescing agent
 - Adhesion promoter on some plastics

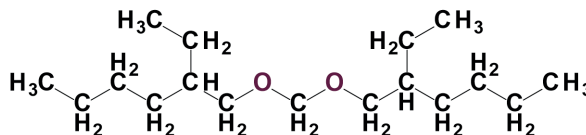
	Elcosol DM	Butyl glycol	NMP
Labelling			
Smell			
Solvent power			

2-Ethylhexylal



DESCRIPTION

CAS number	22174-70-5	Molecular formula	C ₁₇ H ₃₆ O ₂
EC number	244-815-1	Molecular weight	272,46
IUPAC name	2-ethyl-1-[(2-ethylhexyl)oxy]methoxyhexane		
EC name	3,3'-[methylenebis(oxyethylene)]bisheptane		



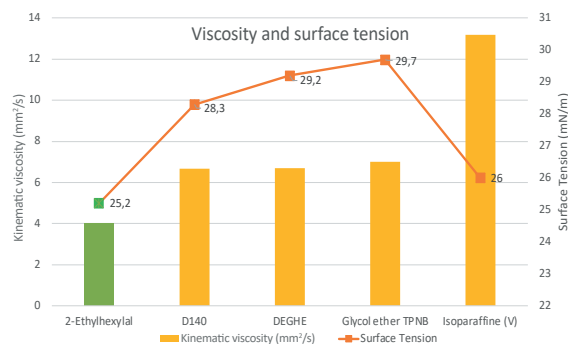
PROPERTIES

Boiling point (°C) at 1013 hPa			290
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	142
Vapour pressure (kPa) at 20°C	ASTM D323 modified		8,4 x 10 ⁻⁶
Evaporation rate	ASTM D3539	Butyl acetate = 1	0,008
Relative density at 20°C	OECD 109		0,848
Surface tension (mN/m) at 25°C			25,2
Water solubility (g/L) at 20°C		2-Ethylhexylal in water	1,04 x 10 ⁻⁵
Kinematic viscosity (mm ² /s) at 25°C			4,03
Hansen Solubility parameters (MPa ^{1/2})	Total δ _T		16,68
	Dispersion δ _d		15,94
	Polarity δ _p		3,30
	Hydrogen bond δ _h		3,64

FEATURES

- Non VOC according to EU directives 1999/13/EC and 2004/42/CE
- Excellent wetting
- Good flowability

Product	Boiling point (°C)	Vapour Pressure (kPa)	VOC 1999/13/EC	VOC 2004/42/CE
2-Ethylhexylal	290	< 0,001	Exempt	Exempt
D140	280	< 0,001	Exempt	Exempt
DEGHE	259	< 0,001	Exempt	Exempt
Glycol ether TPNB	274	< 0,001	Exempt	Exempt
Isoparaffin V	270	< 0,001	Exempt	Exempt



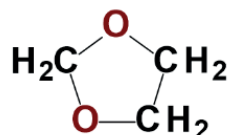
2-Ethylhexylal has a lower viscosity and surface tension compared to other substances with similar boiling point and vapour pressure.



Dioxolane

DESCRIPTION

CAS number	646-06-0	Molecular formula	C ₃ H ₆ O ₂
EC number	211-463-5	Molecular weight	74,08
IUPAC name	1,3-Dioxolane		
EC name	1,3-Dioxolane		



PROPERTIES

Boiling point (°C) at 1013 hPa			76
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	≤ 2,5
Vapour pressure (kPa) at 20°C	ASTM D323 modified		10,1
Evaporation rate	ASTM D3539	Butyl acetate = 1	7,14
Relative density at 20°C	OECD 109		1,06
Surface tension (mN/m) at 25°C			34,3
Water solubility (g/L) at 20°C			Fully miscible
Kinematic viscosity (mm ² /s) at 25°C			0,553
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		20,87
	Dispersion δ_d		17,85
	Polarity δ_p		7,33
	Hydrogen bond δ_h		7,94

