

  
**GRUPA  
azoty**

# **OXO** Segment



Oxoplast.com





### Aleksander Grymel

Director of Oxoplast Business Unit

Plastics, automotive, construction, power engineering, medical segment....We all know that OXO Segment is present in our everyday life. We also know that the world is constantly on the move especially with regards to industry and new technologies. We all know that, but can we live up to expectations? In case of Grupa Azoty, luckily it is a rhetorical question.

Not only we closely follow global trends, but in many areas we are ahead of them, example? First example from our development projects shelf – specialty esters and non-phthalate plasticizers: we call them smart additives aiming at improving finished goods properties and being nature friendly. We are constantly working on improving process parameters and broadening our product portfolio, however the most important challenge is Your satisfaction. Together we change and shape the marketplace – outcome? Amongst other discontinuing ortho-phthalate plasticizers.

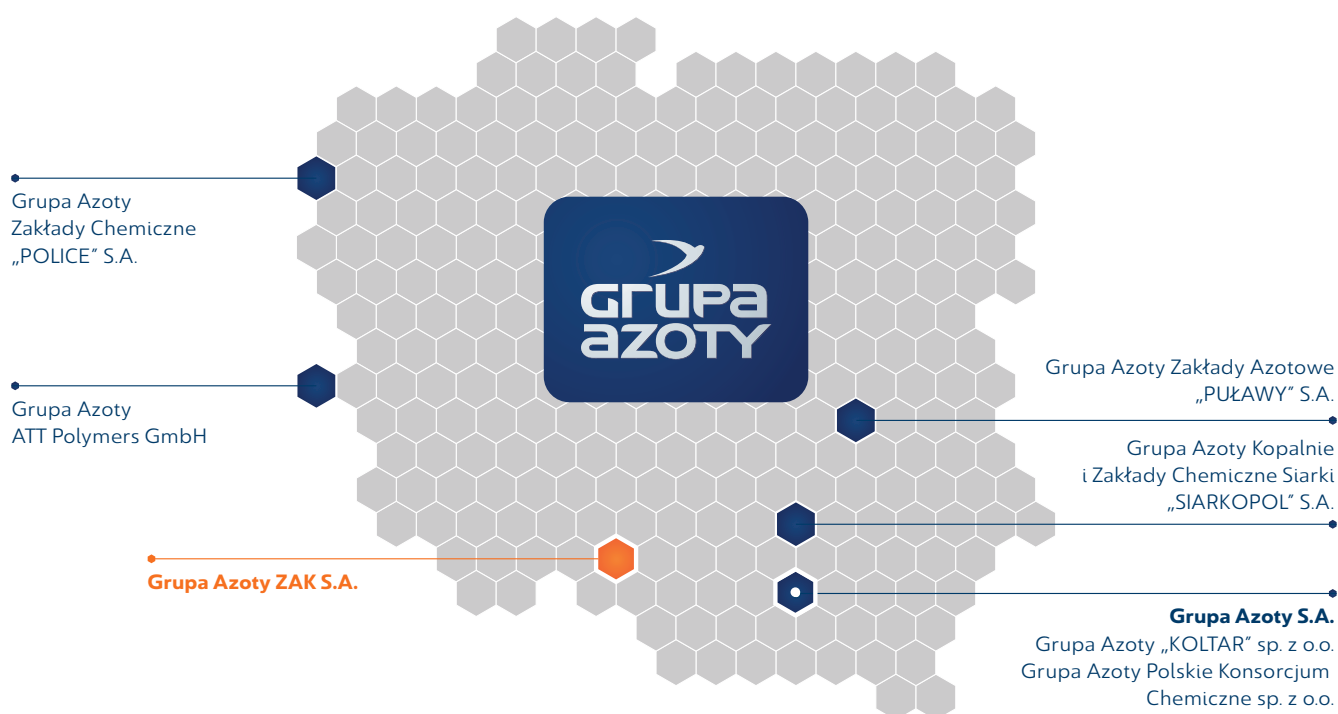
The foundations on which we build our activity are strong – we carry intensive R&D works and setting-up Research and Development Centre, we work on one of the most technologically advanced OXO plants in Europe, we are growing on the European market and globally – our products are available in Asia, Middle East and Americas. We are the fifth OXO alcohols producer and hold second position in delivering 2-EH to European market. We are proud to be the largest European producer and key supplier of non-phthalate DEHT plasticizer. Our products are compliant to REACH and highest quality standards.

Our future? Let me disclose some of them. In 2H of 2018th we will increase our DEHT capacity by 15 kT/year. With this addition we will be able to produce up to 65 kT/year of our flagship plasticizer Oxoviflex®. In 2019th we will launch our specialty esters plant. We are constantly developing new products at our pilot plant to broaden Grupa Azoty ZAK portfolio.

We are proud to link and develop key aspects of innovative company management: qualified and committed staff and technologically advanced production processes which add to our competitiveness.



# WE ARE A PART OF GRUPA AZOTY



	Core Business			Others
	Fertilizers	Chemicals	Plastics	
<b>Grupa Azoty S.A.</b> <b>(parent company, capital group)</b>	AN, CAN, ASN, AS		PA6, POM, Compounds, Caprolactam	logistics, R&D, electricity and heat, laboratory services, designing and engineering services, mining, harbors
Grupa Azoty ZAK S.A. (capital group)	AN, CAN, UAN, CAN+S, urea	OXO alcohols, Plasticizers, Aldehydes		logistics, R&D, electricity and heat, laboratory services, designing and engineering services, harbors
Grupa Azoty Zakłady Azotowe „PUŁAWY” S.A. (capital group)	AN, UAN, urea, NPK	Melamine	Caprolactam	logistics, R&D, electricity and heat, laboratory services, designing and engineering services, harbors
Grupa Azoty Zakłady Chemiczne „POLICE” S.A. (capital group)	NPK, NP, NS, urea	Titanium Dioxide		logistics, R&D, electricity and heat, laboratory services, designing and engineering services, mining, harbors
Grupa Azoty ATT Polymers GmbH			PA6, Compounds	
Grupa Azoty „KOLTAR” sp. z o.o.				logistics
Grupa Azoty Kopalnie i Zakłady Chemiczne Siarki „SIARKOPOL” S.A.		Sulphur based products		mining
Grupa Azoty Polskie Konsorcjum Chemiczne sp. z o.o.				designing and engineering services, repairs, maintenance, chemical rescue

# MANAGEMENT BOARD



**Sławomir Lipkowski**

Chairman of the Board  
Grupa Azoty ZAK S.A.



