



OXFILM 351 OXBLUE DOSX

Next Generation of Coalescing Agents

Non VOC Coalescing Agents



Coalescent agents are used to optimize the film formation process in paints and coatings. With the increasing demand for environmentally-friendly products, coalescent agents which comply with stricter VOC regulations for low odor are widely sought. OXEA's coalescent agents meet these needs with exceptional performance in commercial formulations used in paints and coatings. Furthermore, OXEA produces its coalescent agents on purpose in EU and China for sales across the globe.

OXFILM 351 is an already established coalescent agent proven by excellent feedback from customers. It is an odorless and non VOC coalescent agent. Any non-VOC remains in a dried film, so OXFILM 351 acts as a permanent plasticizer yielding a slightly softer film. If needed, this can be compensated by a harder polymer.

In addition OXEA introduces OXBLUE DOSX as a bio based alternative for standard coalescent agents. It is low odor, non VOC and is produced from renewable feedstocks. Thus OXBLUE DOSX offers opportunities for formulators who are looking for sustainable additives without compromising on performance and economics.

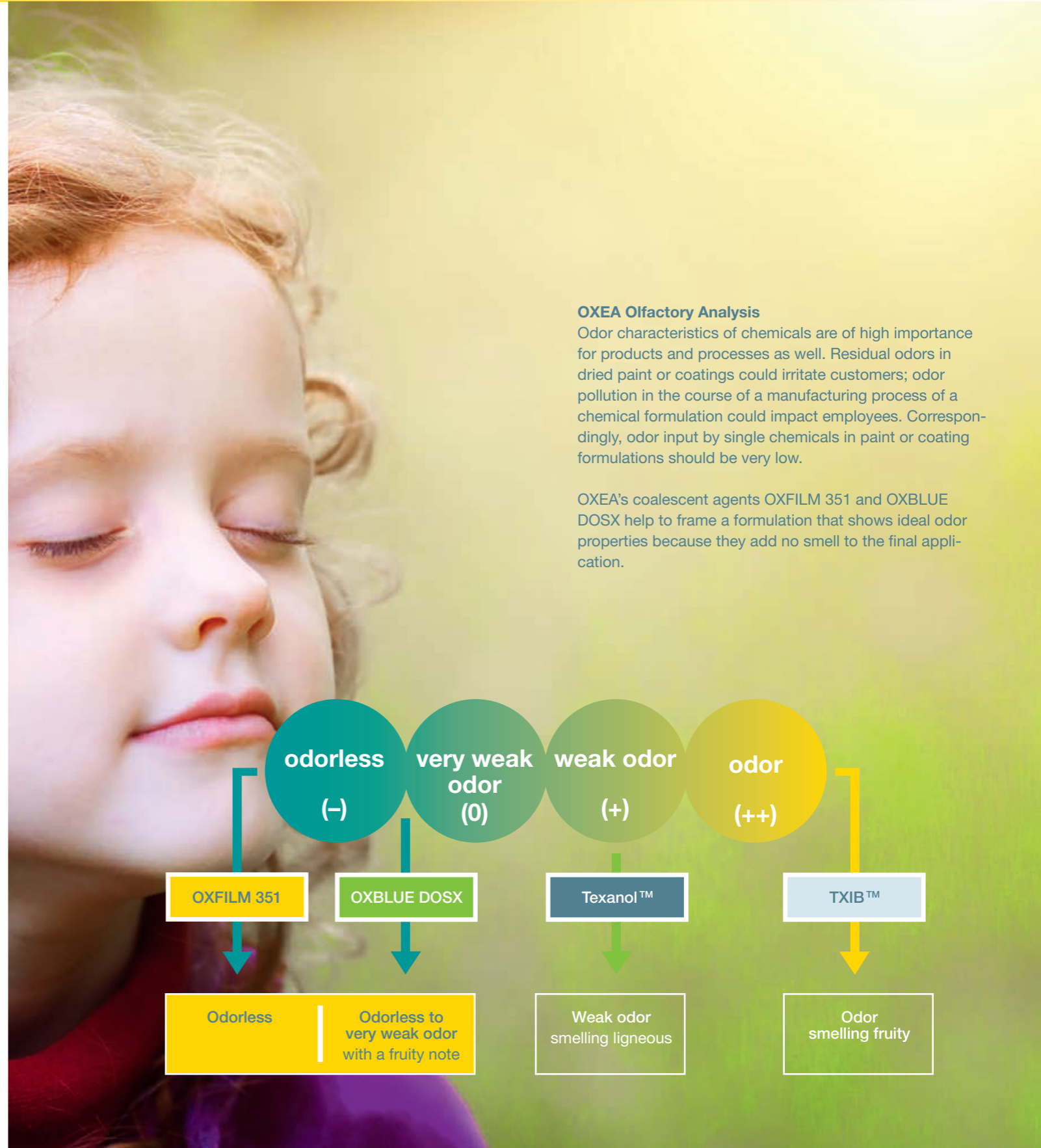


OXEA coalescent agents are:

- Non VOC
- Low odor
- Low color
- On purpose production
- Bio based (OXBLUE DOSX 100 % biodegradable*)
*by OECD 301B



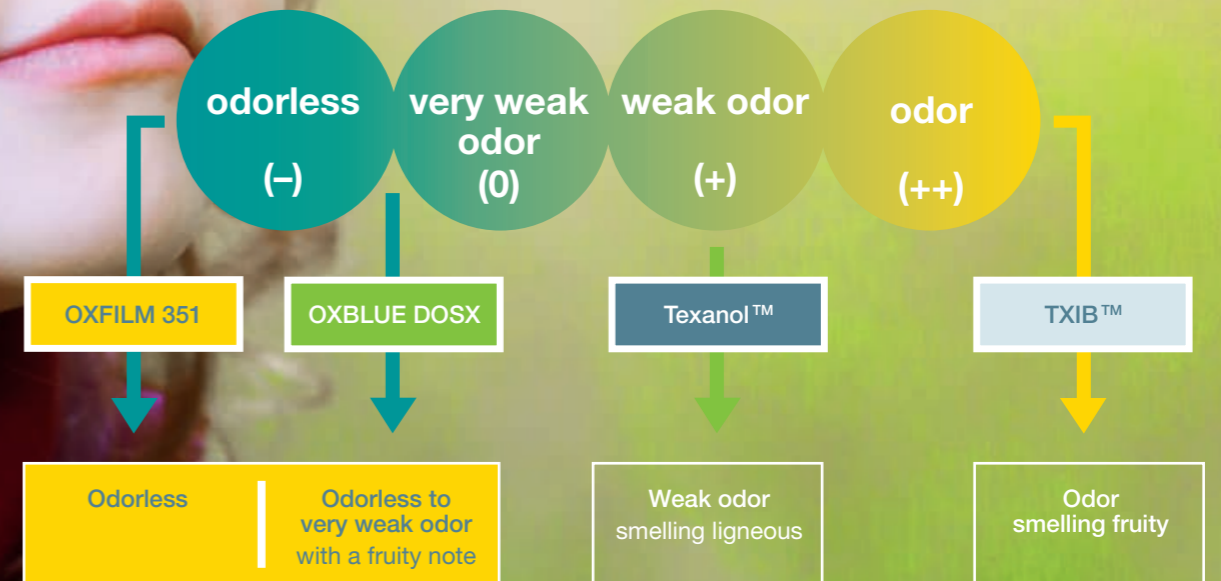
Low Odor Coalescent Agents



OXEA Olfactory Analysis

Odor characteristics of chemicals are of high importance for products and processes as well. Residual odors in dried paint or coatings could irritate customers; odor pollution in the course of a manufacturing process of a chemical formulation could impact employees. Correspondingly, odor input by single chemicals in paint or coating formulations should be very low.

OXEA's coalescent agents OXFILM 351 and OXBLUE DOSX help to frame a formulation that shows ideal odor properties because they add no smell to the final application.



VOC US Regulation by EPA



Definition of VOC by WHO

VOC's (Volatile Organic Compounds) are unstable compounds that evaporate into the air and cause environmental risks. It is measured at the temperature at which an organic compound is evaporating. The WHO has defined a VOC as any organic compound whose boiling point is below 260°C.

