Standard Operating Procedure

Aluminum chloride

*This is an SOP template and is not complete until: 1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and
3) SOP has been signed and dated by the PI and relevant lab personnel.*

 Print a copy and insert into your
*Laboratory Safety Manual* and *Chemical Hygiene Plan*.
Refer to instructions for assistance.

|  |  |
| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was written:** | Click here to enter a date. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Internal 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 ☒Hazardous Chemical ☐ Hazardous Class

**Purpose**

Aluminum chloride is a powerful Lewis acid that reacts violently with water. It can decompose violently at elevated temperatures and can hydrolyze in contact with moisture/water to produce toxic and corrosive fumes of hydrochloric acid. It may be harmful if ingested, inhaled, or absorbed through the skin. It causes burns by all exposure routes. Prolonged exposure may cause reproductive disorders and teratogenic effects.

Aluminum chloride is a highly versatile catalyst used in various syntheses and chemical reactions. It can be used as a catalyst in Friedel-Crafts reactions to prepare anthraquinone, which is used in the production of dyes. It is used in both acylations and alkylations to produce chemicals for detergents and ethylbenzene, a product used in the manufacture of polystyrene and styrene. It is also used in Gattermann-Koch reactions and isomerization and polymerization reactions of hydrocarbons. It has applications in metallurgy and in the manufacture of butyl rubber.

**Physical & Chemical Properties/Definition of Chemical Group**

CAS#: 7446-70-0

Class: **Corrosive, water reactive, toxic, teratogen, reproductive toxin**

Molecular Formula: AlCl3

Form (physical state): Solid

Color: Light yellow

Boiling point: 187.7 °C at 752 mmHg

**Potential Hazards/Toxicity**

Aluminum chloride is hygroscopic and may react violently with water. It can decompose violently at elevated temperatures or mixed with nitrobenzene. It hydrolyzes in contact with moisture/water producing toxic and corrosive fumes of hydrogen chloride. It may be harmful if ingested, inhaled, or absorbed through the skin. It causes burns by all exposure routes. Causes severe skin and eye burns with permanent damage. It is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. Symptoms of exposure include spasm, inflammation and edema of the larynx and bronchi, pneumonitis, pulmonary edema, burning sensation, coughing, wheezing, laryngitis, headache, nausea, vomiting, and diarrhea. Prolonged exposure may cause damage to lungs and reproductive disorders. Laboratory experiments have shown teratogenic effects.

**Personal Protective Equipment (PPE)**

**Respirator Protection**

Use a full-face particle respirator with type N100 (US) respirator cartridges.

Respirators should be used only under any of the following circumstances:

* As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
* When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
* Regulations require the use of a respirator.
* An employer requires the use of a respirator.
* There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
* As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by ORS and should contact occhealt@uga.edu. This is a UGA requirement described in more detail in the [UGA Respiratory Protection Plan](https://esd.uga.edu/sites/default/files/respiratoryprotection.pdf) and supported by the [Office of Research Occupational Health and Safety Program](https://research.uga.edu/ohsp/).

**Hand Protection**

Handle with gloves. Nitrile gloves are recommended.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with aluminum chloride.

Refer to glove selection chart from the links below:

<http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf>

OR

<http://www.allsafetyproducts.biz/page/74172>

OR

<http://www.showabestglove.com/site/default.aspx>

OR

<http://www.mapaglove.com/>

**Eye Protection**

ANSI approved, tight-fitting glasses/goggles. Face shields are recommended.

**Skin and Body Protection**

Flame-resistant lab coat preferably made of anti-static material, long pants, closed-toe shoes.

**Hygiene Measures**

Avoid contact with skin, eyes, and clothing. Wash hands before breaks and after handling.

**Engineering Controls**

Aluminum chloride should be used in a glove box.

**First Aid Procedures**

**If inhaled**

Move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

**In case of skin contact**

Flush with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician.

**In case of eye contact**

Flush eyes with plenty of water for at least 15 minutes lifting upper and lower eyelids and removing contact lenses. Consult a physician. Continue rinsing during transport to hospital.

**If swallowed**

Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**Special Handling and Storage Requirements**

**Precautions for safe handling:** Avoid contact with skin, eyes, and clothing. Avoid inhalation and ingestion. Avoid dust formation. Provide adequate ventilation. Handle under inert gas. Ensure normal measures for preventative fire protection.

**Conditions for safe storage:** Keep container tightly closed in a cool, dry, and well-ventilated area. Never allow contact with water. Store in corrosives area. Store under inert gas. Vent periodically. Do not store under direct sunlight. Heat can cause thermal decomposition. Handle and open with care. Avoid strong oxidizing agents, alcohols, phenols, ethylene oxide, oxygen difluoride, perchloryl fluoride, and nitrobenzene. Mixtures of nitrobenzene and aluminum chloride are thermally unstable and may lead to explosive decomposition above 90 °C.

**Spill and Accident Procedure**

**Chemical Spill Dial 911**

**24-7 On-Call Response to Research, Environment, Health or Safety Concerns Dial 2-5561 from a campus phone or 706-542-5561 from a non-campus line.**

**Spill** – Follow the procedures set out in the [UGA Chemical and Laboratory Safety Manual.](http://research.uga.edu/docs/units/safety/manuals/Chemical-Laboratory-Safety-Manual.pdf)

[If there are any chemical-specific protocols for responding to a spill, insert them here or mark “none”:]

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# **Medical Emergency Dial 911**

**Life Threatening Emergency, After Hours, Weekends And Holidays** – Dial **911** or the emergency phone numbers listed at the beginning of the UGA Chemical and Laboratory Safety Manual

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Non-Life Threatening Emergency** – Follow the instructions in the UGA Chemical and Laboratory Safety Manual.

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Decontamination/Waste Disposal Procedure**

**For general hazardous waste disposal procedures, see Appendix H of the UGA Chemical and Laboratory Safety Manual.**

**Chemical Specific Procedures: [to be inserted or marked as “none”]**

Wearing proper PPE, sweep up or shovel spills avoiding dust formation. Do not flush with water. Dispose of the used chemical and contaminated disposables as hazardous waste.

**Safety Data Sheet (SDS) Location**

UGA personnel can access Online SDS through a link in the upper left corner of the ESD home page (<https://esd.uga.edu>) and logging in by using their UGA email user name and password.

**Protocol/Procedure (Add lab specific Protocol/Procedure here)**

Click here to enter text.

**NOTE**

Any deviation from this SOP requires approval from PI.

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

* Prior to conducting any work with aluminum chloride, 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 his/her laboratory personnel with a copy of this SOP and access to the SDS provided by the manufacturer.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last 12 months.

I have read and understand the content of this SOP:

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