**Sławomir Brzeziński**

Vice Chairman of the Board  
Grupa Azoty ZAK S.A.

## MISSION / VISION

### Mission of OXO Segment

To deliver chemical products meeting customers needs.

### Vision of OXO Segment

We will become leading player in our industry. Our company will be a first choice supplier for the customer. We will achieve a highest value addend factor in our industry regardless of economic situation.





**Artur Kamiński**

Vice Chairman of the Board  
Grupa Azoty ZAK S.A.



**Kamil Bortniczuk**

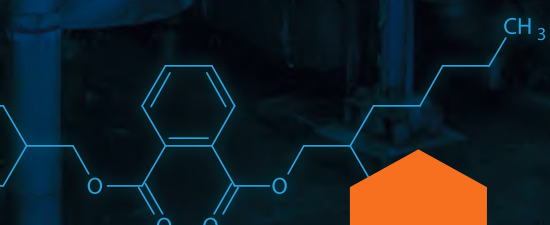
Member of the Board  
Grupa Azoty ZAK S.A.

## Strategic aim

Growth of sales and margins through market development, expanding port folio and product placement.

## Activities

To introduce new generation plasticizers. To lengthen value chains. To perfect customer services employing innovative logistics solutions. To utilize new perspective market segments and markets. To optimize production and storage costs.



# OXO HISTORY



**Our experience in OXO products dates back to 1954.** This is when we started production of our first PVC plasticizer.

1954



1963



**In 1963 we have started to produce diethylhexyl phthalate (DEHP).** It was known worldwide as Oxoplast® O.



**We have started-up a modern OXO alcohols plant (2-Ethylhexanol, n-Butanol, Isobutanol) as well as hydrogen and synthesis gas facilities.** The investment had been started in 1982 and employed Davy Process technology.

1986



1996



**In co-operation with Davy Process we commenced OXO plant modernization aimed at increasing its capacity.** The process ended in November 1998.



**We began production of diisobutyl phthalate (DIBP).** It was known as Oxoplast® IB.

1999



**We changed our internal structure** and a dedicated Oxoplast Business Unit was created.



2002



**Observing trends and dynamic changes in the market** we have introduced a high molecular weight phthalate plasticizer – DPHP. It was known as **Oxoplast® PH.**



2010





We decided to build a large scale plant for Oxoviflex® a non-phthalate plasticizer (50 kT/year).



We have started-up a large scale plant for a non-phthalate, PTA based plasticizer (50 kT/year). The product has been introduced under Oxoviflex® brand.



We have launched SEP (Specialty Esters Project) pilot plant.

2011

2013

2014

2015

2016

2017

2018

As one of the first in Europe we developed a non-phthalate, PTA based plasticizer and put it to small scale production.

We have introduced a new product brand – Oxoplast Medica®, a plasticizer for medical purposes.

We have started putting up our Research and Development Centre.

We have started Specialty Esters Project.

We are ramping up Oxoviflex® capacity by 15 kT up to 65 kT/year.



# OUR TEAM



**Director of Oxoplast  
Business Unit**  
**Aleksander Grymel**



**Production Director  
of Oxoplast Business Unit**  
**Bogusław Gaca**



**Commercial Director  
of Oxoplast Business Unit**  
**Agnieszka Kurpińska**



Speciality Esters  
Project Coordinator  
**Lech Janik**



WGS Department Manager  
**Andrzej Dorosz**



Sales Coordinator  
**Ludomira Trojnar**



Coordinator-Technical Adviser  
**Boris Fleites-Jończyk**



Esters Department Manager  
**Leszek Górczany**



Marketing Specialist  
**Rafał Bobko**



Technology Office Manager  
**Barbara Siwik**



Aldehydes Department Manager  
**Paweł Polański**



Senior Sales Specialist  
**Adam Rogala**



Secretary  
**Beata Bajkiewicz**



OXO Alcohols  
Department Manager  
**Andrzej Stypułkowski**







Sales Manager Western Europe  
and the World  
**Waldemar Pawelczyk**



Sales Manager Southern Europe  
and the World  
**Monika Urbańczyk**



Sales Manager Poland  
and East-Central Europe  
**Jolanta Kamys**



Junior Sales Specialist  
**Honorata Kwaśniewska**



Junior Sales Specialist  
**Agnieszka Lisowiec**



Sales Specialist  
**Katarzyna Łukasik**



Junior Sales Specialist  
**Agnieszka Ciba**



Junior Sales Specialist  
**Barbara Skrzypczyk-Scheit**



Junior Sales Specialist  
**Tomasz Bednarz**

### Sales representatives



Sales Representative Germany,  
Austria, Switzerland  
**Jacek Ogonowski**



Sales Representative Belgium,  
Netherlands, France  
**Daniel Olszewski**



Sales Representative  
North America  
**Paweł (Paul) Bozek**

# PRODUCT PORTFOLIO

## Plasticizers

Oxoviflex®

### MAIN APPLICATIONS

- PVC additive (for polymer flexibility),
- Coatings, rubber products, glues, sealants

### INDUSTRY

- Construction
- Automotive
- Shoe production
- Wire & cable
- Packaging
- Medical devices
- Toys