While Texanol™ boiling point is at 254°C, OXEA's coalescent agents are non VOC by WHO definition:

- Boiling Point OXFILM 351 @ 351°C
- Boiling Point OXBLUE DOSX @ 298°C

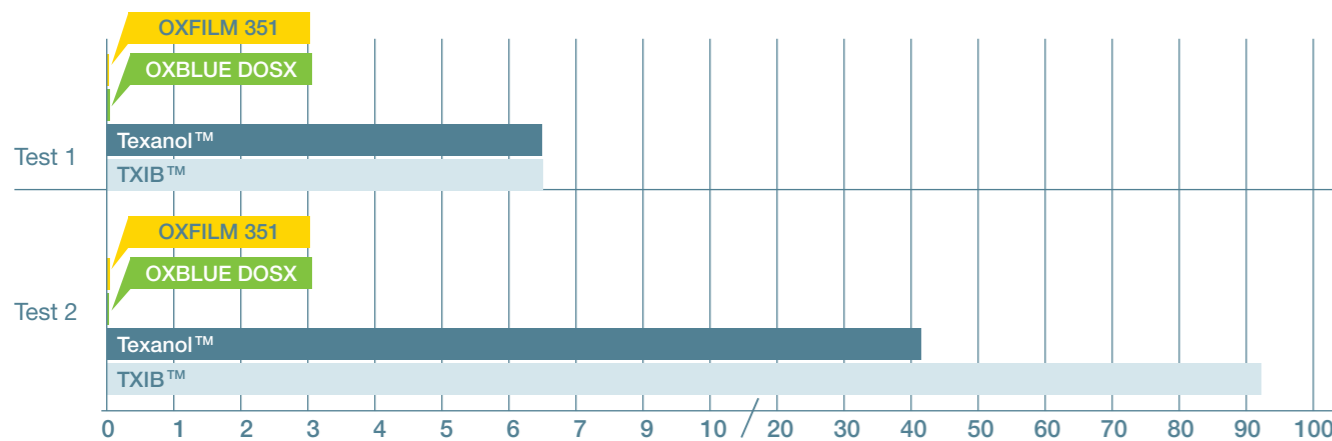


US Definition of VOC (EPA Method 24)

Volatile Organic Compound (VOC) means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reaction. The VOC content is measured in g_VOC per L_Paint (excluding water and exempts).

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Results by EPA Method 24 Evaporation Loss, Weight-%



Test 1: Evaporation loss for neat materials; Test method according EPA Method 24a (4h @ 120oC / 68 kPa)

Test 2: Evaporation loss for neat materials; Test method according EPA Method 24 (1h @ 110oC)

