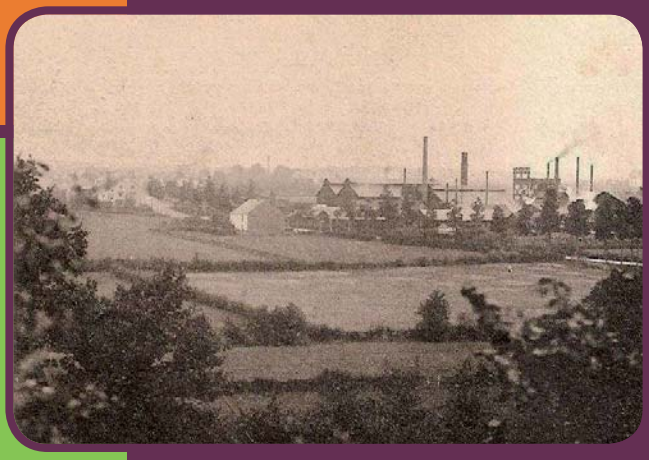
LAMBIOTTE & CIE S.A.

Lambiotte

Lambiotte & cie



Lambiotte & Cie started its activities in 1860 with forestry and sawmill activities, producing railway sleepers. In parallel and with a sustainable approach, the company valorised by-products by developing an innovative carbonization process to convert wood into charcoal. At the beginning of 20th century, one of the chemicals obtained with this technology was methanol used to produce formaldehyde. By 1970, Lambiotte's activities in chemistry expanded: formaldehyde was used as a reagent in the production of acetals. Since then, the company has continued to develop its expertise in chemistry by developing new processes, making it the leader in the highly specialised field of acetals synthesis. Acetals are now the core-business of the company.

We at Lambiotte are offering a wide range of acetals, manufactured in dedicated facilities. Our technical expertise in this specialist field guarantees the highest and most constant quality and purity of product, allowing us to respond to specific demands of customers.

A specialized support team is available to give the customer technical advice, providing tailored formulae for many industrial sectors. In order to meet the customer's needs, we propose the services of our application laboratories in aerosols, cosmetics, coatings... A world-wide network of specialised distributors ensures fast product availability, delivery, and technical support to guarantee optimal client services. I

Acetals product range

Acetals are produced by reacting an alcohol with an aldehyde. They are a very stable chemical family with linear or cyclic structures.

"Acetals have very good toxicity and ecotoxicity profiles improving quality of life."

Lambiotte's acetals have very good toxicity and ecotoxicity profiles improving quality of life.
Their atmospheric chemistry behaviour is also very good.
GWP and POCP are low, ODP is zero.

Lambiotte offers a broad range of acetals with highly differentiated properties. Acetals have non to full miscibilities with water and are easy to blend with organic solvents. They improve the performance of our customers' formulations.

Thanks to their high solvent power, acetals are widely used to solubilise a large range of products, such as resins, active ingredients, additives, etc.

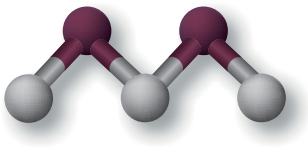
Biosourced products are also available, confirming the sustainable character of the acetals. I

Methylal 4
Ethylal 5
Propylal 6
Butylal 7
TOU 8
2-Ethylhexylal 9
Dioxolane 10
Glycerol Formal 11
Regulatory 12
Applications 13
Acetals' Properties 14-15

Methylal

DESCRIPTION

Molecular formula	$C_3H_8O_2$
Molecular weight	76,08
CAS number	109-87-5
EC number	203-714-2
IUPAC name	Dimethoxymethane
EC name	Dimethoxymethane



PROPERTIES

Boiling point (°C) at 1013 hPa			42,3
Freezing point (°C) at 1013 hPa			-104,8
Flash-point (°C) at 1013 hPa	DIN 51755 part 2	Closed cup	-30,5
Relative density at 20°C	OECD 109		0,861
Vapour pressure (kPa) at 20°C	ASTM D323 modified		40
Surface tension (mN/m) at 20°C			21,2
Water solubility (g/L) at 20°C		Methylal in water	330
Viscosity (kinematic) (mm^2/s) at 25°C			0,371
Evaporation rate compared to	DIN 53170	Diethyl ether (= 1)	1,36
		Butyl acetate (= 1)	0,11