## Aldehydes

n-Butyraldehyde  
Isobutyraldehyde

## Oxo Alcohols

2-Ethylhexanol  
n-Butanol  
Isobutanol  
Octyl alcohol F

### MAIN APPLICATIONS

- Plasticizers
- Solvents
- Acrylates
- Acetates
- Fuel additives

### INDUSTRY

- Plasticizers
- Paints and varnishes
- Glues
- Fuels

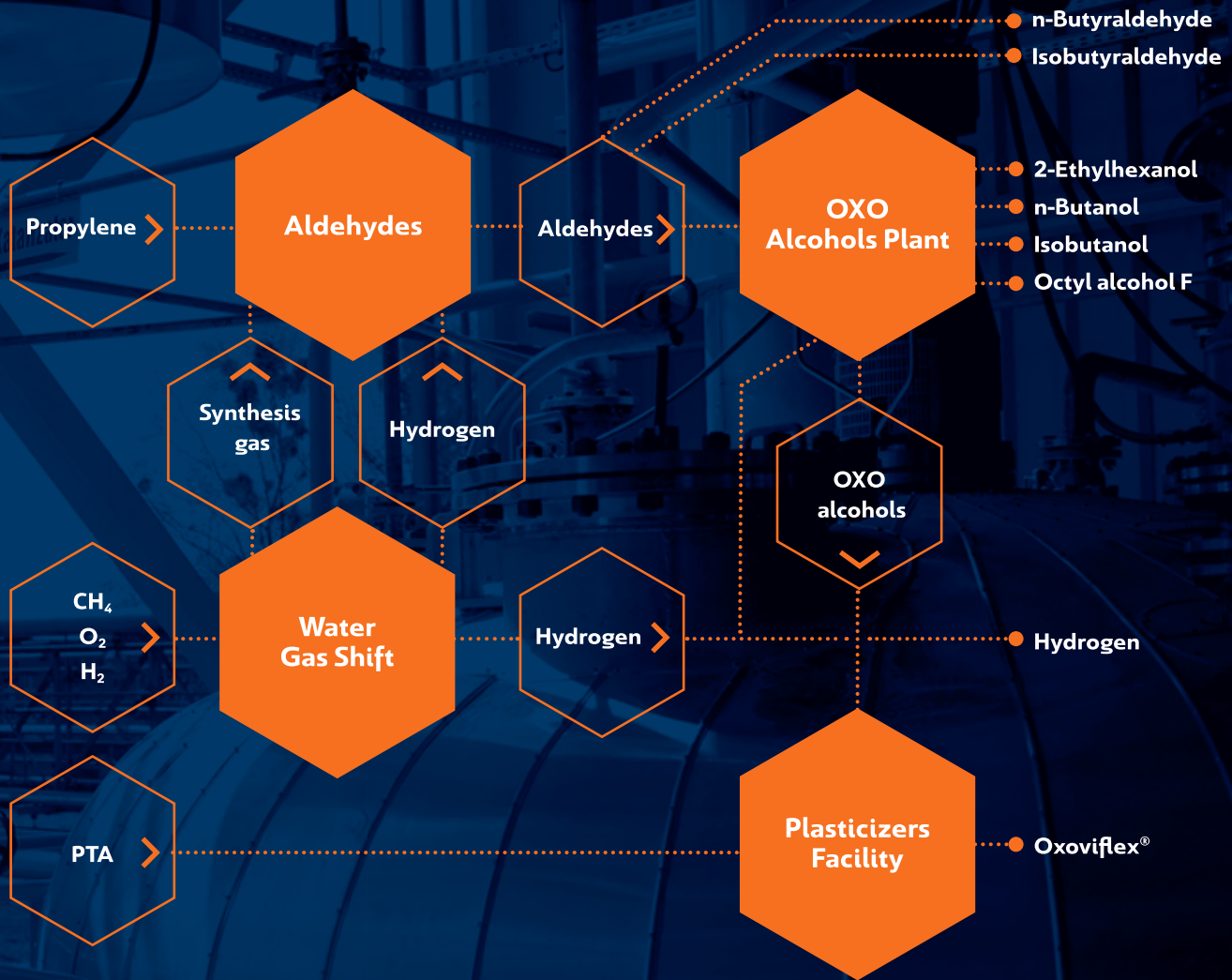


**Agnieszka Kurpińska**

*Commercial Director  
of Oxoplast Business Unit*

We owe the current market position of the OXO Segment to our business partners. That is why every day we strive to meet their requirements by ensuring high quality products, competitive sales conditions, efficient logistics and prospects for long-term cooperation. We constantly search for new markets and applications and work to extend our portfolio with specialty products and respond to market demand. We have accomplished many great things over the years but we are ready to face new challenges. We are changing ourselves for our partners to create a future - together.

# PRODUCTION PROCESS



**Bogusław Gaca**

*Production Director  
of Oxoplast Business Unit*

Together with my team we ensure that the products are the highest quality. This is a result of knowledge based on many years of experience. We have been manufacturing plasticizers since 1954 and OXO alcohols since 1986. Nowadays our main focus is the development, and our major goals include process optimisation and extension of the product range.



**Barbara Siwik**

*Technology Office Manager*

Integrated production cycle is our great advantage. I'm responsible that at every stage strict process conditions are met. My team supervises not only product quality but also selection of raw materials. We are also in charge of all issues connected with process and technology documentation of our plants.

# PLASTICIZERS

PLASTICIZERS  
SINCE 1954

- / Our experience in plasticizers dates back to **1954**
- / We are No.1 European producer of **non-phthalate DEHT plasticizer**
- / We invest in future – **new Oxoviflex® capacity will come on stream in H2 2018, in 2019<sup>th</sup> we will launch our specialty esters plant.**



**Leszek Górczany**

*Esters Department  
Manager*

We are proud of our great experience in plasticizers production of which beginnings dates back to 1954. The quality of esters manufactured at the plants I am responsible for depends on two issues: quality of raw material provided by the OXO Alcohols Department and sourced externally as well as involvement of my staff. I am proud to say that owing to our plasticizers, every day products used by millions of people all over the world are safer, flexible and more functional.



