



OXSOFT[®]
go phthalate-free

OXBLUE[®]
the best of bio & oxo

www.phthalate-free-plasticizers.com

Trusted Partner for Plasticizers

Facing the rising health and image concerns of consumers, the industry is calling for safe, high-performing and affordable plasticizers to meet the market requirements. Accordingly, OXEA offers a wide range of plasticizer solutions to support the increasing market shift to phthalate-free, non-VOC and bio-based plasticizers.

Our **phthalate-free** OXSOF[®] and **bio-based** OXBLUE[®] plasticizers can replace the traditional phthalate products and are being applied in a broad variety of end-uses, such as **automotive, construction, food** and **medical applications**.

An overview of the OXSOF[®] plasticizers

- OXSOF[®] DOA: Dioctyl adipate/Bis(2-ethylhexyl)adipate
- OXSOF[®] 3G8: Triethylene glycol bis(2-ethylhexanoate)
- OXSOF[®] TOTM: Trioctyl trimellitate/Tris(2-ethylhexyl)trimellitate
- OXSOF[®] GPO: Dioctyl terephthalate/Bis(2-ethylhexyl)-1,4-benzenedicarboxylate
- OXSOF[®] DUO 1: A defined mix of plasticizers
- OXSOF[®] DUO 2: A defined mix of plasticizers

The **bio-based** OXBLUE[®] solutions help the industry produce affordable products with higher bio content, with no compromise on performance.

An overview of the OXBLUE[®] plasticizers

- OXBLUE[®] DOSX: Dioctyl succinate/Bis(2-ethylhexyl)succinate
- OXBLUE[®] ATBC: Acetyl tributyl citrate

Integrated with key raw materials, OXEA is committed to fulfilling the needs of our worldwide customers through reliable supply of quality phthalate-free and bio-based plasticizers. With multiple production sites dedicated to supporting the specialty esters business, we are a trusted partner with strong global production capacity.

For more information, visit us at www.phthalate-free-plasticizers.com

About OXEA

OXEA is a global manufacturer of oxo intermediates and oxo derivatives, such as alcohols, polyols, carboxylic acids, specialty esters, and amines. These products are used for the production of high-quality coatings, lubricants, cosmetics and pharmaceutical products, flavourings and fragrances, printing inks and plastics. OXEA generated an annual revenue of about EUR 1.5 billion with its 1,400 employees in Europe, the Americas and Asia. OXEA is owned by Oman Oil Company S.A.O.C.

Oxo chemicals are OXEA's core competency. We produce oxo intermediates and oxo derivatives in our plants in Germany, the Netherlands, and the USA and are currently in the process of building our first manufacturing facility in China. Our global customer base is served from sales offices in numerous locations, including Europe, North America, Asia and Latin America.

As "The Oxo People", OXEA has more than 75 years of experience in the production of Oxo chemicals. We are the inventor of the Oxo synthesis process (or "hydroformylation") as well as several other proprietary technologies for the manufacture of Oxo chemicals.

More information about OXEA is available at www.oxea-chemicals.com

Overview: Applications & Plasticizers

Application	Desired Plasticizer Performances	Typical Used Product(s)	Alternative(s)
Wire & Cable Insulation			
Building wire	· Long term safety · Low migration · Ease of processing	DIDP, DPHP, trimellitates, linear phthalates	TOTM, DUO 1&2
Other wire & cable	· Safety is key · Performance requirements depending on exact use	DOP, DINP, DPHP, trimellitates, linear phthalates, DOTP	TOTM, GPO, DOA
Construction			
Caulks & sealants	· Low indoor air emissions · Film coalescent · Long shelf life	BBP, dibenzoates, C7 phthalates	3G8, DOSX
Urethane sealants	· UV resistant · Low volatility · Compatibility · Long shelf life	Mesamoll, dibenzoates, DINP, linear phthalates	3G8, DOSX, GPO
Wall paper	· Low indoor air emissions · Film coalescent · Long shelf life · Printability	DINP, DIDP, DPHP	DUO 1&2
Hoses	· FDA approval · High clarity · Low water solubility · Hydrolytic stable	DINP, DIDP, DPHP, trimellitates	GPO, TOTM
Roofing	· UV resistant · Low volatility · Prolonged service life (up to 20 years)	DIDP, DPHP, linear phthalates, trimellitates	DUO 1&2
Swimming pool liners	· Low migration · UV resistant · Water resistant	DOP, DOTP, TOTM	GPO, DUO 1&2
Flooring & Carpets			
Vinyl tile	· Ease of processing · Low migration · Long service life	BBP, dibenzoates, DINP, DOP, DIDP, DPHP	DOA, GPO, DUO 1&2
Resilient Flooring	· Ease of processing · Stain resistance · Low emissions · Low odor · Long service life	BBP, dibenzoates, DINP, DOP, DIDP, DPHP, DOTP	DOA, DOSX, GPO, DUO 1&2
Carpets	· Ease of processing · Chemical stability · Low emissions · Low odor	DINP, DINP, DOTP	GPO, DUO 1&2
Automotive			
Artificial leather	· Ease of processing · Minimized migration · Low fogging · Good cold temp · Flexibility · UV resistant · Heat stable	DINP, DOP, DPHP	DUO 1&2
Auto Mats	· Ease of processing · Long service life · Good cold and warm temperature performance · Stain resistance	DOP, DOTP adipates	GPO, DUO 1&2, DOA
Wiring	· Low migration · Oil extraction resistance · Heat stable · Low fogging	DIDP, DPHP, Linear phthalates, trimellitates, polymeric	TOTM, DUO 1&2
Household			
Furniture	· Ease of processing · Low emissions · Stain resistance	DINP, DIDP, DPHP, linear phthalates, DOTP	DUO 1&2, GPO
Garden hoses	· Low water solubility · Hydrolysis resistant	DOP, DINP, DIDP, DPHP, DOTP	DOA, GPO
Table cloths	· Migration resistant · Stain resistant	DOP, DINP, DIDP, DPHP, DOTP	GPO
Shower curtains	· Migration resistant · Low water solubility	DOP, DINP, DIDP, DPHP, DOTP	GPO
Floor mats	· Migration resistant · Low emissions · Stain resistance	BBP, DINP, DIDP, DPHP, DOTP	GPO, DUO 1&2
Food cling wraps	· FDA approval · Low water solubility	DOA, Mesamoll	DOA, DOSX, ATBC
Toys	· Fast processing · Low migration · Low odor · High purity	DOTP, Citrates, polymeric	ATBC, GPO
Medical			
Blood bags	· Relevant Approvals · Long safe history · No color change in sterilization	DOP	TOTM, GPO
Tubes	· Migration resistance · High clarity	DOP, TOTM	TOTM
Nutrition	· Migration resistance · High clarity	TOTM	TOTM