COMPARISON

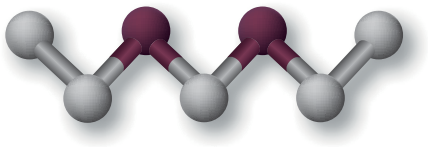
	Methylal	Methylene Chloride	Acetone	MEK
Health				
Solvent Power				
Miscibility with water				

APPLICATIONS

Ethylal

DESCRIPTION

Molecular formula	$C_5H_{12}O_2$
Molecular weight	104,15
CAS number	462-95-3
EC number	207-330-6
IUPAC name	(Ethoxymethoxy) ethane
EC name	Diethoxymethane



PROPERTIES

Boiling point (°C) at 1013 hPa			88
Freezing point (°C) at 1013 hPa			-66,5
Flash-point (°C) at 1013 hPa		Closed cup	-7
Relative density at 20°C			0,83
Vapour pressure (kPa) at 20°C	ASTM D323 modified		17
Surface tension (mN/m) at 25°C			21,62
Water solubility (g/L) at 18°C		Ethylal in water	70
Viscosity (kinematic) (mm^2/s) at 25°C			0,507
Evaporation rate compared to	DIN 53170	Diethyl ether (= 1)	3
		Butyl acetate (= 1)	0,25

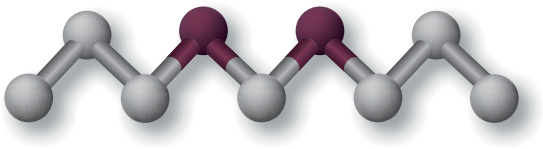
HIGHLIGHTS

APPLICATIONS

Propylal

DESCRIPTION

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



PROPERTIES

Boiling point (°C) at 1013 hPa			137,4
Freezing point (°C) at 1013 hPa			-97,3
Flash-point (°C) at 1013 hPa		Closed cup	26
Relative density at 20°C			0,8338
Vapour pressure (KPa) at 20°C	ASTM D323 modified		<2
Surface tension (mN/m) at 25°C			23,43
Water solubility (g/L) at 20°C	OECD TG 105	Propylal in water	3,65
Viscosity (kinematic) (mm^2/s) at 20°C			0,77
Evaporation rate compared to	DIN 53170	Diethyl ether (= 1)	14
		Butyl acetate (= 1)	1,25

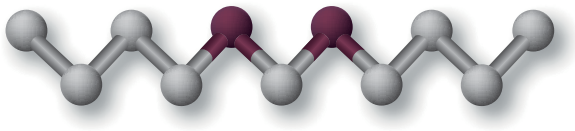
HIGHLIGHTS

APPLICATIONS

Butylal

DESCRIPTION

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



PROPERTIES

Boiling point (°C) at 1013 hPa			182,5
Freezing point (°C) at 1013 hPa			-59,4
Flash-point (°C) at 1013 hPa	ASTM D93	Closed cup	62,2
Relative density at 20°C			0,8354
Vapour pressure (kPa) at 20°C			0,079
Surface tension (mN/m) at 25°C			25,2
Water solubility (g/L) at 20°C		Butylal in water	0,2225
Viscosity (kinematic) (mm^2/s) at 25°C			1,18
Evaporation rate compared to	DIN 53170	Butyl acetate (= 1)	5,54

COMPARISON

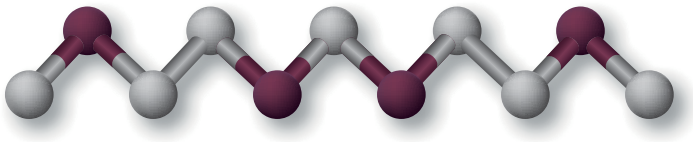
	Butylal	d-limonene	Dearomatized Hydrocarbons	Perchloro-ethylene
Health				
Environment				
Degreasing power				

APPLICATIONS

TOU

DESCRIPTION

Molecular formula	$C_7H_{16}O_4$
Molecular weight	164,20
CAS number	4431-83-8
EC number	224-631-8
IUPAC name	2,5,7,10-Tetraoxaundecane
EC name	2,5,7,10-Tetraoxaundecane



PROPERTIES

Boiling point (°C) at 1013 hPa			201.5
Freezing point (°C) at 1013 hPa	ASTM D1177		< -65
Flash-point (°C) at 1013 hPa	ASTM D93	Closed cup	88
Relative density at 20°C			0,9921
Vapour pressure (kPa) at 25°C	Method A4 (Dir 92/69/EEC)		0,022
Surface tension (mN/m) at 25°C			31,5
Water solubility at 20°C			Fully miscible
Viscosity (kinematic) (mm^2/s) at 25°C			1,532
Evaporation rate compared to	DIN 53170	Butyl acetate (= 1)	17,38

