



DEZn TCO



Diethylzinc for thin film solar cells

Nouryon



Welcome to Nouryon

We are Nouryon, your partner in essential chemistry for a sustainable future

A long history

We have a long history in metal alkyls, starting with large-scale production of aluminum alkyls in 1959. Today, we're one of the world's top producers with a broad range of metal alkyls, including aluminum, magnesium, boron and zinc alkyls. Our ultra-high purity semiconductor-grade product range includes gallium-, indium-, aluminum-, zinc- and magnesium-based MO-sources.

We are the only fully integrated high purity metalorganics supplier serving the semiconductor industry, producing our own trimethyl aluminum, a key raw material for these products.

Nouryon also plays a role in the fast-growing solar cell market. We have developed new technology for the production of high purity diethyl zinc, which is used by thin film solar cell manufacturers to create the all-important TCO layer. It is our contribution to solar energy, for the benefit of our planet.

At Nouryon we look beyond horizons. We believe that what is good for you today is not necessarily good for you tomorrow. We are committed to the success of our customers. That's why we continually invest in high-quality standards, innovation, safety, active technical support and better distribution systems.



A secure partner

Nouryon pioneered the large-scale production of diethyl zinc (DEZn) and has been producing commercial quantities in La Porte (Texas, USA) since the 1960s. Main applications are as ZnO precursor for the TCO layer in thin film solar cells and in pharmaceutical synthesis. Our product grade specifically aimed to serve the needs of the solar cell industry is called DEZn TCO.

We supply a broad range of metal alkyls from our La Porte (Tx - USA) and Rotterdam (the Netherlands) sites, as well as from smaller facilities in China, India and Brazil. Our global distribution network allows us to deliver products to you anywhere in the world.

Nouryon has acquired Zhejiang Friend Chemical Co. (Friend), the largest Chinese producer of triethyl aluminum (TEAL) – a metal alkyl used in the production of high-volume polymers, such as polypropylene and polyethylene.

The acquisition will substantially raise our organization's global TEAL production and strengthen our position as a leading global producer of TEAL. The deal also makes us the only truly global producer of metal alkyls.

That's how we ensure security of supply and easy access to quality products wherever you are.

All our sites are ISO 9001 and ISO 14001 certified to ensure the highest product quality and strict compliance with environmental regulations. Additionally, La Porte is an OSHA VPP Star site and both Rotterdam and Paulinia have achieved OHSAS 18001 certification. Our sites in the Americas have achieved RC 14001 certification as well.



DEZn TCO product data

Nouryon uses leading edge processes, purification and transfilling techniques that ensure the repeatable and consistent delivery of the highest purity DEZn TCO in each cylinder that we supply. We apply state of the art techniques such as ICP-AES for trace metal analysis to meet customer's demands. Product specifications are provided on our Product Data Sheet (PDS), which is available on nouryon.com/hpmo

PRODUCT DESCRIPTION

Molecular formula	(C ₂ H ₅) ₂ Zn
Molecular weight	123.50
CAS No.	557-20-0
EINECS/ELINCS No.	209-161-3
TSCA status	listed on inventory
UN No.	3394

CHARACTERISTICS

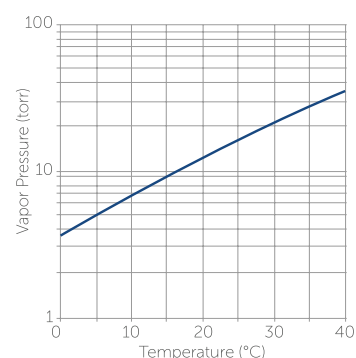
Appearance	colorless liquid
Density, 30°C	1.198 g/ml
Melting point	-30°C
Viscosity, 20°C	0.7 mPa.s
Boiling point, 760 torr	118°C
Stability to air	ignites upon exposure
Stability to water	reacts violently
Solubility	soluble in aromatic and saturated aliphatic and cycloaliphatic hydro-carbons

THERMOCHEMICAL PROPERTIES

Specific heat, 57°C	1.502 J/g.°C (0.359 cal/g.°C)
Heat of vaporization ΔH_v , at 118°C	326 J/g (78 cal/g)
Heat of hydrolysis, 25°C	2117 J/g (506 cal/g)
Heat of formation ΔH_f , 25°C, 1 bar	17 kJ/mole (4 kcal/mole)
Heat of combustion ΔH_c , 25°C	-3364 kJ/mole (-804 kcal/mole)

VAPOR PRESSURE

at 10°C (283.15 K)	6.79 torr
at 20°C (293.15 K)	12.2 torr
Gas constants	$\log P(\text{torr})=B-A/T(K)$
A	2109
B	8.28



Shipping containers

We maintain a fleet of cylinders and portable tanks designed for the shipment of DEZn TCO. Shipping containers are designed and constructed to meet all national and international transport regulations and are tested periodically, in accordance with the appropriate regulations. Containers are fabricated from carbon steel and are equipped with dip tubes for top discharge. Valves are equipped with standard VCR connections.