Shore A Hardness

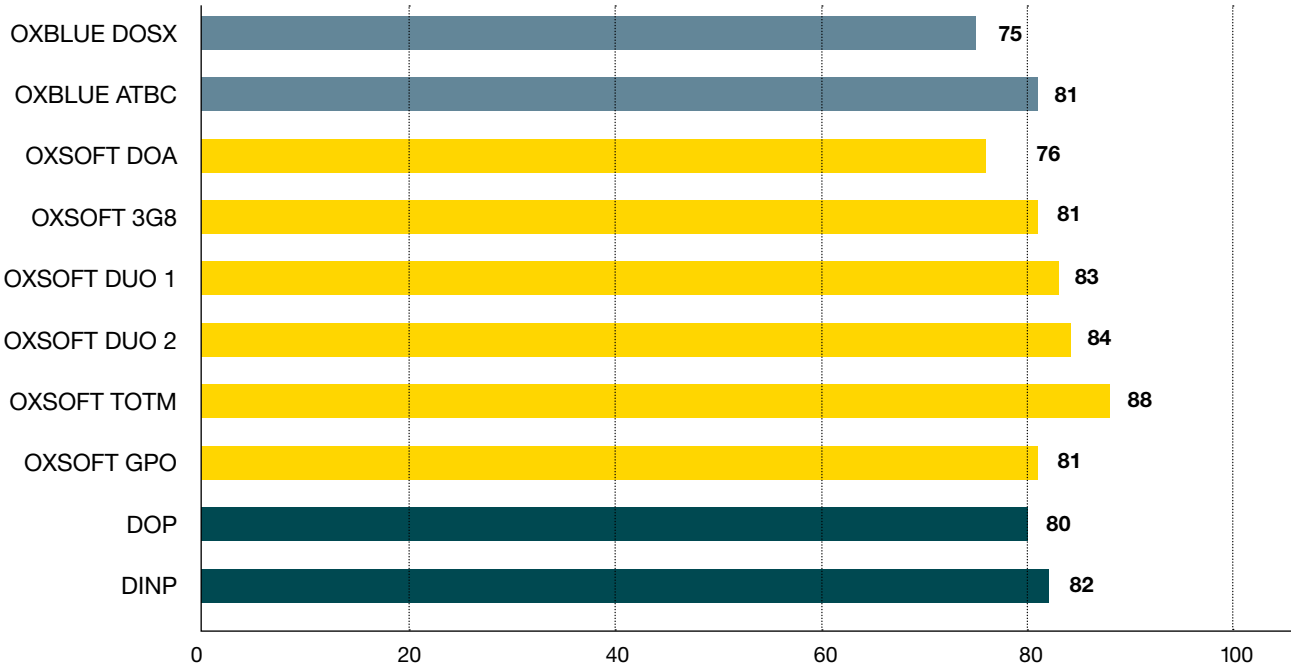
Test description

This test measures the material's ability to resist indentation under specific conditions of force and time. The preferred method for testing the relative hardness of rubbers, elastomers or softer plastics is the Shore A durometer. A Shore A durometer is a portable device that uses a truncated cone indenter point and a calibrated steel spring to measure the resistance of the elastomer to indentation.

The obtained values lie between 0 and 100. The higher the number, the greater the resistance. If the value is 0, the indenter completely penetrates the sample. If the result is 100, no penetration occurs. Shore A Hardness is an indication of the "efficiency" of the plasticizer – the lower the number, the more efficient the plasticizer. Following data is based on ASTM D1706, using a plasticizer concentration in PVC of 50 phr.

Evaluation

OXBLUE DOSX and OXSOFT DOA show the best performances and may be considered as the most efficient plasticizer. OXSOFT 3G8, GPO and OXBLUE ATBC show a similar performance as DOP but a slightly better performance compared to DINP.