FEATURES

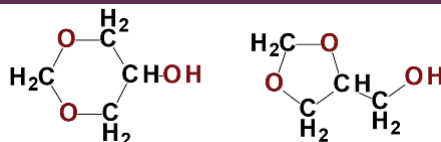
- Very high solvent power
- Fully water miscible
- Fast drying
- Low viscosity
- Co-monomer of Polyoxymethylene resins (POM)
- Listed in European Union Reference Laboratory for Food Contact Materials (EURL-FCM)
 - List of Authorized Substances: Annex I of the Commission Regulation (EU) No 10/2011 - FCM No 363

Glycerol Formal



DESCRIPTION

CAS number	4740-78-7 & 5464-28-8	Molecular formula	2(C ₄ H ₈ O ₃)
EC number	911-694-8	Molecular weight	104,1
IUPAC name	1,3-dioxan-5-ol & 1,3-dioxolan-4-ylmethanol		
EC name	Reaction mass of 1,3-dioxan-5-ol and 1,3-dioxolan-4-ylmethanol		

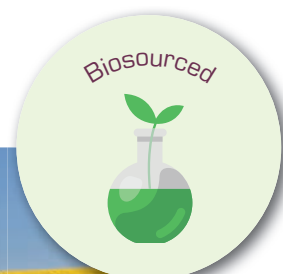


PROPERTIES

Boiling point (°C) at 1013 hPa			193,95
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	99
Vapour pressure (kPa) at 20°C	ASTM D323 modified		0,03
Evaporation rate	ASTM D3539	Butyl acetate = 1	0,041
Relative density at 20°C	OECD 109		1,218
Surface tension (mN/m) at 25°C			44,49
Water solubility (g/L) at 20°C			Fully miscible
Kinematic viscosity (mm ² /s) at 25°C			11,7
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		26,07
	Dispersion δ_d		18,2
	Polarity δ_p		10,1
	Hydrogen bond δ_h		15,7

FEATURES

- Odourless
- Fully water miscible
- Excellent solvency for active ingredients:
 - Excipient for veterinary products
 - Agrochemical uses

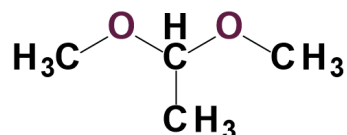




DMA

DESCRIPTION


CAS number	534-15-6	Molecular formula	C ₄ H ₁₀ O ₂
EC number	208-589-8	Molecular weight	90,12
IUPAC name	1,1-dimethoxyethane		
EC name	1,1-dimethoxyethane		



PROPERTIES

Boiling point (°C) at 1013 hPa			58,24
Flash point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	-19,5
Vapour pressure (kPa) at 20°C	ASTM D323 modified		18,27
Evaporation rate	ASTM D3539	Butyl acetate = 1	6,66
Relative density at 20°C	OECD 109		0,855
Surface tension (mN/m) at 25°C			21,42
Water solubility (g/L) at 20°C		DMA in water	< 250
Hansen Solubility parameters (MPa ^{1/2})	Total δ_T		16,61
	Dispersion δ_d		15,1
	Polarity δ_p		4,9
	Hydrogen bond δ_h		4,9

