**Standard Operating Procedure**

**Aluminum Alkyls (ex: Trimethylaluminum)**

Print a copy and keep with your
*Chemical Hygiene Plan* and/or *Lab Safety Resources Binder*

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| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Lab Safety Coordinator/Lab Manager:** | Click here to enter text. |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | Click here to enter text. |
| **Emergency Contact:** | Click here to enter text. |
| *(Name and Phone Number)* |
| **Location(s) covered by this SOP:** | Click here to enter text. |
| *(Building/Room Number)* |

**Type of SOP:** ☐ Process X Hazardous Chemical ☐Equipment

1. **Purpose**

The purpose of this SOP is to establish safe practices when working with aluminum alkyls. Aluminum alkyls are spontaneously flammable in air, react violently with water, and are corrosive (i.e. can cause burns to skin and eyes). Aluminum alkyls are often catalysts in the polymerization of olefins and dienes and are effective alkylating agents.

1. **Procedure/Scope:**

[Identify when the procedure is to be followed]

[Include laboratory procedure and specify hazardous stages of the procedure]

Working with aluminum alkyl compounds is not allowed when alone in the lab. Prior to starting the reaction, locate the extinguisher, eyewash and safety shower.

1. **Physical & Chemical Properties/Potential Hazards**

CAS #:

Class: Pyrophoric Liquid, Water Reactive, Corrosive

Hazards: Catches fire spontaneously if exposed to air. In contact with water releases flammable gases which may ignite spontaneously. Causes severe skin burns and eye damage.

1. **Safety Data Sheet (SDS) Location**

Online SDS can be accessed at (<http://oregonstate.edu/ehs/sds>). A hard copy can be found at Oak Creek Building with Environmental Health & Safety.

1. **Personal Protective Equipment (PPE)**

Laboratory personnel must always wear a lab coat when working in a lab. Closed-toed shoes are also required at all times.

**Hand Protection:** Handle with gloves only. Nitrile gloves are recommended.

**Eye Protection:** Safety goggles required. Face shield required during handling.

**Skin and Body Protection:** long pants, fire-resistant lab coat, closed-toed shoes required. Long hair should be pulled back.

**Respiratory Protection:** Only required when there is a potential for PEL exceedance.

**Hygiene Measures:** Wash hands immediately after handling the product.

1. **Engineering Controls**

Aluminum Alkyls should be used in a glove box or in a closed system in a certified chemical fume hood.

1. **Special Storage & Handling Requirements**

**Handling**:

Avoid inhalation, ingestion, and contact with skin and eyes. Keep away from sources of ignition including heat, sparks, open flames, hot surfaces. Prevent build-up of electrostatic charges.

Do not allow contact with air or water. Handle under inert gas. Protect from moisture.

**Storage:**

Keep container closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Never allow product to get in contact with water during storage. Store away from oxidizing agents and air. Store under inert atmosphere in glove box due to air sensitivity.

**Transporting:**

Do not transport outside the laboratory if substance has been opened. Call EH&S for assistance if chemical transportation is needed.

1. **Chemical Spill**

Assess the extent of the danger. Help contaminated or injured persons. Evacuate the spill area and avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area.

Inform EH&S of all spills, even if you are trained and able to clean them up.

**OSU Chemical Spill Safety Instruction**: <http://ehs.oregonstate.edu/sites/ehs.oregonstate.edu/files/pdf/si/spill_response-chemicals_si.019.pdf>

**Pyrophoric Spill Response**

* In the case of a spill, announce the situation loudly in the immediate area and have any nearby persons move to a safe location.
* Immediately eliminate/remove all nearby ignition sources.
* If spill occurs in a fume hood, cover with Met-L-X, dry sand, or other non-combustible material, close the hood sash and if present, press the red purge button.
* If a spill occurs outside a fume hood, cover with Met-L-X, dry sand, or other non-combustible material, and stand away from the spill.
* Locate and have a proper fire extinguisher (dry chemical-based) ready in case of ignition/fire.
* Use clean, non-sparking tools to collect absorbed material and place into loosely-covered metal or plastic containers ready for disposal.
* Do not use combustible materials (paper or cloth towels) to clean up a spill, as these may increase the risk of igniting the reactive compound.
* If you cannot assess the situation well enough to be sure of your own safety, do not approach the spill.
* Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).• Report the spill to 541-713-SAFE.