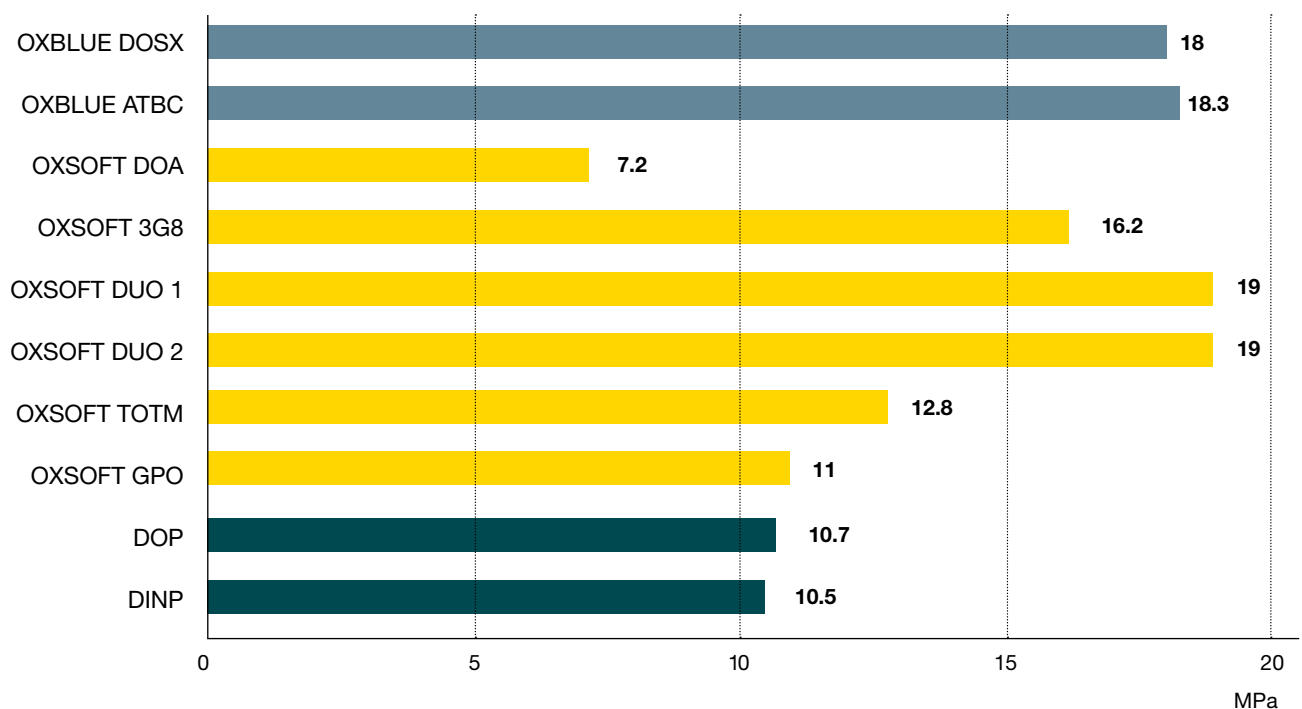
100 % Modulus

Test description

Modulus is basically the stiffness of a material, or more precisely, the force required to produce a given elongation, usually 100 per cent (100 % Modulus). Modulus is measured in MPa. Compounds with a higher modulus are more resilient and compounds with a lower modulus are more efficient. Test method is ASTM D638, using a plasticizer concentration of 50 phr in PVC.

Evaluation

OXSOFT DUO 1 & 2 are the most resilient plasticizers, having a value of 19 whereas the plasticizer average of the 100 % Modulus Test is around 11. OXSOFT DOA, with a relatively low value of 7.2 is obviously not as resilient as the other plasticizers, but is the most efficient one.



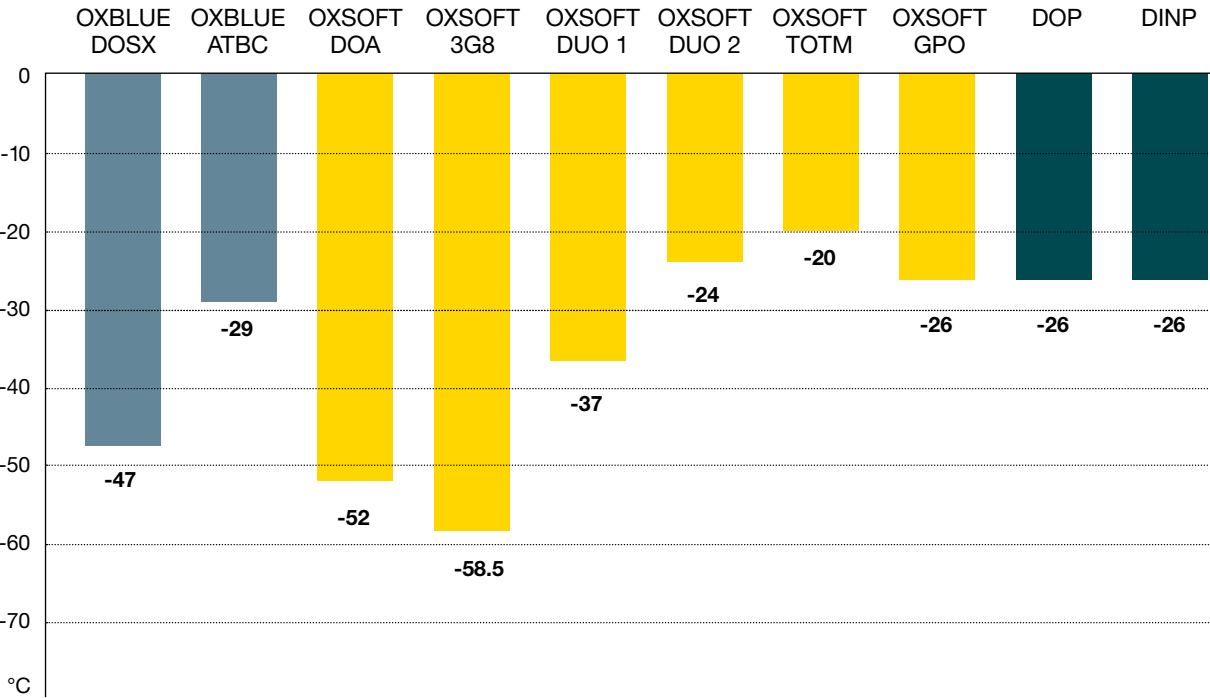
Low Temperature Flexibility

Test description

All plastics which are flexible at room temperature become less flexible if they are cooled, finally becoming brittle at lower temperatures. This property is often measured by torsional tests over a wide range of temperatures. The specimen is bent to an angle of 90° and examined for cracks at the bend. The temperature, where a fracture into two or more pieces, or any crack visible to the unaided eye occurs, is reported, using the test method ASTM D1043 (concentration = 50 phr).

Evaluation

OXSOFT 3G8, DOA and OXBLUE DOSX show by far the best low temperature flexibility. These three plasticizers are highly recommended for applications where excellent low temperature properties are required. OXSOFT GPO shows a very similar performance like traditional phthalate plasticizers.