# TONS PRODUCED

SINCE 1954

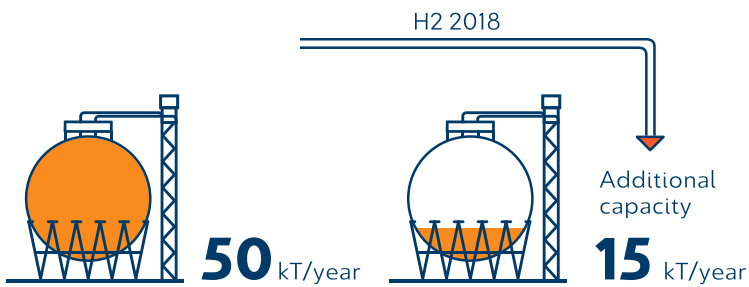


TOTAL  
**2,3**  
mln tons

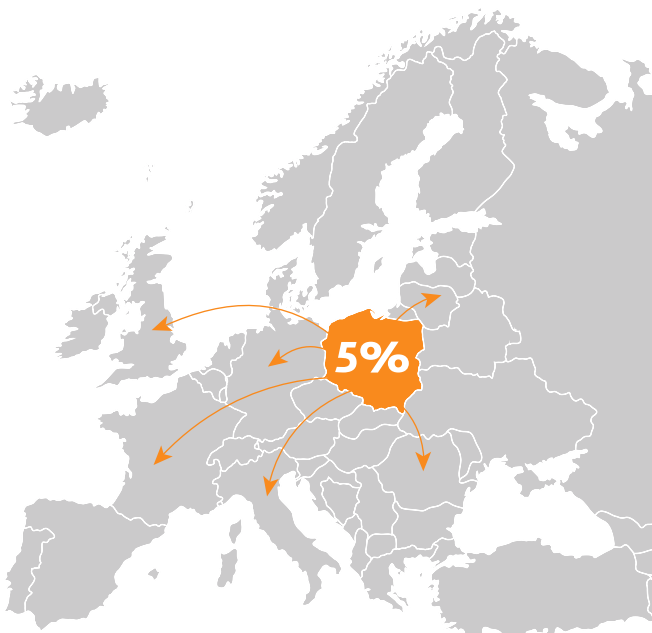
# CAPACITIES

**Oxoviflex<sup>®</sup>**

TOTAL  
**65**  
kT/year



# MARKET SHARE IN EU



No. 1  
in DEHT

with reference to DEHT, DINCH, DINP, DPHP





High quality standards and still growing expectations of PVC converters are reflected in OXO Segment offer. Oxoviflex<sup>®</sup> is a user friendly non-phthalate PVC plasticizer that provides high performance parameters to flexible PVC products.

Oxoviflex<sup>®</sup> can be used in food contact applications and child toys. Our product complies with the highest quality requirements of purity, including the most strict ones of the European Pharmacopoeia.

**Oxoviflex<sup>®</sup> - choose innovative and trusted solution**



# Oxoviflex®

**Trade name:**

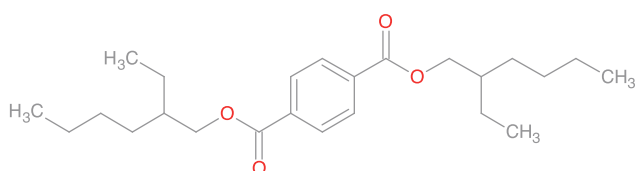
Oxoviflex®

**Chemical name:**

Bis(2-ethylhexyl) terephthalate

**CAS:** 6422-86-2**Status REACH:** DEHT

registered 06/09/2012



**Oxoviflex®** formulation is based on our 2-EH OXO alcohol and PTA which is also used in PET bottles manufacturing.

**Oxoviflex®** is completely safe in terms of CLP classification and in most cases it can substitute phthalate plasticizers. **Oxoviflex®** is REACH registered according to EC regulation No. 1907/2006.

Specification	Value	Test method
Colour, Pt-Co scale	max. 20 [°Hz]	DIN ISO 6271
Flash point	min. 230 [°C]	ISO 2592
Volatile matter content (150°C/2 h)	max. 0.15 [wt %]	Internal method of Grupa Azoty ZAK S.A. (GC)
Bis(2-ethylhexyl) terephthalate	min. 99.5 [wt %]	GC
Density at 20°C	min. 0.980 [g/cm <sup>3</sup> ] max. 0.985 [g/cm <sup>3</sup> ]	ISO 12185
Free acids as phthalic acid	max. 0.01 [wt %]	ISO 1385/IV
Water content	max. 0.05 [wt %]	ISO 760

## PLASTICIZERS

**Oxoviflex®** is our response to growing interest in non-phthalate plasticizers. It has been positively tested for usage in food packaging and child toys according to European regulation.

## IDENTIFIED USE:

- Paints & Lacquers
- Wires & Cables
- Plastic (PVC) additives
- Chemical Synthesis
- Automotive
- Pharmaceutics & Cosmetics
- Technical Gases
- Textiles
- Other



# ESTERIFICATION VS. TRANSESTERIFICATION – comparison of DEHT production methods

European markets of plasticizers are continuously evolving. The catalyst for the changes is high competitive and regulatory pressure resulting in the replacement of the traditional plasticizers with the new, alternative solutions. An example of such an impact is the replacement of phthalate DEHP with its non-orthophtalate alternative – DEHT – which is produced on the basis of the same OXO alcohol. DEHT systematically gains the market share on the European market of PVC plasticizers. In this paper, we will look into DEHT production methods and indicate significant differences that may influence on the DEHT quality.