COMPARISON

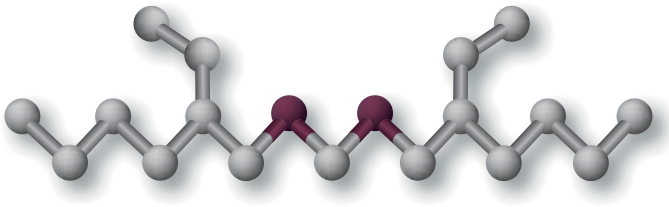
	TOU	NMP/NEP	Clycols	Aromatics
Labelling				
Smell				
Solvent power				

APPLICATIONS

2-Ethylhexylal

DESCRIPTION

Molecular formula	$C_{17}H_{36}O_2$
Molecular weight	272,4
CAS number	22174-70-5
EC number	244-815-1
IUPAC name	3-{{{(2-Ethylhexyl)oxy] methoxy}methyl}heptane
EC name	3,3'-[Methylenebis (oxymethylene)]bisheptane



PROPERTIES

Boiling point (°C) at 1013 hPa			290
Freezing point (°C) at 1013 hPa	ASTM D1177		< - 65
Flash-point (°C) at 1013 hPa	NBN T52-110	Closed cup	142
Relative density at 20 °C	OECD TG 109		0,848
Vapour pressure (kPa) at 20°C and 50°C	Method A4 (Dir. 92/69/EEC)		< 0,01
Surface tension (mN/m) at 25°C		ring method	25,2
Water solubility (g/L) at 20°C	OECD TG 105	2-Ethyhexyllal in water	<0,001
Viscosity (kinematic) (mm^2/s) at 25°C			9,42
Evaporation rate compared to	DIN 53170	Butyl acetate (= 1)	No evaporation

HIGHLIGHTS

VOC FREE

NON VOC ACCORDING TO:

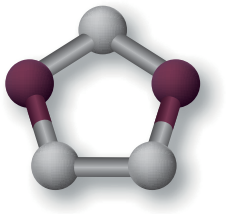
- **DIRECTIVE 1999/13/EC :**
  ITS VAPOUR PRESSURE AT 293,15 K IS LOWER THAN 0,01 KPA
- **DIRECTIVE 2004/42/CE :**
  ITS BOILING POINT IS OVER 250°C AT 101.3 KPA.

APPLICATIONS

Dioxolane

DESCRIPTION

Molecular formula	$C_3H_6O_2$
Molecular weight	74,08
CAS number	646-06-0
EC number	211-463-5
IUPAC name	1,3-Dioxolane
EC name	1,3-Dioxolane



PROPERTIES

Boiling point (°C) at 1014 hPa	OECD 103		76
Freezing point (°C) at 1014 hPa	OECD 102		< - 90
Flash-point (°C) at 1026,2 hPa	ISO 2719 :2002	Closed cup	≤ 2,5
Relative density at 20°C	OECD 109		1,06
Vapour pressure (kPa) at 20°C	OECD 104		10,1
Surface tension (mN/m) at 25°C			34,3
Water solubility at 20°C			Fully miscible
Viscosity (kinematic) (mm^2/s) at 20°C			0,553
Evaporation rate compared to	DIN 53170	Diethyl ether (= 1)	3,6
		Butyl acetate (= 1)	0,29

COMPARISON

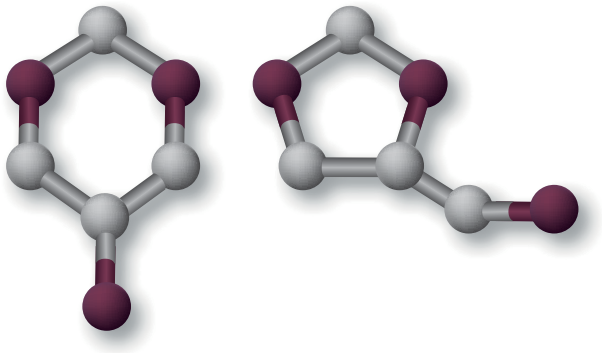
	Dioxolane	THF	NMP/NEP	Chlorinated solvents
Health & Environment				
Solvent Power				
Miscibility with water				