Elevated Temperature Volatility

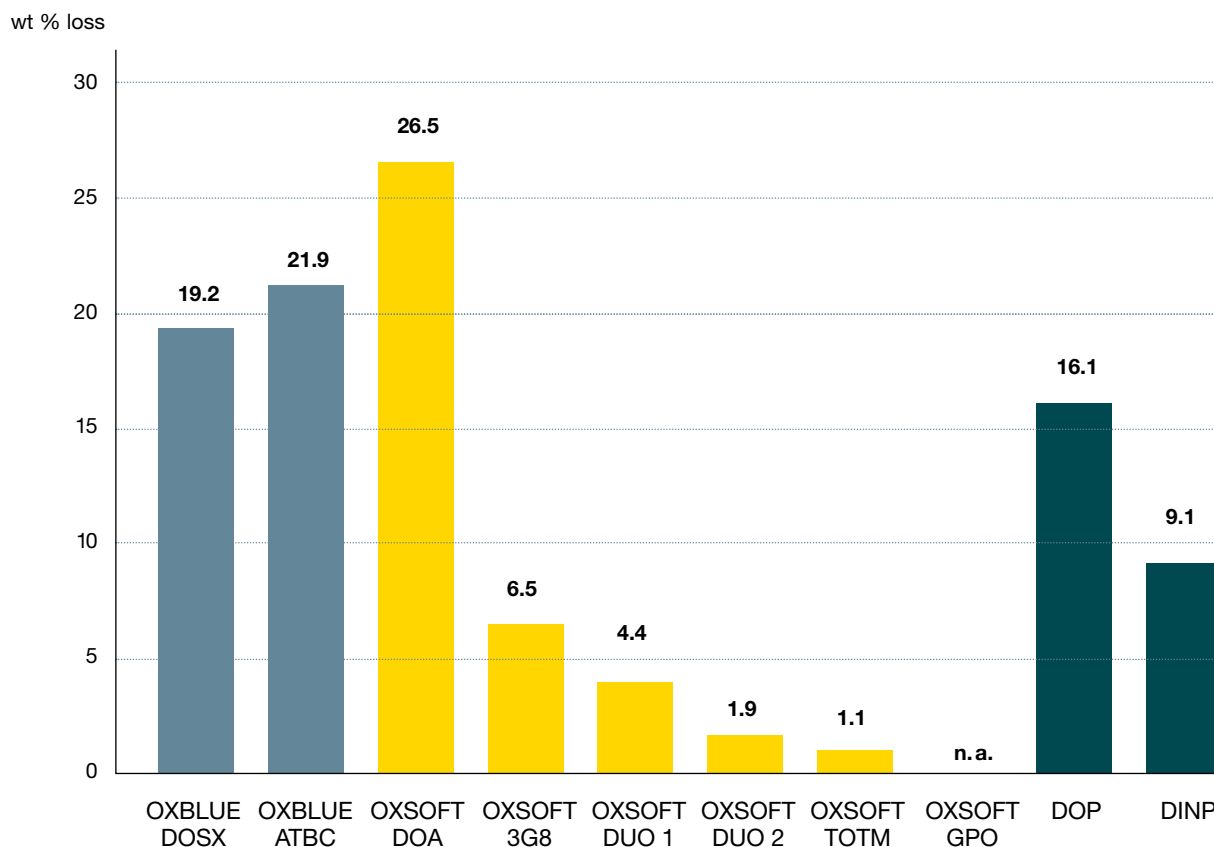
Test description

Volatility is the tendency of a substance to vaporise and is directly related to a substance's vapor pressure. At a given temperature, a substance with a higher vapor pressure vaporizes more readily than a substance with a lower vapor pressure.

Volatility is expressed as a percentage weight change (wt %) due to plasticizer loss to the atmosphere (value indicates loss of softener). Volatility loss was measured after 7 days at 100°C (concentration = 50 phr).

Evaluation

OXSOFT TOTM outperforms all included plasticizers, it offers superior permanence at elevated temperatures. OXSOFT TOTM is a highly permanent plasticizer which limits any migration concerns even at higher temperatures.



Relative Extraction Resistance

Test description

The relative extraction resistance intends to be a rapid empirical test to determine the loss of the plasticizer or other extractable components from the plastic film when immersed in commonly used liquids. The presented values illustrate the percentage weight change of a film after immersion in chemicals. Therefore the following three liquids were tested using the method ASTM D1239:

- Soapy water
- Oil
- Hexane

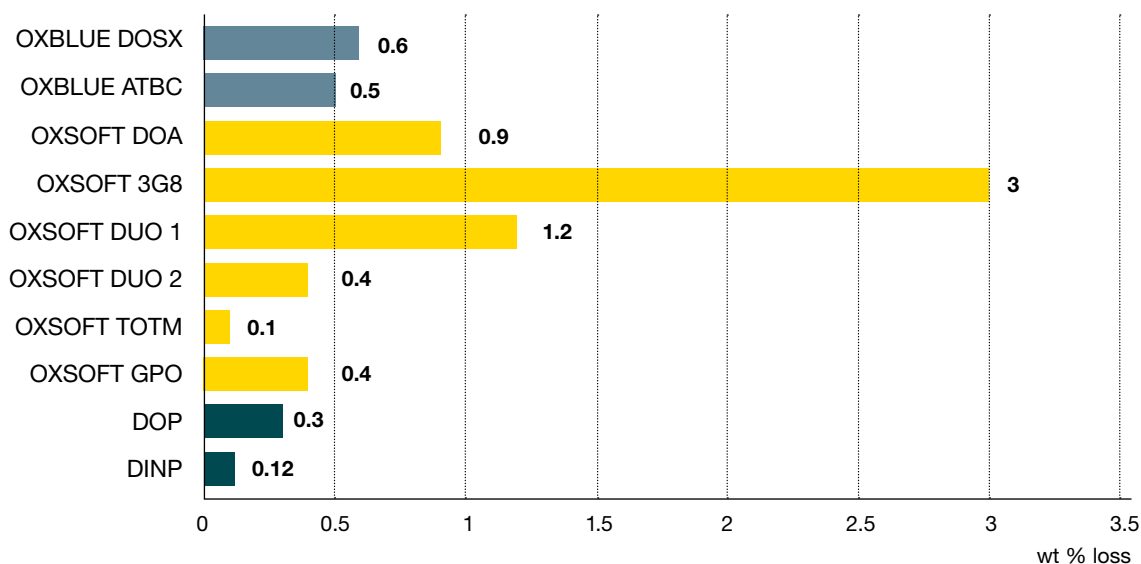
Evaluation

Results of plasticizer loss are very different when comparing the three liquids. With increasing wt % loss, ranking appears to be the following: soapy water < oil < hexane.

Migration of plasticizers can be a concern. For some application like medical applications any migration risk should be limited.