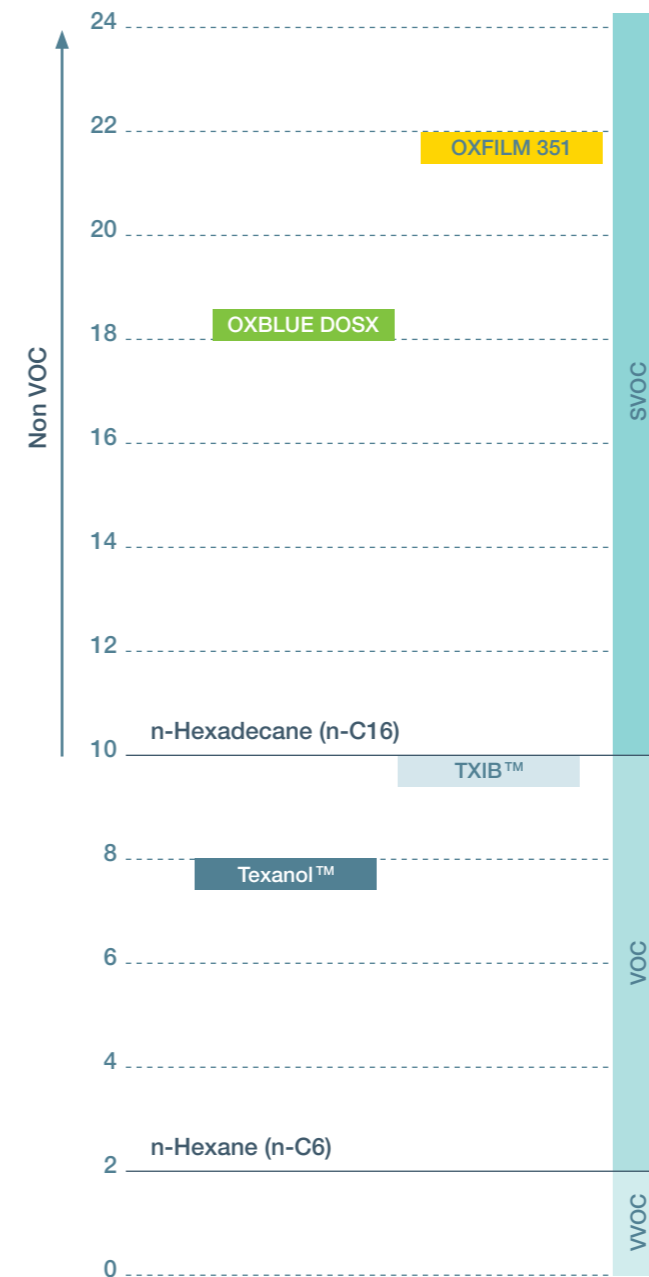
VOC European Regulation



EU Definition of VOC (DIN ISO 16000-6)

Total VOC content is defined in ISO 16000-6 as the sum of volatile organic compounds, which elute from a non-polar or slightly polar gas chromatographic separation column between n-Hexane and n-Hexadecane (n-C6 and n-C16). This covers any organic compound with a boiling point between 69°C and 287°C.

Results by DIN ISO 16000-6*
Retention Time, min



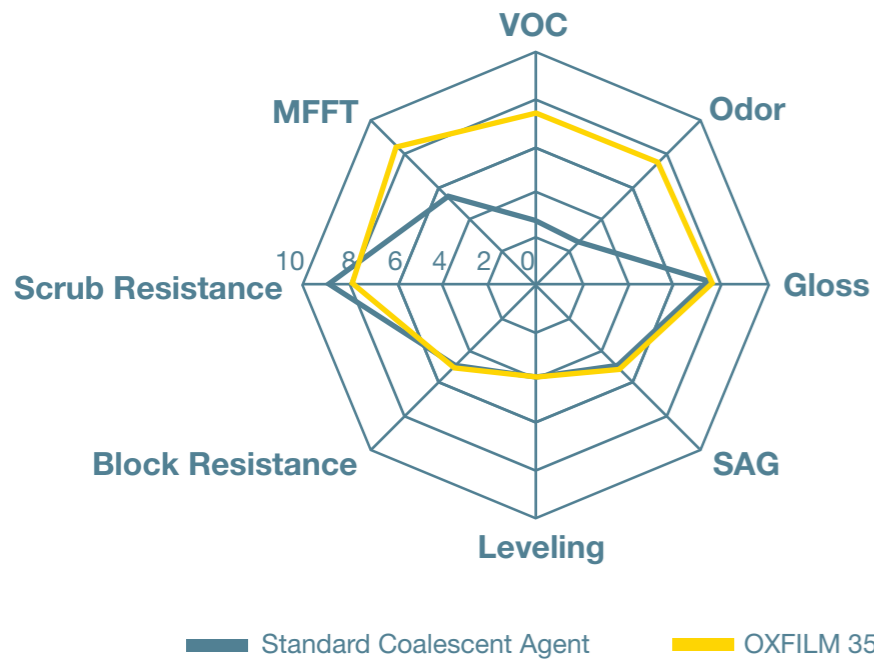
Substance Classification

VOC Very Volatile Organic Compounds	Substances eluting before n-Hexane (n-C6)
VOC Volatile Organic Compounds	Substances eluting between n-Hexane (n-C6) and n-Hexadecane (n-C16)
SVOC Semi Volatile Organic Compounds	Substances eluting after n-Hexadecane (n-C16)