Two primary methods for the production of di-esters used as plasticizers are the following: esterification (employed by Grupa Azoty ZAK S.A. for production of Oxoviflex®) and transesterification (employed by some other manufacturers). The composition and properties of plasticizers may differ based on the production technology.

## Production process

Oxoviflex® is produced in a continuous process, based on a direct reaction of terephthalic acid with 2-ethylhexanol. It enables continuous monitoring of the process and maintaining stable quality parameters of the product. In DEHT transesterification, the batch production method is dominant, which may result in some inconsistencies in the product batches, especially if the production is carried out in swing mode at the same production line with another plasticizer.

## Raw materials

Another property that differentiates both processes are raw materials. The esterification process is carried out directly in the reaction of terephthalic acid with 2-ethylhexanol (PTA + 2EH). Therefore, the risk of undesirable impurities affecting the quality of the final product is substantially lower. Additionally, conducting the process solely with PTA and 2EH reduces the risk of forming more volatile – methyl octyl esters.

In case of transesterification, the basic raw material, apart from 2-ethylhexanol, is dimethyl terephthalate (DMT). DMT may be obtained from terephthalic acid (PTA) or by alcoholysis of

polyethylene terephthalate with methanol (recycling of PET products), which may result in the introduction of impurities into the raw material.

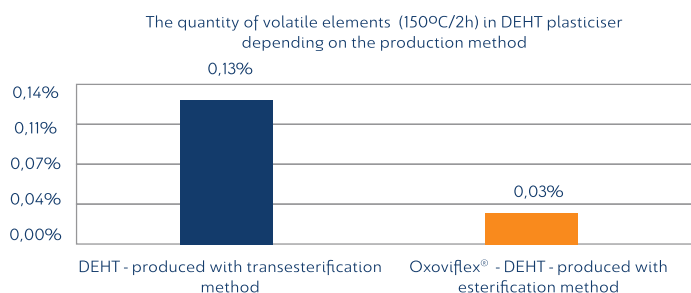
## Reaction catalyst

The esterification process employed in Oxoviflex® production is carried out in the presence of titanium compounds, mainly TnBT as catalyst. Titanium catalyst is an amphoteric catalyst that decomposes in water to TiO<sub>2</sub>, this facilitates its separation from the product during distillation, and reduces the quantity of media required to neutralise raw DEHT. Metalorganic catalysts are more selective, their use results in the production of fewer by-products, and they highly facilitate the separation of the catalyst residue by its precipitation.

Transesterification uses an acidic catalyst (sulphuric acid, methanesulfonic acid, p-Toluenesulfonic acid) or a Sn, Ti, Zr-based catalyst. In this case larger quantities of by-products are obtained and may affect the quality of the final product, in particular, the colour.

## Process conditions

Oxoviflex® esterification is carried at 180–200 °C and under reduced pressure. The process is carried in the terephthalic acid suspension in an excessive quantities of 2-ethylhexanol. It improves the separation of unreacted terephthalic acid from ester through adequate filters. The transesterification process requires increased pressure and higher temperature of 180–260 °C. Moreover, it is carried in a homogeneous mixture of reactants, which contributes to the occurrence of undesired by-products.



Source: GA ZAK S.A. estimation



DEHT manufacturing method	Transesterification	Esterification (Oxoviflex® as an example)
Production process	<b>In batches</b> Inconsistencies possible across the production batches	<b>Continuous</b> Direct reaction, lower risk of introducing impurities, lower risk of forming more volatile esters
Substrates	<b>DMT + 2EH</b> DMT obtained from PTA or recycled PET, higher risk of impurities occurring in DEHT, higher volume of volatile esters	<b>PTA + 2EH</b> Direct reaction, lower risk of introducing impurities, lower risk of forming more volatile esters
Reaction catalyst	<b>Acidic catalyst or catalyst based on Sn, Ti, Zr</b> Larger quantity of by-products that may negatively affect the quality of the final product, in particular the colour	<b>Titanium derivatives, mainly TnBT</b> Easier filtration, no acidic catalyst residue
Process conditions	<b>180-260 °C, increased pressure</b> Undesired by-products	<b>180-200 °C, decreased pressure</b> Improved separation
The content of other esters in the final product	<b>minimum 3%</b>	<b>No other esters</b>
The content of pure bis (2-ethylhexyl) terephthalate in the final product	<b>minimum 96%</b>	<b>minimum 99,5%</b>

## Summary

All of the above differences affect the final product quality. Oxoviflex® is produced employing esterification method and is chemically pure because of its manufacturing conditions that prevent occurrence of excessive by-products while DEHT manufactured in the transesterification method may contain even 3% of by-products. Furthermore, Oxoviflex® contains, among others, min. 99,5% of bis (2-ethylhexyl) terephthalate while the products obtained in transesterification process – 96%.

In the process of selective esterification, employing terephthalic acid and 2-ethylhexanol only, DEHT produced is of good qualitative parameters, pure and with low content of by-products.

Oxoviflex® is a safe product that does not contain acidic catalyst residue, residual methanol or phthalates. As for the metal content, it is comparable to a plasticizer produced for medical purposes for medical purposes and meets top qualitative criteria, including those specified in the European Pharmacopoeia.

DEHT produced according to esterification method is characterised by much higher homogeneity of subsequent batches with respect to transparency (colour). It can turn out especially important in the production of coloured elements as

the risk of colour inconsistencies of the products is minimised; thus, contributing to lower volume of pigments used in PVC processing. It particularly pertains to bright colours (white through beige to light brown tones), where the changes in the plasticizer's transparency significantly affect the perception of the final product.