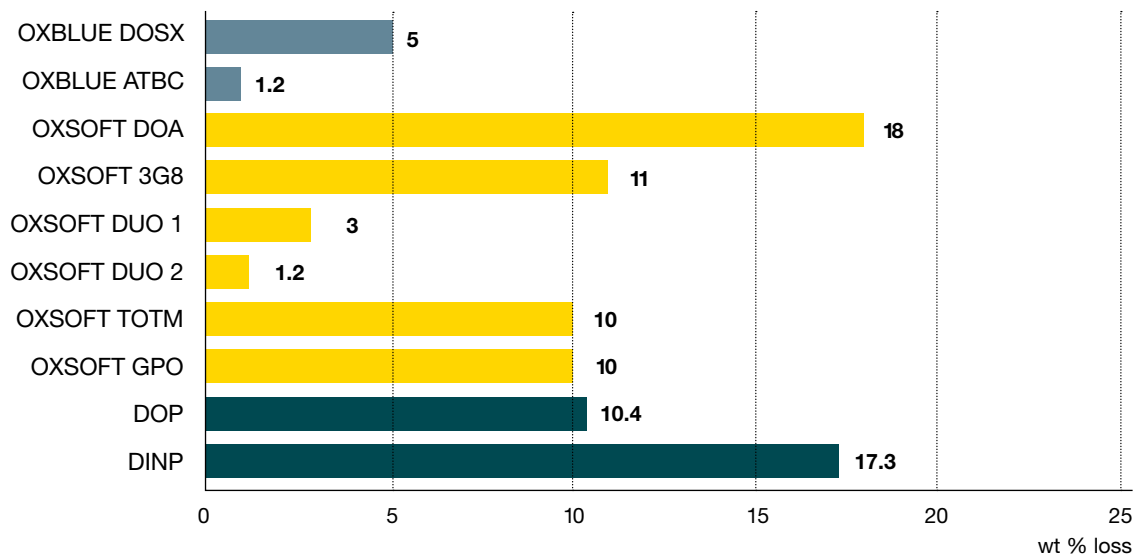
OXSOFT TOTM can be considered as a very permanent plasticizer. OXSOFT TOTM basically stays in the plastic film from the test of soapy water extraction. OXBLUE DOSX, ATBC, OXSOFT 3G8 and DUO 1 & 2 all demonstrate good extraction resistance using oil and hexane as liquids.

Soapy water extraction (ASTM D1239)

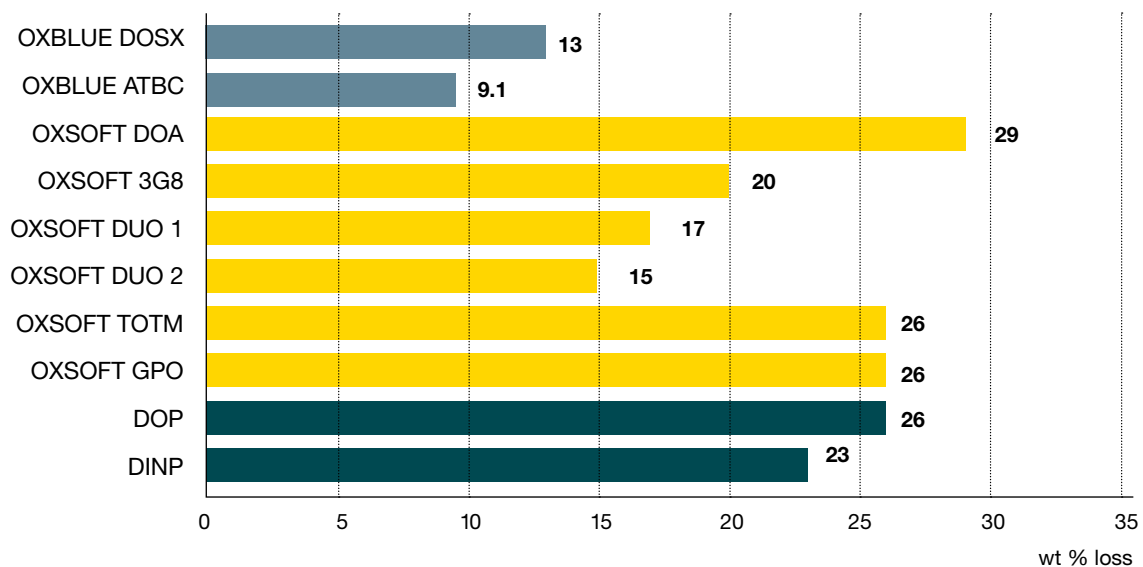


Relative Extraction Resistance (Cont'd)

Oil extraction (ASTM D1239)



Hexane extraction (ASTM D1239)



Fogging Number

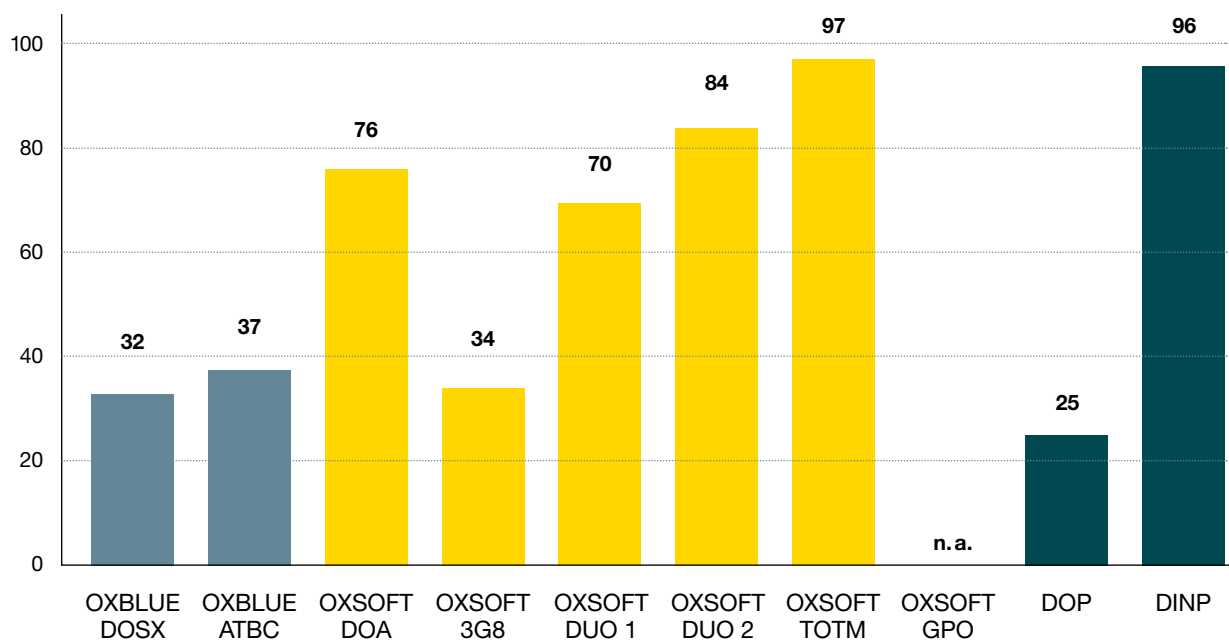
Test description

The fogging test measures the tendency for plastic or elastomeric materials to volatize substances which can condense and collect on other surfaces when in use. It is a photometric method giving a quotient of the fogged plate and the unfogged plate multiplied by 100.