APPLICATIONS

Glycerol formal

DESCRIPTION

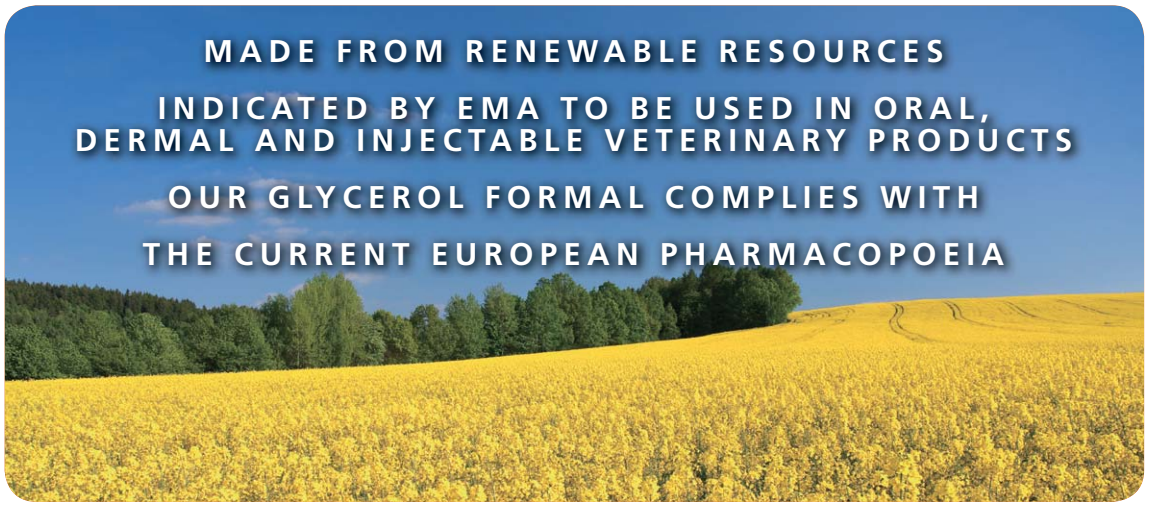
Molecular formula	2 ($C_4H_8O_3$)
Molecular weight	104,11
CAS number	4740-78-7 and 5464-28-8
EC number	911-694-8
IUPAC name	1,3-dioxan-5-ol and 1,3-dioxolan-4-ylmethanol
EC name	Reaction mass of 1,3-dioxan-5-ol and 1,3-dioxolan-4ylmethanol



PROPERTIES

Boiling point (°C) at 1014 hPa			193,9
Freezing point (°C) at 1014 hPa	NFT 78 102 / ASTM D1177		< -50
Flash-point (°C) at 1026,2 hPa	NBN-EN 22719	Closed cup	99
Relative density at 20°C			1,218
Vapour pressure (kPa) at 20°C	ASTM D323 modified		0,03
Surface tension (mN/m) at 25°C			44,49
Water solubility at 20°C			Fully miscible
Viscosity (kinematic) (mm^2/s) at 20°C			11,7
Evaporation rate compared to	DIN 53170	Butyl acetate (= 1)	No evaporation

HIGHLIGHTS

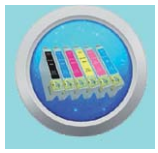
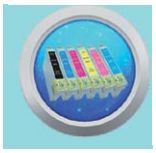
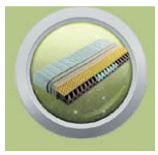
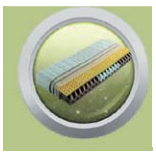