#### Bibliography:

- US 7361779 B1 "Low-melting mixtures of di-n-butyl and diisobutyl terephthalate"
- US 7964658 B2 "Dialkyl terephthalates and their use"
- WO 2010/071717 "Polymer compositions comprising terephthalates"
- PL 216179 B1 "The method of obtaining dioctyl terephthalate"
- US 20150307435 A1 "Esterification Process"



**Author: Szymon Ustrzycki**  
Specialist Product Engineer  
OXO Segment  
Grupa Azoty ZAK S.A.

# OXO ALCOHOLS



- / We've been producing OXO alcohols since **1986**
- / Our **plant** was modernised in 1998 and **is one of the most modern in Europe**
- / Apart from OXO alcohols we supply their precursors i.e. n-Butyraldehyde & Isobutyraldehyde
- / We serve customers globally



## Andrzej Stypułkowski

*OXO Alcohols  
Department Manager*

My department is the heart of the OXO Segment. Since 1986 we have been producing OXO alcohols which are recognised for their quality in European chemical processing. Owing to reliable and hard work of my staff the facility after 30 years of operation runs in accordance to the highest technical standards. It translates directly into excellent quality of OXO alcohols we produce.



## Andrzej Dorosz

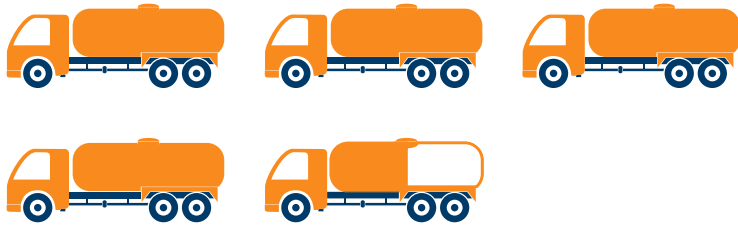
*WGS Department  
Manager*

My department plays a special role as it is the first stage of OXO production chain. Together with my staff we feel the responsibility. Every day we put our hearts into our jobs because we know how much depends on it.



# TONS PRODUCED

SINCE 1986

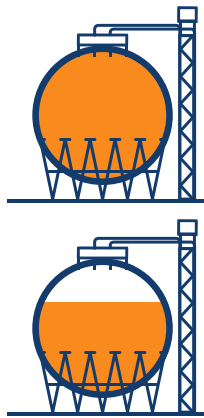


TOTAL  
**4,65**  
mln tons

# CAPACITIES

**170** kT/year

2-Ethylhexanol



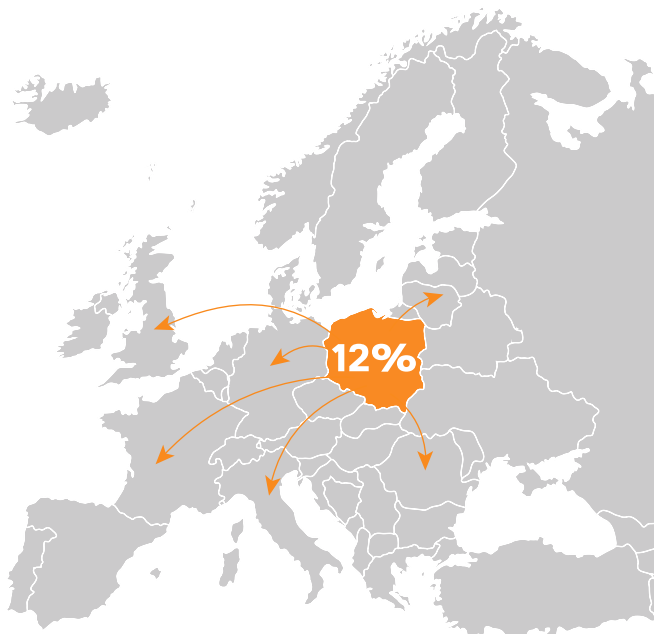
**55** kT/year

n-Butanol  
Isobutanol  
Octyl alcohol F



TOTAL  
**225**  
kT/year

# MARKET SHARE IN EU



with reference to 2-EH and butanols

No. 2  
in 2-EH

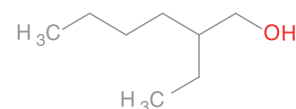
5<sup>th</sup>  
place



# 2-Ethylhexanol

**Trade name:**  
2-Ethylhexanol  
**Chemical name:**  
2-Ethylhexan-1-ol

**CAS:** 104-76-7  
**REACH Status:** 2-Ethylhexanol  
registered 28/09/2010



## OXO ALCOHOLS

**2-Ethylhexanol (2-EH)**  
is our main OXO alcohol.

It is produced according to strict process regime derived from our experience. We put an extra emphasis on its quality which is transferred to further processed products: plasticizers, acrylates, fuel additives (2-EHN) and other chemical products.

**2-EH** is REACH registered according to EC regulation No. 1907/2006.

## IDENTIFIED USE:

- Paints & Lacquers
- Wires & Cables
- Plastic (PVC) additives
- Chemical Synthesis
- Automotive
- Pharmaceutics & Cosmetics
- Technical Gases
- Textiles
- Other

Specification	Value	Test method
2-Ethylhexanol	min. 99.7 [wt %]	GC
Colour, Pt-Co scale	max. 5 [APHA]	ISO 6271
Density at 20°C <sup>1</sup>	min. 0.832 [g/cm <sup>3</sup> ] max. 0.834 [g/cm <sup>3</sup> ]	ISO 12185
Acids as acetic acid <sup>1</sup>	max. 0.01 [wt %]	ASTM D 1613
Aldehydes as 2-ethylhexanal <sup>1</sup>	max. 0.05 [wt %]	BS 4583
Water content	max. 0.05 [wt %]	ISO 12937:2000

<sup>1</sup>These parameters are covered by the producer's guarantee, to be analysed in case of a claim only.