The test is used to evaluate materials to be used in automotive or other vehicle interiors. In general, automotive specifications require 1 hour fog analysis to be greater than 60. Most vinyl compounds require a minimum of 80 or better. Here, a 3 hour analysis at 100°C was applied (concentration = 67 phr).

Evaluation

OXSOFT DOA, TOTM and Duo 1 & 2, all having values greater than 60, meet the requirements of the automotive specifications. OXSOFT TOTM shows best in class performance.



Overview: Tests & Test Methods

	OXBLUE DOSX	OXBLUE ATBC	OXSOFT DOA	OXSOFT 3G8	OXSOFT DUO 1	OXSOFT DUO 2	OXSOFT TOTM	OXSOFT GPO	DOP	DINP
Shore A Hardness ASTM D1706, 50 phr	75	81	76	81	83	84	88	81	80	82
100% Modulus [mPa] ASTM D638, 50 phr	18	18.3	7.2	16.2	19	19	12.8	11	10.7	10.5
Low temperature flexibility [°C] ASTM D1043, 50 phr	-47	-29	-52	-58.5	-37	-24	-20	-26	-26	-26
Elevated temp volatility [wt %] 100°C. 7 days, loss, 50 phr	19.2	21.9	26.5	6.5	4.4	1.9	1.1	n. a.	16.1	9.1
Relative extraction resistance ASTM D1239, 50 phr										
soapy water extraction [wt %]	0.6	0.5	0.9	3	1.2	0.4	0.1	0.4	0.3	0.12
oil extraction [wt %]	5	1.2	18	11	3	1.2	10	10	10.4	17.3
hexane extraction [wt %]	13	9.1	29	20	17	15	26	26	26	23
Fogging number 3 hours, 100°C, 67 phr	32	37	76	34	70	84	97	n. a.	25	96
VOC data (Boiling point) [°C]	206-208 @ 5.3 hPa	331 @ 976 hPa	417	340	n. a.	n. a.	355	383	384	403
Molecular weight (theoretical) [g/mol]	342	402	371	403	n. a.	n. a.	547	391	391	418
Density (g/cm³, 20°C)	0.93	1.05	0.93	0.97	0.98	0.99	0.99	0.98	0.99	0.98
Refractive index (20°C) ASTM D1045	1.44	1.44	1.45	1.44	1.47	1.48	1.49	1.49	1.49	1.49
Color [APHA Pt-Co] ASTM D5386	≤ 20	≤ 50	≤ 20	≤ 30	≤ 30	≤ 30	≤ 30	≤ 20	≤ 25	≤ 25
Volatiles [wt %] ASTM D2369	2.25	n. a.	2.41	0.53	0.2	0.23	0.14	n. a.	1	0.36
Melting point/pour point [°C]	-73	-57	-68	-70	n. a.	n. a.	-43	-48	n. a.	n. a.
Flash point [°C] COC	>160	>230	196	199	>199	>199	250	238	218	240
Viscosity ASTM D445										
20°C [mm ² /s]	13.4	38.5	15.1	16.9	49.8	149.7	312.64	86.2	86	82
40°C [mm ² /s]	6.8	15.5	7.8	8.8	20.1	49.6	90	30.2	n. a.	27.8
100°C [mm ² /s]	2	3.1	2.3	2.4	4.1	6.9	9.6	4.8	n. a.	n. a.
VI ASTM D2270	74	24	107	86	103	92	80	64	n. a.	n. a.

OXBLUE[®] DOSX

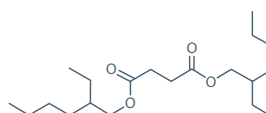
Diocetyl succinate/Bis(2-ethylhexyl)succinate

Technical data

Features and applications

OXBLUE DOSX is a bio-based plasticizer with outstanding performances for low temperature uses and applications in an oily environment. OXBLUE DOSX is a sustainable solution which enables producers to economically manufacture products with no compromise on performance. Suggested applications include flooring, food cling wraps and adhesives & sealants.

CAS Number 2915-57-3
EINECS Number 220-836-1



Physical and chemical properties

Formula $C_{20}H_{38}O_4$
Molecular Weight 342.51 g/mol
Boiling Range (°C @5,3 hPa) 206 – 208
Density (g/cm³, 20°C) 0.933
Refractive Index (20°C) 1.445
Viscosity (mPa*s, 20°C) 12.4

Specifications*

Property	Limit	Unit	Test Method	PQR
Appearance	Clear to light yellow liquid		Visual Examination	
Ester Content	min. 99.5	% (w/w)	Gas Chromatography	x
Acid Value	max. 0.07	mg KOH/g	ASTM D 974 (mod.)	x
Water	max. 0.05	mg KOH/g	ASTM E 1064	x
Saponification Value	322 – 328		Calculated from GC	x
Platinum/Cobalt Color (Hazen/APHA Color)	max. 20		ASTM D 5386	x

*Preliminary test results only. Data are subject to change without notice.

OXBLUE® ATBC

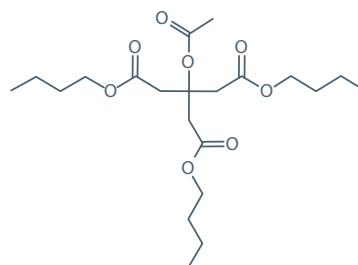
Acetyl tributyl citrate

Technical data

Features and applications

OXBLUE ATBC is a bio-based plasticizer. It is easily biodegradable in polymers of polyvinyl chlorides (PVC) and cellulose derivatives. Besides its use in gaskets, benefits of ATBC have been recognized in an increasing variety of applications, following the trend for more environmentally friendly materials, such as food cling wraps, children's toys or medical devices. It is also used as solvent and fixative of inks in the flexographic industry and perfumery.