APPLICATIONS

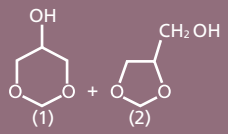
		Methylal	Ethylal	Propylal	Butylal	TOU	2-Ethylhexylal	1,3-Dioxolane	Glycerol formal
EUROPE	REACH	01-2119664781-31	01-2119947549-21	Registration in 2018	01-2119969502-33	01-2119973500-41	01-2119969504-29	01-2119490744-29	01-2119979102-39
	WGK - Germany (Verwaltungssvorschrift wassergefährdende Stoffe (VwVwS)	1 Kennummer: 1380	1 Kennummer: 7638	-	1 Kennummer: 1764	1 Kennummer: 8184	-	1 Kennummer: 5035	-
	Switzerland - Product register for chemicals (RPC)	215976-33 214729-88 250402-60 250401-63	214727-94	204240-30	204241-27	250399-69	250391-93	214728-91 250398-72	214726-00
USA	Toxic Substances Control Act (TSCA) Chemical Substances Inventory (February 2017)	✔	✔	✔	✔	✔	-	✔	✔ (As CAS N° 68442-91-1)
	State Right-to-Know List : Illinois, Massachusetts, Minnesota, New Jersey, Pennsylvania, Rhode Island	✔ (All states)	✔ (NJ)	-	-	-	-	✔ (MA, MN, NJ, PA)	-
	California Proposition 65 List - Chemicals known to the State to cause cancer or reproductive toxicity (Apr 22, 2016)	-							
CANADA	Domestic Substances List (DSL) as amended through Apr 5, 2017	✔	-	-	✔	-	-	✔	-
	Non-Domestic Substances List (NDSL) as amended through Apr 1, 2017	-	✔	✔	-	✔		-	✔ (As CAS N° 68442-91-1)
MEXICO	National Inventory of Chemical Substances (INSQ). Base 2009 Secretariat of Environment and Natural Resources – National Institute of Ecology, First edition: 2012	✔	✔	-	-	-	-	✔	
CHINA	Inventory of Existing Chemical Substances (IECSC) (2013 Version, Jan 2013, amended through MEP No. 2016-20, March 8, 2016)	✔	✔	-	✔	-	-	✔	✔ (CAS N° 4740-78-7 only)
JAPAN	Inventory of Existing & New Chemical Substances (ENCS) as amended through Mar 27, 2017	(2)-498	-	-	-	-	-	(5)-500	-
	Industrial Safety & Health Law (ISHL) Inventory as amended through Mar 27, 2017	(2)-498	2-(11)-64	-	-	-	-	(5)-500	
KOREA	Existing Chemicals Inventory (KECI, Jan 27, 2015, amended through MoE 2016-138, July 13, 2016)	KE-11074	KE-23849	KE-12221	-	-	-	KE-12027	-
PHILIPPINES	Inventory of Chemicals and Chemical Substances (PICCS) 2014	✔	✔	-	✔	-	-	✔	-
TAIWAN	Chemical Substance Inventory (TCSI) (MOL No. 10302023691, Dec 31, 2014, amended through No. 10402028451, Sep 10, 2015)	✔	✔	✔	✔	✔	✔	✔	✔
THAILAND	Existing Chemicals Inventory from FDA (TECI List, 12 January 2017)	55-1-00571	-	-	-	-	-	55-1-05154	-
VIETNAM	Draft National Inventory List (Published by VCERC on 13 March 2017)	✔	✔	✔	✔	✔	✔	✔	✔
AUSTRALIA	Inventory of Chemical Substances (AICS) (as amended through May 5, 2017)	✔	✔	-	✔	-	-	-	✔ (CAS N° 5464-28-8 only)
NEW ZEALAND	New Zealand Inventory of Chemicals (NZIoC) published by the Environmental Protection Authority (as amended through Dec 2016)	HSNO Approval Code HSR001047	HSNO Approval Code HSR006750	-	HSNO Approval Code HSR100595	-	-	HSNO Approval Code HSR001141	HSNO Approval Code HSR003700 assigned to CAS# 5464-28-8

(✔) listed in the specified regulation

Applications

	Methylal	Ethylal	Propylal	Butylal	TOU	2-Ethyl hexylal	Dioxolane	Glycerol Formal
Coatings								
Inks								
Adhesives								
Cleaning								
Aerosols								
Cosmetics								
Pharma-ceuticals								
Veterinary								
Synthesis								
Textile / Leather								
Agro chemical								
Poly urethane								