[www.oxoplast.com/en/oxo-alcohols/2-ethylhexanol/](http://www.oxoplast.com/en/oxo-alcohols/2-ethylhexanol/)

# n-Butanol

**Trade name:**

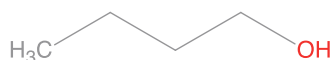
n-Butanol

**Chemical name:**

Butan-1-ol, n-Butanol

**CAS:** 71-36-3

**REACH Status:** n-Butanol  
registered 02/11/2010



It is manufactured according to highest quality standards which guarantees our customers that all requirements concerning its further processing to acrylates, acetates and solvents and other chemical substances are met.

**N-butanol** is REACH registered according to EC regulation No. 1907/2006.

Specification	Value	Test method
n-Butanol	min. 99.8 [wt %]	GC
Colour, Pt-Co scale	max. 5 [APHA]	ISO 6271
Density at 20°C <sup>1</sup>	min. 0.810 [g/cm <sup>3</sup> ] max. 0.812 [g/cm <sup>3</sup> ]	ISO 12185
Acids as acetic acid <sup>1</sup>	max. 0.005 [wt %]	ASTM D 1613
Aldehydes as butanal <sup>1</sup>	max. 0.05 [wt %]	BS 4583
Water content	max. 0.05 [wt %]	ISO 12937:2000

<sup>1</sup>These parameters are covered by the producer's guarantee, to be analysed in case of a claim only.



## OXO ALCOHOLS

**n-Butanol** is our second most important OXO alcohol.

## IDENTIFIED USE:

- Paints & Lacquers
- Wires & Cables
- Plastic (PVC) additives
- Chemical Synthesis
- Automotive
- Pharmaceutics & Cosmetics
- Technical Gases
- Textiles
- Other



# Isobutanol

**Trade name:**

Isobutanol

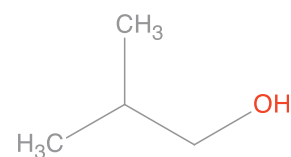
**Chemical name:**

2-Metylopropan-1-ol, isobutanol

**CAS:** 78-83-1

**REACH Status:** Isobutanol

registered 04/11/2010



## OXO ALCOHOLS

**Isobutanol** is produced from our Isobutyraldehyde.

Our product is mainly used as solvent in many appreciated brands of paints, varnishes and resins.

**Isobutanol** is REACH registered according to EC regulation No. 1907/2006.

## IDENTIFIED USE:

- Paints & Lacquers
- Wires & Cables
- Plastic (PVC) additives
- Chemical Synthesis
- Automotive
- Pharmaceutics & Cosmetics
- Technical Gases
- Textiles
- Other

Specification	Value	Test method
Isobutanol	min. 99.8 [wt %]	GC
Colour, Pt-Co scale	max. 5 [APHA]	ISO 6271
Density at 20°C	min. 0.802 [g/cm <sup>3</sup> ] max. 0.804 [g/cm <sup>3</sup> ]	ISO 12185
Acids as acetic acid	max. 0.003 [wt %]	ASTM D 1613
Aldehydes as butyraldehyde	max. 0.05 [wt %]	BS 4583
Water content	max. 0.10 [wt %]	ISO 12937:2000



# Octyl alcohol F

**Trade name:**

Octyl alcohol F

**Chemical name:**

1-Hexanol, 2-ethyl-, manuf.

of, by-products from, distn. residues

**CAS:** 68609-68-7

**REACH Status:** Octyl alcohol F

registered 12/01/2012



**Octyl alcohol F** is a liquid with various colourations: from yellow through yellow-brown to greenish and with the specific odour.

Octyl alcohol F is REACH registered according to EC regulation No. 1907/2006.

Specification	Value	Test method
2-Ethylhexanol	max. 30 [wt %]	GC
High molecular weight compounds (>C <sub>8</sub> )	min. 70 [wt %]	GC

## OXO ALCOHOLS

### IDENTIFIED USE:

- Paints & Lacquers
- Wires & Cables
- Plastic (PVC) additives
- Chemical Synthesis
- Automotive
- Pharmaceutics & Cosmetics
- Technical Gases
- Textiles
- Other



# ALDEHYDES

/ On our plant, apart from OXO alcohols we supply their precursors  
i.e. n-Butyraldehyde & Isobutyraldehyde

/ **111 kT of aldehydes supplied to the market since 1986**



**Paweł Polański**

*Aldehydes  
Department Manager*

OXO synthesis starts in my department. In the presence of a rhodium catalyst a reaction of propylene and syngas hydroformylation to butyric aldehydes occurs. The high quality of all market products manufactured by the OXO Segment is ensured by my team's professional experience and dedicated work.





# n-Butyraldehyde

**Trade name:**

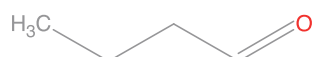
n-Butyraldehyde

**Chemical name:**

n-Butyraldehyde; Butanal

**CAS:** 123-72-8

**REACH Status:** n-Butyraldehyde registered 07/10/2010



Owing to its high quality our alcohols are recognised as leading products on the market. Apart from captive usage we offer our aldehyde to customers who process it and produce solvents, esters, acids, resins, etc.

**n-Butyraldehyde** is REACH registered according to EC regulation No. 1907/2006.

[www.oxoplast.com/en/aldehydes/n-butyraldehyde/](http://www.oxoplast.com/en/aldehydes/n-butyraldehyde/)



## ALDEHYDES

**n-Butyraldehyde** is a main intermediate in our OXO alcohols (2-EH, NBA) production process.

### IDENTIFIED USE:

- Paints & Lacquers
- Wires & Cables
- Plastic (PVC) additives
- Chemical Synthesis
- Automotive
- Pharmaceutics & Cosmetics
- Technical Gases
- Textiles
- Other

# Isobutyraldehyde

**Trade name:**

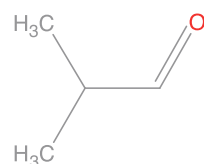
Isobutyraldehyde

**Chemical name:**

Isobutanal; 2-methylpropanal

**CAS:** 78-84-2

**REACH Status:** Isobutyraldehyde registered 11/08/2010



We process it to isobutanol. With its specific properties isobutyraldehyde is also used by our customers for production of resins, amines and specialty esters.