CAS Number 77-90-7
EINECS Number 201-067-0



Physical and chemical properties

Formula $C_{20}H_{34}O_8$
Molecular Weight 402.48 g / mol
Boiling Point (°C @ 976 hPa) 331
Melting Point (°C) -57°C (Pour Point)
Density (g/cm³, 20°C) 1.053
Water Solubility (mg/l, 20°C) 4.49
Vapor Density (Air=1, 20°C) 14.1
Viscosity (mm²/s, 20°C) 38.5

Specifications*

Property	Limit	Unit	Test Method	PQR
Appearance	Clear Liquid		Visual Examination	
Ester Content	min. 99.0	% (w / w)	Gas Chromatography	x
Acidity (as Citric Acid)	max. 0.2	% (w / w)	Titration	x
Water	max. 0.5	% (w / w)	Karl Fischer	x
Platinum/Cobalt Color (Hazen/APHA Color)	max. 50		Comparison	x

*Preliminary test results only. Data are subject to change without notice.

OXSOFT® DOA

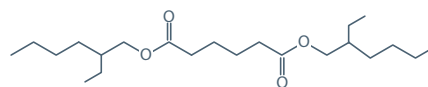
Diocetyl adipate/Bis(2-ethylhexyl)adipate

Technical data

Features and applications

OXSOFT DOA is a highly efficient plasticizer with excellent low temperature properties. Suggested applications are food cling wraps, garden hoses, gaskets, flooring and blended with other plasticizers to improve efficiency and/or low temperature properties.

CAS Number 103-23-1
EINECS Number 203-090-1



Physical and chemical properties

Formula $C_{22}H_{42}O_4$
Molecular Weight 370.6 g/mol
Appearance Clear colorless liquid
Boiling Point (°C) 417
Density (g/cm³, 20°C) 0.925
Odor odorless
Water Solubility (g/l, 22°C) < 0.001
Vapor Pressure (hPa, 20°C) < 0.01
Viscosity (mPa*s, 20°C) 13.7

Specifications

Property	Limit	Unit	Test Method	PQR
Appearance	Clear Liquid		Visual Examination	
Ester content	min. 99.5	% (a/a)	Gas Chromatography	x
Acid Value	max. 0.07	mg KOH/g	ASTM D 974 (mod.)	x
Water	max. 0.05	% (w/w)	ASTM E 1064	x
Saponification Value	298–306	mg KOH/g	Calculated from GC	x
Platinum/Cobalt Color (Hazen/APHA Color)	max. 20		ASTM D 5386	x
Density (20°C)	0.924–0.926	g/cm ³	ASTM D 4052	
Refractive Index (20°C)	1.446–1.448		ASTM D 1045	x

OXSOFT® 3G8

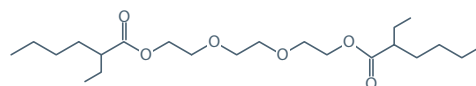
Triethylene glycol bis(2-ethylhexanoate)

Technical data

Application suggestion

OXSOFT 3G8 combines some unique properties like superior low temperature performance, high resilience and good migration resistance. OXSOFT 3G8 shows outstanding VOC results making it suitable for all applications where non-VOC is required.

CAS Number 94-28-0
EINECS Number 202-319-2



Physical and chemical properties

Formula $C_{22}H_{42}O_6$
Molecular Weight 402.6 g/mol
Appearance Clear colorless liquid
Boiling Range (°C) 340–351
Density (g/cm³, 20°C) 0.966
Odor fruity
Water Solubility (mg/l, 20°C) 1.53
Vapor Pressure (hPa, 20°C) <0.001
Viscosity (mPa*s, 20°C) 16.4

Specifications

Property	Limit	Unit	Test Method	PQR
Appearance	Clear Liquid		Visual Examination	
OXSOFT 3G8	min. 97	% (a/a)	DIN 51405 (GC)	x
Triethyleneglycol-mono-2-ethylhexanoate (Monoester)	max. 1.5	% (a/a)	DIN 51405 (GC)	x
Diethyleneglycol-bis-2-ethylhexanoate	max. 0.5	% (a/a)	DIN 51405 (GC)	x
Acid Value	max. 0.10	mg KOH/g	DIN EN ISO 2114/ ASTM D 1613	x
Peroxide Value	max. 1.5	mäq O/kg	RCH-AL079	x
Ester Value	263–279	mg KOH/g	DIN EN ISO 3681	
Hydroxyl Value	max. 5.0	mg KOH/g	DIN 53240	
Water	max. 0.07	% (w/w)	DIN 51777 Part I	x
BHT Stabilizer	min. 50	mg/kg	DIN 51405 (GC), qual.	x
Platinum/Cobalt Color (Hazen/APHA Color)	max. 30		DIN EN ISO 6271	x
Density (20°C)	0.962–0.972	g/cm ³	DIN 51757 Verf. D	
Refractive Index (20°C)	1.441–1.447		DIN 51 423-2/ASTM D 1747	

OXSOFT® DUO 1 & DUO 2

A defined mix of plasticizers

Technical data

OXSOFT DUO 1

Application suggestion

OXSOFT DUO 1 features an excellent migration profile combined with good processability. The low viscosity of the product enables easy handling. Additionally OXSOFT DUO 1 offers very good low temperature properties. OXSOFT DUO 1 is recommended in applications like wall covering, flooring and artificial leather.

Physical and chemical properties

Appearance	Clear liquid
Saponification Value	282–300 mg KOH/g
Density (g/cm ³ , 20°C)	0.98
Refractive Index (20°C)	1.47
Viscosity (mm ² /s, 20°C)	50

Specifications

Property	Limit	Unit	Test Method
Appearance	Clear Liquid		Visual Examination
Ester Content	min. 97	% (w/w)	Gas Chromatography
Acid Value	max. 0.1	mg KOH/g	DIN EN ISO 2114 • ASTM D 1613
Water	max. 0.1	% (w/w)	DIN 51777 TI 1
Hazen/APHA Color	max. 30		DIN EN ISO 6271 • ASTM D 5368

OXSOFT DUO 2

Application suggestion

OXSOFT DUO 2 features a further improved migration profile compared to OXSOFT DUO 1, but still the product is easy to process. The extraction resistance and fogging values are excellent. OXSOFT DUO 2 is recommended in applications where migration is a concern but where high viscosity products like OXSOFT TOTM (with an even better migration profile) are causing process issues.