		Methylal	Ethylal	Propylal
Molecular formula		$C_3H_8O_2$	$C_5H_{12}O_2$	$C_7H_{16}O_2$
Chemical structure		CH_3-O-CH_2-O-CH_3	CH_3-CH_2-O-CH_2-O-CH_2-CH_3	CH_3-$(CH_2)_2$-O-CH_2-O-$(CH_2)_2$-CH_3
IUPAC name		Dimethoxymethane	(Ethoxymethoxy)ethane	1-(Propoxymethoxy)propane
EC name		Dimethoxymethane	Diethoxymethane	Dipropoxymethane
CAS N°		109-87-5	462-95-3	505-84-0
EC N°		203-714-2	207-330-6	208-021-9
Molecular weight		76,08	104,15	132,2
Relative density 20°C		0,861	0,83	0,8338
Boiling point (°C) 101 325 Pa		42,3	88	137,4
Freezing point (°C)		-104,8	-66,5	-97,3
Flash point (°C)	Closed cup (Pensky-Martens)	-30,5	-7	26
Surface tension (mN/m)		21,20	21,62	23,43
Vapour pressure (kPa) 20°C (ASTM D 323 modified)		40	17	<2
Kinematic viscosity (mm^2/s) 25°C		0,371	0,507	0,77
Autoignition temperature (°C) (ASTM E 659)		260	240	330
Explosion limits (Vol%)		LEL20 : 2,2 UEL20 : 19,9	LEL : 2,1 UEL : 20	Not available
Evaporation (DIN 53170) rate compared to.	Diethyl ether (= 1)	1,36	3	14
	Butyl acetate (= 1)	0,11	0,25	1,25
Vapour density		2,6	3,6	4,6
Refractory index $\eta^{20}D$		1,3531	1,3725	1,3930
Solubility of the acetal in water (g/L)		330	70	3,65
Kauri-butanol index (ASTM D 1133-90) measured with	gum 4938	101	92	73
	gum 4939	164	120	94
Solubility parameters (MPa1/2)	Total δ_t	18,24	17,06	16,84
	Dispersion δ_d	14,83	14,87	15,11
	Polarity δ_p	6,01	4,67	3,95
	Hydrogen bond δ_h	8,76	6,95	6,32

Butylal	TOU	2-ethylhexylal	Dioxolane	Glycerol formal
$C_9H_{20}O_2$	$C_7H_{16}O_4$	$C_{17}H_{36}O_2$	$C_3H_6O_2$	2 ($C_4H_8O_3$)
CH_3-(CH_2)$_3$- O-CH_2-O-(CH_2)$_3$-CH_3	CH_3-O-(CH_2)$_2$-O-CH_2-O-(CH_2)$_2$-O-CH_3	CH_3-(CH_2)$_3$-CH(C_2H_5)-CH_2-O-CH_2-O-CH_2-CH(C_2H_5)-(CH_2)$_3$-CH_3		
1-{Butoxymethoxy}butane	2,5,7,10-Tetraoxaundecane	3-{{[[2-Ethylhexyl]oxy] methoxy}methyl}heptane	1,3-Dioxolane	1,3-dioxan-5-ol and 1,3-dioxolan-4-ylmethanol
1,1'-[Methylenebis(oxy)]dibutane	2,5,7,10-Tetraoxaundecane	3,3'-[Methylenebis (oxymethylene)]bisheptane	1,3-Dioxolane	Reaction mass of 1,3-dioxan-5-ol and 1,3-dioxolan-4ylmethanol
2568-90-3	4431-83-8	22174-70-5	646-06-0	4740-78-7 and 5464-28-8
219-909-0	224-631-8	244-815-1	211-463-5	911-694-8
160,26	164,2	272,4	74,08	104,11
0,8354	0,9921	0,848	1,06	1,2185
182,5	201.5	290	76	193,9
-59,4	< -65	< -65	< -90	< -50
62,2	88	142	≤ 2,5	99
25,2	31,5	25,2	34,3	44,49
0,079	0,022	<0,01	10,1	0,03
1,18	1,532	9,42	0,553	11,7
220	210	280	250	>400
LEL20 : 0,65	LEL100 : 0,75	Not available	LEL : 2,3 +/-10	Not available
UEL180 : 23,6	UEL180 : 38,2		UEL: 30,5 +/-5	
Not available	Not available	No evaporation	3,6	Not available
5,54	17,38	No evaporation	0,29	Not available
5,5	5,7	9,4	2,6	Not available
1,4054	1,4142	1,4350	1,4005	1,45
0,2225	Fully miscible	< 0,001	Fully miscible	Fully miscible
62	> 200	31	>218	71
75	> 200	33	>207	74
16,23	18,74	Not available	22,07	25,79
14,70	15,16		16,95	16,37
3,43	6,09		7,85	11,99
5,96	9,19		11,76	19,63

Lambiotte

BRUSSELS (OFFICES)

Avenue des Aubépines 18
B-1180 Brussels
Belgium
Tel: +32 2 374 44 65
Fax: +32 2 375 31 55
contact@lambiotte.com

MARBEHAN (PLANT)

Grand'Rue 79
B-6724 Marbehan
Belgium
Tel: +32 63 41 00 80
Fax: +32 63 41 16 98

2017

www.lambiotte.com