**Isobutyraldehyde** is REACH registered according to EC regulation No. 1907/2006.

[www.oxoplast.com/en/aldehydes/isobutyraldehyde/](http://www.oxoplast.com/en/aldehydes/isobutyraldehyde/)



## Isobutyraldehyde

is a second intermediate in our OXO alcohols facility.

### IDENTIFIED USE:

- Paints & Lacquers
- Wires & Cables
- Plastic (PVC) additives
- Chemical Synthesis
- Automotive
- Pharmaceutics & Cosmetics
- Technical Gases
- Textiles
- Other

## CONTACTS

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### Oxoplast BU Commercial Director



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#### Waldemar Pawelczyk

*Sales Manager Western Europe  
and the World*

Together with my team I'm developing OXO Segment position on the West European and Global markets. I feel immense satisfaction when my direct contact with a customer results in long-lasting relationship. My goal is to make Grupa Azoty ZAK S.A. the first choice company for my business partners.

#### Sales Representative Germany, Austria, Switzerland Jacek Ogonowski

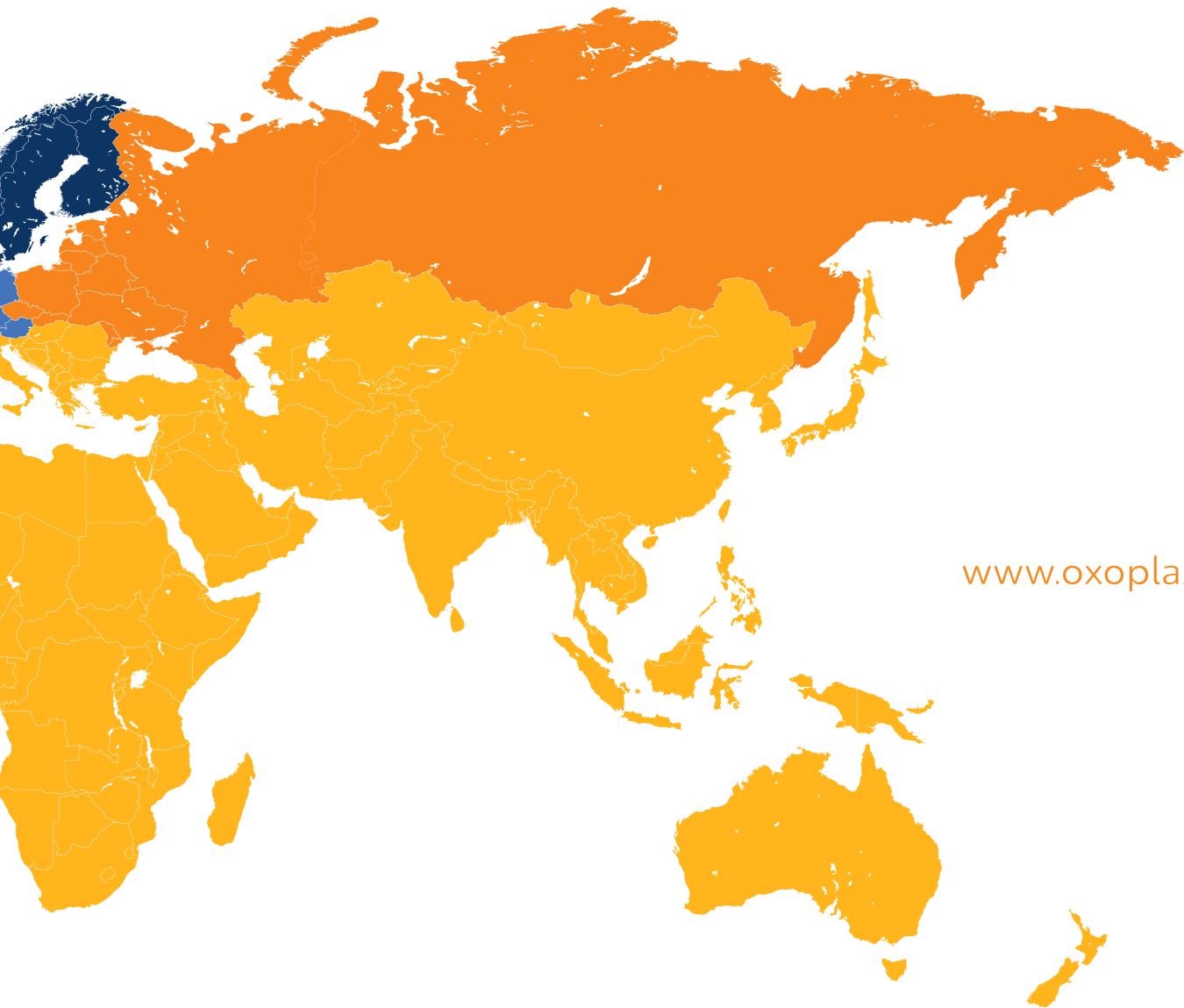
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**Jolanta Kamys**

*Sales Manager Poland  
and East-Central Europe*

I'm in charge of sales to Polish and East-Central European markets. I'm building relations which influence perception of Grupa Azoty ZAK S.A. We want to live up to the expectations of our business partners – this is our main challenge, especially that the domestic market is so close to us. Together with my colleagues we are ready to answer difficult questions and provide technical advice to our customers whenever necessary.



**Monika Urbańczyk**

*Sales Manager Southern Europe  
and the World*

I put particular emphasis on positive business relations and creating bonds with our partners. My team is responsible for Global and South European market. We are driven by a common goal - we want to become the leader in our sector. And thanks to our partners who have trusted us and appreciated the potential of an experienced Polish company we're getting closer and closer to achieving our aim.



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