Physical and chemical properties

Appearance	Clear liquid
Saponification Value	294–314 mg KOH/g
Density (g/cm ³ , 20°C)	0.99
Refractive Index (20°C)	1.48
Viscosity (mm ² /s, 20°C)	150

Specifications

Property	Limit	Unit	Test Method
Appearance	Clear Liquid		Visual Examination
Ester Content	min. 97	% (w/w)	Gas Chromatography
Acid Value	max. 0.1	mg KOH/g	DIN EN ISO 2114 • ASTM D 1613
Water	max. 0.1	% (w/w)	DIN 51777 TI 1
Hazen/APHA Color	max. 30		DIN EN ISO 6271 • ASTM D 5368

OXSOFT[®] TOTM

Trioctyl trimellitate/Tris(2-ethylhexyl)trimellitate

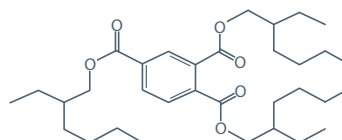
Technical data

Application suggestion

OXSOFT TOTM is a permanent, non-migrating plasticizer with excellent elevated temperature properties. In every application where migration is a concern OXSOFT TOTM can limit these concerns due to its permanent character. Suggested and existing applications are medical, cable and wire.

In automotive and in-house applications OXSOFT TOTM is highly recommended due to outstanding fogging and non-VOC properties.

CAS Number 3319-31-1
EINECS Number 222-020-0



Physical and chemical properties

Formula C₃₃H₅₄O₆
Molecular Weight 546.8 g/mol
Appearance Light yellow liquid
Boiling Point (°C) 355
Density (g/cm³, 20°C) 0.9885
Odor weak
Water Solubility (g/l, 25°C) < 0.01
Vapor Pressure (hPa, 20°C) < 0.001
Viscosity (mm²/s, 20°C) 312.64

Specifications

Property	Limit	Unit	Test Method	PQR
Appearance	Light Yellow Liquid		Visual Examination	
Ester Content	min. 99.0	% (w/w)	Gas Chromatography	x
OXSOFT TOTM	min. 96.0	% (w/w)	Gas Chromatography	x
GPO	max. 1.0	% (w/w)	Gas Chromatography	x
DOP	max. 0.099	% (w/w)	Gas Chromatography	x
Rest Alcohol	max. 0.1	% (w/w)	Gas Chromatography	x
Water	max. 0.1	% (w/w)	ASTM D 1364/ASTM E 203	x
Acid Value	max. 0.1	mg KOH/g	ASTM D 974	x
Saponification Value	300 – 320	mg KOH/g	Calculated from GC	
Platinum/Cobalt Color (Hazen/APHA Color)	max. 30		ASTM D 5386	x
Cr, Ba, Pb, Cu, Sn	each < 1	mg/kg	ASTM D 5185	
Cd	< 0.6	mg/kg	ASTM D 5185	
Density (25°C)	0.986 – 0.990	g/cm ³	ASTM D 4052	x
Refractive Index (20°C)	1.4850 – 1.4870		ASTM D 1045	x

OXSOFT® GPO

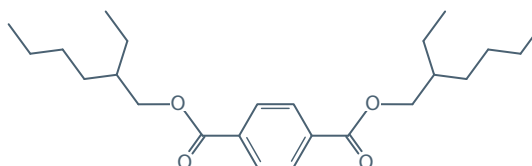
Diocetyl terephthalate/Bis(2-ethylhexyl)-1,4-benzenedicarboxylate

Technical data

Application suggestion

OXSOFT GPO is suitable as a general purpose plasticizer. The properties are very similar as DOP and OXSOFT GPO can be used as a direct replacement for DOP but also for other general purpose phthalates like DINP.

CAS Number 6422-86-2
EINECS Number 229-176-9



Physical and chemical properties

Formula $C_{24}H_{38}O_4$
Molecular Weight 390.6 g/mol
Appearance Clear colorless liquid
Boiling Point (°C) 383
Density (g/cm³, 20°C) 0.984
Odor slight
Water Solubility (mg/l, 20°C) 4
Viscosity (mPa*s, 25°C) 63

Specifications

Property	Limit	Unit	Test Method	PQR
Appearance	Clear Liquid		Visual Examination	
OXSOFT GPO	min. 96	% (w/w)	Gas Chromatography	x
Ester Content	min. 99.5	% (w/w)	Gas Chromatography	x
Free Alcohol	max. 0.1	% (w/w)	Gas Chromatography	x
Water	max. 0.05	% (w/w)	ASTM D 1364 / ASTM E 203	x
Acid Number	max. 0.05	mg KOH/g	ASTM D 974	x
Platinum/Cobalt Color (Hazen/APHA Color)	max. 20		ASTM D 5386	x

Glossary of Terms

%	percentage	kg	kilogramme
% (w/w)	mass percent	KOH	Potassium hydroxide
% (a/a)	area-percent (of GC-graph)	l	liter
°C	degree Celsius	max.	maximum
3G8	Triethylene glycol bis(2-ethylhexanoate)	mäq	mol Äquivalent
APHA	American Public Health Association	mg	milligram
ASTM	American Society for Testing Materials	min	minute
ATBC	Acetyl tributyl citrate	min.	minimum
Ba	Barium	mm ²	square millimetre
CAS	Chemical Abstracts Service	mod.	modified
Cd	Cadmium	mol	mole
cm ³	cubic centimetre	MPa	megapascal
COC	Cleveland open cup	Pb	Lead
Cr	Chromium	phr	parts per hundred of rubber
Cu	Copper	PQR	Product Quality Report
DIDP	Diisodecylphthalate	PVC	polyvinyl chloride
DIN	German Institute for Standardization	qual.	qualitative
DINP	Diisononylphthalate	s	second
DOA	Diocetyl adipate/Bis(2-ethylhexyl)adipate	Sn	Tin
DOP	Diocetyl phthalate	SVOC	semivolatile organic compounds
DOSX	Diocetyl succinate/Bis(2-ethylhexyl)succinate	TOTM	Triocetyl trimellitate/Tris(2-ethylhexyl)-trimellitate
EINECS	European Inventory of Existing Commercial Chemical Substances	Verf.	procedure
g	gram	VOC	volatile organic compounds
GC	Gas Chromatography	VVOC	very volatile organic compounds
GPO	General purpose octyl/Diocetyl terephthalate/ Bis(2-ethylhexyl)-1,4-benzenedicarboxylate	wt %	percentage weight change
HC	Hydrocarbon		
hPa	hectopascal		

Disclaimer

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