CYLINDER	MAX. FILLING WEIGHT (90%)	DIMENSIONS	
		diameter	height
Pyrosafe	1 kg (2.2 lb)	9.0 cm (3.562 in)	26.7 cm (10.5 in)
B-2	11.8 kg (26.0 lb)	23.2 cm (9.125 in)	46.4 cm (18.25 in)
B-5	24 kg (52.9 lb)	30.8 cm (12.125 in)	53.3 cm (21 in)
B-28	116 kg (256 lb)	37.1 cm (14.625 in)	129.5 cm (51 in)
B-118	476 kg (1049 lb)	71.1 cm (28 in)	145.7 cm (57.375 in)

PORTABLE TANK	MAX. FILLING WEIGHT (90%)	DIMENSIONS		
		length	diameter	height
C-430 saddle type	1755 kg (3869 lb)	208 cm (82 in)	107 cm (42 in)	128 cm (50.5 in)
C-1980	8081 kg (17816 lb)	305 cm (120 in)	190 cm (74.8 in)	224 cm (88.2 in)
ISO*	23001-25338 kg (50709-55861 lb)	606 cm (239 in)	244 cm (96 in)	259 cm (102 in)

* Exact volume of an ISO tank container depends on the model



Safety: Our top priority



Nouryon's success in safely handling DEZn is due to our long-term commitment to safety. Knowledge of proper handling techniques, carefully designed facilities and thorough training of personnel can overcome the hazards. Personnel who understand and pay proper attention will be able to handle metal alkyls confidently and safely.

Safety and Handling

DEZn ignites upon exposure to air and reacts violently with water. DEZn must be handled under a dry, inert atmosphere, e.g. nitrogen or argon. DEZn may undergo exothermic decomposition with evolution of flammable gas if stored above 70°C (158°F).

The decomposition may become self-accelerating and UNCONTROLLABLE and may result in an explosion if heated above 120°C (248°F). Water must be scrupulously removed from process equipment prior to putting it into metal alkyls service. Failure to do so may result in an explosion. Products of complete combustion of DEZn are zinc oxide, carbon dioxide and water. DEZn causes severe burns to the skin and eyes. It is imperative that proper personal protective equipment be worn when handling DEZn.

Storage

DEZn is stable when stored under a dry, inert atmosphere and away from heat. DEZn may undergo violent exothermic decomposition with flammable gas evolution if stored at temperatures above 70°C (158°F).

Safety Services

Nouryon is recognized as a global leader in metal alkyl safety. We always place safety as our top priority. Sharing our experience in safety is one of the most important resources we offer. Through our safety programs we can provide expert advice on the handling of these materials including:

- classroom review of safety and handling of metal alkyls
- consultation of metal alkyl facility design
- demonstrations on the safe use, handling and control of metal alkyls
- on-site assistance and advice regarding procedures

As such, we routinely advise our customers on the development of systems which deliver DEZn from our bulk containers to their production tools and the safety procedures that should be employed in these production processes. Please contact us if you are interested in such services.





Contact us

Your global Nouryon HPMO team is here to serve you. For more information, please contact your sales manager or regional Nouryon sales office.

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Additional information

Product Data Sheets (PDS) and Safety Data Sheets (SDS) are available at nouryon.com

On request we also provide specific publications on subjects such as applications of metal alkyls, analytical technique, safe use and storage of metal alkyls, facilities design and maintenance, and unloading procedures.

All information concerning this product and/or suggestions for handling and use contained herein are offered in good faith and are believed to be reliable. Nouryon, however, makes no warranty as to accuracy and/or sufficiency of such information and/or suggestions, as to the product's merchantability or fitness for any particular purpose, or that any suggested use will not infringe any patent. Nouryon does not accept any liability whatsoever arising out of the use of or reliance on this information, or out of the use or the performance of the product. Nothing contained herein shall be construed as granting or extending any license under any patent. Customer must determine for himself, by preliminary tests or otherwise, the suitability of this product for his purposes. The information contained herein supersedes all previously issued information on the subject matter covered. The customer may forward, distribute, and/or photocopy this document only if unaltered and complete, including all of its headers and footers, and should refrain from any unauthorized use. Don't copy this document to a website.

Nouryon

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