TRIMETHYLALUMINUM (AND RELATED ORGANOALUMINUM COMPOUNDS)

Substance Trimethylaluminum (and related organoaluminum compounds)
(Trimethylalane, trimethylaluminium)
CAS 75-24-1
Note: Although other alkylaluminum reagents may have different physical properties than trimethylaluminum, their toxicology and reactivity are similar.

Formula $(CH_3)_3Al$

Physical Properties Colorless pyrophoric liquid
bp 125 to 126 °C, mp 15 °C
React explosively with water

Odor Corrosive odor and "taste" may be detectable from trimethylaluminum fires

Vapor Density Not available

Vapor Pressure 12 mmHg at 25 °C

Flash Point -18 °C

Autoignition Temperature Spontaneously ignites in air (even as a frozen solid)

Toxicity Data TLV-TWA (ACGIH) 2 mg (Al)/m ^{3}

Major Hazards Highly reactive, pyrophoric substances; corrosive on contact with skin and eyes.

Toxicity Trimethylaluminum and related alkylaluminum reagents are pyrophoric materials that can react explosively with the moisture in tissues, causing severe burns. The heat of reaction can also ignite the methane gas generated, resulting in thermal burns. Alkylaluminum reagents are corrosive substances, and contact is extremely destructive to the eyes, skin, and mucous membranes. Inhalation of trimethylaluminum and other volatile alkylaluminum compounds may cause severe damage to the respiratory tract and can lead to fatal pulmonary edema.

Flammability and Explosibility Trimethylaluminum is pyrophoric and burns violently on contact with air or water. Other alkylaluminum reagents show similar behavior, although most are not as volatile as trimethylaluminum. *Water or CO_2 fire extinguishers must not be used to put out fires involving trialkylaluminum reagents.* Instead, dry chemical powders such as bicarbonate, Met-L-X®, or inert smothering agents such as sand or graphite should be used to extinguish fires involving trialkylaluminum compounds.

Reactivity and Incompatibility Trialkylaluminum reagents are highly reactive reducing and alkylating agents. They react violently with air, water, alcohols, halogenated hydrocarbons, and oxidizing agents. These reagents are often supplied as solutions in hydrocarbon solvents, which are less hazardous than the pure liquids.

Storage and Handling Trialkylaluminum agents should be handled in the laboratory using the "basic prudent practices" described in Chapter 5.C, supplemented by the additional precautions for work with highly flammable (Chapter 5.F) and reactive (Chapter 5.G) substances. Safety glasses, impermeable gloves, and a fire-retardant laboratory coat should be worn at all times when working with these compounds. Trialkylaluminum reagents should be handled only under an inert atmosphere.

Accidents In the event of skin contact, immediately wash with soap and water and remove contaminated clothing. In case of eye contact, promptly wash with copious amounts of water for 15 min (lifting upper and lower lids occasionally) and obtain medical attention. If trialkylaluminum compounds are ingested, obtain medical attention immediately. If any of these compounds are inhaled, move the person to fresh air and seek medical attention at once.

Any spill of trialkylaluminum will likely result in fire. Remove all ignition sources, put out the trialkylaluminum fire with a dry chemical extinguisher, sweep up the resulting solid, place in an appropriate container under an inert atmosphere, and dispose of properly. Respiratory protection may be necessary in the event of a large spill or release in a confined area.

Disposal Excess trialkylaluminum reagents and waste material containing these substances should be placed in an appropriate container under an inert atmosphere, clearly labeled, and handled according to your institution's waste disposal guidelines. Alternately, small quantities of trialkylaluminum reagents can be destroyed in the laboratory by experienced personnel by slow addition of *t*-butanol to a solution of the reagent in an inert solvent such as toluene under an inert atmosphere such as argon. The resulting mixture should then be placed in an appropriate container, clearly labeled, and handled according to your institution's waste disposal guidelines.

The information in this LCSS has been compiled by a committee of the National Research Council from literature sources and Material Safety Data Sheets and is believed to be accurate as of July 1994. This summary is intended for use by trained laboratory personnel in conjunction with the NRC report *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals*. This LCSS presents a concise summary of safety information that should be adequate for most laboratory uses of the title substance, but in some cases it may be advisable to consult more comprehensive references. This information should not be used as a guide to the nonlaboratory use of this chemical.

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