FEATURES

- Listed in  FL No 06.064
- Use in synthesis

	Methylal	Ethylal	Propylal	Butylal	TOU	Elcosol DM	
Molecular Formula	C ₃ H ₈ O ₂	C ₅ H ₁₂ O ₂	C ₇ H ₁₆ O ₂	C ₉ H ₂₀ O ₂	C ₇ H ₁₆ O ₄	C ₉ H ₂₀ O ₄	
Molecular weight (g/mol)	76,09	104,15	132,2	160,26	164,20	192,25	
Relative density (20°C)	0,861	0,830	0,8338	0,8354	0,9544	0,950	
Boiling Point (°C)	42,3	87,1	137,2	182,5	201,5	209,1	
Freezing Point (°C)	-104,8	-66,5	-97,3	-59,4	< -65	< -20	
Flash Point (°C)	-30,5	-7	26	62,4	88	88	
Vapour Pressure (kPa, 20°C)	40	6,8	0,75	0,066	0,0142	0,0069	
LEL (vol %)	LEL ₂₀ : 2,2	LEL 2,1	Not available	LEL ₂₀ : 0,65	LEL ₂₀ : 0,8	LEL ₂₀ : 0,77	
UEL (vol %)	UEL ₂₀ : 19,9	UEL 20	Not available	UEL ₁₈₀ : 23,6	UEL ₁₈₀ : 38,2	Not available	
Auto-ignition temperature (°C)	260	240	330	220	210	160	
Surface Tension (mN/m, 25°C)	21,20	21,62	23,43	25,20	31,50	29,50	
Kinematic Viscosity (mm ² /s, 25°C)	0,371	0,507	0,77	1,264	1,532	1,63	
Solubility of the acetal in water (g/L)	330	70	3,65	0,223	Fully miscible	370	
Solubility of water in the acetal (w/w %)	4	1,21	0,45	0,24	Fully miscible	Not available	
Partition coefficient n-octanol/water (log Kow)	0	0,84	2,04	2,77	-0,69	1,35	
Kauri-Butanol index	Gum 4938	101	92	73	62	> 200	> 200
	Gum 4939	164	120	94	75	> 200	> 200
Hansen solubility parameters (MPa ^{1/2})	Total δ_T	17,20	16,87	16,86	16,74	18,01	19,73
	Dispersion δ_d	15,09	15,5	15,55	15,68	15,89	16
	Polarity δ_p	2,53	4,36	4,27	4,03	5,51	7,8
	Hydrogen bond δ_h	7,86	5,03	4,93	4,26	6,44	8,5

2-Ethylhexylal	1,3-Dioxolane	Glycerol Formal	DMA	
$C_{17}H_{36}O_2$	$C_3H_6O_2$	$2(C_4H_8O_3)$	$C_4H_{10}O_2$	Molecular Formula
272,40	74,08	104,1	90,12	Molecular weight (g/mol)
0,848	1,06	1,218	0,855	Relative density (20°C)
290	76	193,95	58,24	Boiling Point (°C)
< -65	< -95	< -50	-94,26	Freezing Point (°C)
142	≤ 2,5	99	-19,5	Flash Point (°C)
$8,4 \times 10^{-6}$	10,1	0,03	18,27	Vapour Pressure (kPa, 20°C)
Not available	LEL ₄₅ : 2,3	Not available	Not available	LEL (vol %)
Not available	UEL ₆₅ : 30,5	Not available	Not available	UEL (vol %)
280	250	> 400	247	Auto-ignition temperature (°C)
25,20	34,30	44,49	21,42	Surface Tension (mN/m, 25°C)
4,03	0,553	11,7	Not available	Kinematic Viscosity (mm ² /s, 25°C)
$1,04 \times 10^{-5}$	Fully miscible	Fully miscible	< 250	Solubility of the acetal in water (g/L)
Not soluble	Fully miscible	Fully miscible	Not available	Solubility of water in the acetal (w/w %)
6,53	- 0,37	- 0,99	0,63	Partition coefficient n-octanol/water (log Kow)
31	> 218	71	Not available	Gum 4938
33	> 207	74	Not available	Gum 4939
16,68	20,87	26,07	16,61	Total δ_T
15,94	17,85	18,2	15,1	Dispersion δ_d
3,30	7,33	10,1	4,9	Polarity δ_p
3,64	7,94	15,7	4,9	Hydrogen bond δ_h
				Hansen solubility parameters (MPa ^{1/2})

Kauri-Butanol index



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