* GC track available on request

OXEA's Top performing Coalescing Agents

Technical Data



VOC
DIN ISO 16000-6

Odour
OXEA Olfactory Analysis Protocol

Gloss
ASTM D523

SAG
ASTM D4400

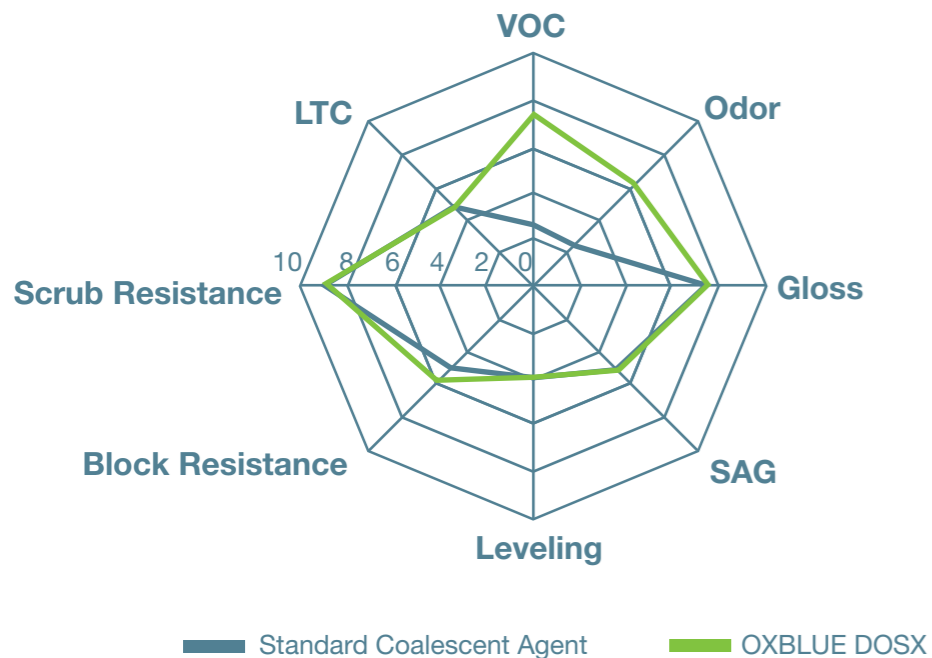
Leveling
ASTM D4062

Block Resistance
ASTM D4946

Scrub Resistance
ASTM D2486

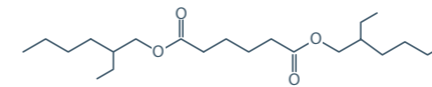
LTC
(Low Temperature Coalescent)
ASTM D7306

MFFT
(Minimum Film Forming Temperature)
ASTM D2354



OXFILM 351

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



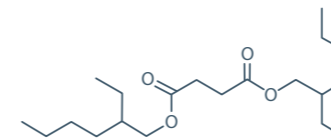
Physical and chemical properties

Formula $C_{22}H_{42}O_6$
 Molecular Weight 402.6 g/mol
 Boiling Point (@ 1013 hPa) 351 °C
 Density (@ 20°C) 0.967 g/cm³
 Solubility in Water (@ 20°C) 1.53 mg/L
 Vapor Pressure (@ 20°C) <0.001 hPa
 Viscosity (@ 20°C) 16.3 mPa·s

Sales Specification	Limit	Test Method	PQR
Appearance	Clear liquid	Visual Examination	
Ester Content	min 97.0 % (a/a)	DIN 51405 (GC)	x
Triethylenglycol-mono-2-ethylhexanoate	max 1.5 % (a/a)	DIN 51405 (GC)	x
Diethylenglycol-bis- 2-ethylhexanoate	max 0.5 % (a/a)	DIN 51405 (GC)	x
Acid Value	max 0.10 mg KOH/g	DIN EN ISO 3682 / ASTM D 1613	x
Peroxide Value	max 1.5 meq O/kg	RCH – AL079	x
Ester Value	236 – 279 mg KOH/g	DIN 53401	
Hydroxyl Value	max 5.0 mg KOH/g	DIN 53240	
Water	max 0.07 % (w/w)	DIN 51777 Part I	x
BHT Stabilizer	50 mg/kg	DIN 51405 (GC), qual.	x
Platinum/Cobalt Color (Hazan/ APHA Color)	max. 30	DIN ISO 6271	x
Density (@ 20°C)	0.962 – 0.972 g/cm ³	Din 51757 Verf. D	
Refractive Index nD25	1.441 – 1.447	DIN 51423 / ASTM D 1747	

OXBLUE DOSX

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 Point (@ 1013 hPa) 298 °C
 Density (@ 20°C) 0.933 g/cm³
 Refractive Index (@ 20°C) 1.445
 Viscosity (@ 20°C) 12.4 mPa·s

Sales Specification	Limit	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 (Hazan/ APHA Color)	max. 20	ASTM D 5386	x

Any Questions?



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, flavorings and fragrances, printing inks and plastics. 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, the USA and 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 chemical.

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