**Pyrophoric Fire Response**

* Call 911 for emergency assistance and for assistance with all fires, even if extinguished.
* If the spill ignites, and if you are trained and you feel comfortable to do so, consider extinguishing the fire with an appropriate fire extinguisher. Only dry chemical fire extinguishers should be used (classes ABC or D). Do not use a CO2 extinguisher.
* A can of Met-L-X or dry sand in the work area, within arm’s reach, might be helpful to extinguish any small fire as it can smother the flames.
* Do not use water to extinguish a pyrophoric chemical fire as it may enhance the intensity of the fire. An exception to this would be in the case of skin contact or ignited clothing/skin. In these cases rinsing any unreacted chemical off is of primary importance.
* Be AWARE: Small flames at the tip of the needles can be produced – always expect this to occur, and do not panic. The can of Met-L-X/sand is in the hood to quickly extinguish those small flames.
1. **First Aid Procedures**

If an accident happens the following documents must be completed:

* Online OSU HR Advocate Public Incident Reporting Form within 24 hours of the incident
* If the employee’s incident resulted in the need for medical treatment, have the employee complete the worker section of the SAIF 801 Form and fax to risk management at 541-737-4855 within 24 hours.

**If inhaled**

Move to fresh air. Call Poison Control Center/Doctor.

**In case of skin contact**

Immediately (within seconds) flush affected area for at least 15 minutes in a nearby safety shower. Remove all contaminated clothing. Consult with doctor and/or call 911 if needed.

**In case of eye contact**

Use eye wash to flush eyes for 15 minutes. Immediately call Poison Control Center/Doctor.

**If ingested**

Do not induce vomiting. Contact 911 and/or poison control center if swallowed: 1(800)222-1222

1. **Other Emergencies**

**Medical Emergency Dial 911**

**Fire-fighting & Extinguishing media:** DO NOT use water on aluminum alkyl fires. Dry powder fire extinguishing media is acceptable. Carbon oxides and aluminum oxide gases are emitted with contact with water.

1. **Decontamination/Waste Disposal Procedure**

Aluminum Alkyls must be quenched, otherwise known as neutralizing, prior to EH&S waste pickup. See attached SOP for *Quenching & Disposal of Pyrophoric Solids or Water Reactive Alkali Metals.*

**Label Waste**

* Affix an EH&S hazardous waste label on all waste containers (<http://ehs.oregonstate.edu/sites/ehs.oregonstate.edu/files/pdf/hwlabelfull.pdf>) as soon as the first drop of waste is added to the container.

**Store Waste**

* Store hazardous waste in closed containers, in secondary containment and in a designated location within the fume hood.

**Dispose of Waste**

* Dispose of immediately.
* Put in a waste request at: <http://ehs.oregonstate.edu/waste>
1. **References**

[UCSB’s Aluminum Alkyls SOP](https://sites.chemengr.ucsb.edu/~ceweb/faculty/scott/Chemical%20SOPs/Aluminumalkyls.pdf)

[Sigma-Aldrich Technical Bulletin AL-134](https://www.sigmaaldrich.com/content/dam/sigma-aldrich/docs/Aldrich/Bulletin/al_techbull_al134.pdf) – Handling Air-Sensitive Reagents

[Sigma-Aldrich Technical Bulletin AL-164](https://www.sigmaaldrich.com/content/dam/sigma-aldrich/docs/Aldrich/Bulletin/al_techbull_al164.pdf) – Handling Pyrophoric Reagents

University of Minnesota, Environmental Health and Safety – “[Pyrophoric Chemicals Guide](https://www.google.com/url?client=internal-uds-cse&cx=000747455861485679472:bqyjqaw6sp8&q=http://www.me.umn.edu/intranet/safety/doc/Pyrophoric%2520Chemicals%2520Guide.docx&sa=U&ved=2ahUKEwjQirSIl6HkAhXoFjQIHbAhCnAQFjAAegQIAxAB&usg=AOvVaw0pnB6xupRki_lEz4dnLxKZ)”

UCLA, Environmental Health and Safety – [“Pyrophoric Liquid Safety Video”](https://www.youtube.com/watch?v=21iC4YEgOAs)

University of Mass Amherst – [SOP Pyrophoric Liquids and Solids](https://ehs.umass.edu/sites/default/files/Pyrophoric%20Liquids%20or%20Solids%20SOP.pdf)

[UCSD - Transferring Pyrophoric Chemicals Video](https://www.youtube.com/watch?v=WUHrzcEunNY&feature=youtu.be)

[UCSD - Working with Pyrophoric Reagents Video Part 1](https://www.youtube.com/watch?v=3_cBVfYVAC8&feature=youtu.be)

[UCSD - Working with Reactive Metals Video](https://www.youtube.com/watch?v=ozmddj0fIpk&feature=youtu.be)

1. **Training Requirements**
* OSU’s Comprehensive Laboratory Safety Training
* OSU’s Fire Extinguisher Training
* Review of aluminum alkyl SOP
* In-person handling training

**Documentation of Training** (signature of all users is required)

* Prior to conducting any work with aluminum alkyls designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide this SOP and a copy of the SDS (can be available online) available to all laboratory personnel.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training.

**Principal Investigator SOP Approval**

By signing and dating here the designee certifies that the Standard Operating Procedure (SOP) for *Aluminum Alkyls* is accurate and effectively provides standard operating procedures for laboratory personnel.

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Signature Printed Name/Title Date

I have read and understand the content of this SOP:

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| **Name** | **Signature** | **Date** |
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