

Metal Alkyls

LANXESS Solutions US Inc. is a global partner for the manufacture, marketing and development of specialty organometallic products. These products are used in polymer production, synthesis of fine chemicals, pharmaceuticals, and in processes for production of semiconductor devices and photovoltaic modules. The metal alkyls described in here are a specific group of organometallics mainly using aluminum, zinc and magnesium.

These products have become powerful devices in modern chemistry. However, they also react rapidly and significantly with air and water and therefore present challenges in production, storage and handling.

LANXESS Solutions US Inc. uses certified containers for storage and transport of metal alkyls. These containers are specially designed to protect product quality. We also developed and established methods and processes that ensure safe transportation and handling of these compounds.

Identification

Product Trade Names:

- AXION® PA 1300
- AXION EA 1301
- AXION CA 1310
- AXION CA 1320
- AXION CA 1330
- AXION PZ 2200
- AXION EZ 2201

Chemical Names:

- Triethylaluminium
- Trimethylaluminium
- Trioctylaluminium
- Trihexylaluminium

- Tri-isobutylaluminium
- Di-isobutylaluminum hydride
- Methylaluminoxane
- Diethylaluminium chloride
- Ethylaluminium sesquichloride
- Ethylaluminium dichloride
- Diethylzinc
- Butylethylmagnesium
- Butyloctylmagnesium

Description

Metal alkyls are used in a great variety of products we use in everyday life, such as packaging materials, fibers and adhesives.

Many pharmaceuticals could not be synthesized without organometallics as a helping agent. Organometallics support active pharmaceutical substances to eliminate pathogens, diseases and parasites within the human body.

Organometallics are also important for the modern energy supply, as they are used in the production of photovoltaic modules to convert sunlight into electric current.

Metal alkyls are increasingly important in the production of semiconductor devices that are essential for the construction of electronically-functional units like LED lighting.

Despite their broad use, metal alkyls are not visible in the final product, as they are transformed into other materials during the various production processes.

Physical/Chemical Properties:

Organometallics are a group of chemical compounds including at least one carbon atom directly bonded to at least one metal atom. Normally, most metal alkyls are flammable and can spontaneously combust when coming into contact with air. They may react even more significantly when contacting water.

Product Safety Assessment: Metal Alkyls

Organometallics vary in appearance and properties, depending on the metal and its substituents. Many of them are clear liquids, while others are solids at room temperature. Organometallics also have a wide range of hazardous properties. Some are skin irritants, while others can cause severe thermal burns.

Some metal alkyls are applied as solvent solutions, which makes them less reactive. Such solutions can form vapor clouds that are flammable and may cause a fire. Metal alkyls may only be handled by trained, appropriately protected, and equipped employees.

Health Effects:

Generally, all metal alkyls should be handled carefully due to their reactive properties.

Most metal alkyls inflame spontaneously when coming into contact with water or air. The resulting gases and fumes can cause serious damage and severe health effects. Inhaling metal alkyl gases can injure the throat and lungs, as well as induce headaches, fever, dizziness and breathing difficulties.

Toxicity and eco-toxicity effects include irritation of the skin. Metal alkyls can cause thermal burns to the eyes, skin, and internal organs.

Potential Environmental Impact

Due to their reactivity, metal alkyls decompose rapidly and do not accumulate significantly in the environment.

As mentioned before, metal alkyls may inflame spontaneously. During this process, an extreme heat is produced, along with dense smoke, carbon dioxide, water and metal oxides. In case of an incomplete combustion, carbon monoxide and acidic by-products can result.

Product Stewardship:

LANXESS conducts ongoing analysis of its products to evaluate potential risk areas throughout each product's life cycle. Chemical risks are identified at the very early stage of new product development. They are evaluated by stage-gated reviews using environmental, health and safety (EHS) criteria. The analysis of existing products will evaluate raw materials, manufacturing, transportation, customer end-use and disposal. Additionally, before changes in existing product formulations are made, a detailed evaluation is made of the proposed change. A critical component of all of these processes is the Safety Data Sheet, which lists detailed product hazard information.

Product Safety Assessment: Metal Alkyls

Potential product risks are reviewed according to current controls. In the context of a continually improving risk-reduction program, periodic reviews of current controls occur in order to identify opportunities for improvements or enhancements. This includes adaptation of existing procedures to changes in regulations (e.g., covering workplace and transportation). Customers and the public are advised, however, that the hazard information for a product is only one of several factors that can affect the potential risks presented by that product in any particular use and application. In using our products, customers should follow proper instructions and ensure that proper personal protective equipment is used. These are critical components in reducing the potential risks of any product.

Regulatory Compliance:

Because metal alkyls are reactive in numerous ways, several regulations apply regarding transportation, handling and disposal of this product class.

The Occupational Safety and Health Administration (OSHA) in the U.S., as well as various regulatory bodies in the European Union (EU), govern safety at workplaces according to published exposure limits.

Various regulatory bodies such as the U.S. Department of Transportation, the EU and the International Maritime Organization classify metal alkyls for transport. Examples for transport classes are described as self-igniting liquid or water-reactive, flammable liquid. The use and disposal of metal alkyls is covered in the U.S. by the Toxic Substances Control Act (TSCA) and in Europe by the REACH regulation. International shipping is controlled by the United Nations Transport of Dangerous Goods Code.

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Manufacturing and Processing:

The production takes place in closed systems. These production units are regularly inspected by third-party inspectors certified by regulatory authorities.

Metal alkyls are produced by a variety of methods and chemical processes. LANXESS SOLUTIONS US INC. has more than 50 years' experience in synthesizing and handling these compounds. The LANXESS metal alkyls product portfolio is manufactured at our sites in Bergkamen, Germany and Mapleton, Illinois, USA.

Product Safety Assessment: Metal Alkyls

Release Control and Disposal:

Manufacturing and storage equipment is designed to prevent release of the reactive metal alkyls into the environment.

The method of choice for disposal is combustion or solvolysis of dilute solutions. We have extensive experience in disposing of metal alkyls and give advice and support to our customers.

Transportation:

Metal alkyls are transported in special, pressure-resistant steel containers that have been constructed, tested and approved according to existing transport regulations. The size of the containers vary in filling volume from 1.6 liters to 23,000 liters. Ten different types are available.

For ease of transport, special platforms, frame containers and ISO flats support those cylinders.

Exposure Potential:

Due to the high reactivity of metal alkyls, we strive to avoid exposure to these materials.

All employees must complete special training on the necessary handling skills before working with metal alkyls. While unloading the products, plant workers must wear protective, fire-resistant, full body suits and safety helmets with face shields that give sufficient protection.

LANXESS Solutions US Inc. sells these products only to approved customers since their employees also have to receive the same training.

Conclusion

The products which are produced using metal alkyls are an integral part of daily life. While the metal alkyls are no longer present in the final application, they are essential to enabling us to live as comfortable, safe and future-oriented as possible.

Contact Information

For more information, please contact us by our web site:

<http://www.LANXESS.com>

Notices

Use and Application Information

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under the claims of any patent.