Standard Operating Procedure

Diethyl Zinc

*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 [x] Hazardous Chemical [ ]  Hazardous Class

**Purpose**

Diethyl Zinc is pyrophoric (air reactive), hygroscopic (moisture sensitive), heat sensitive and a highly water reactive chemical. It should therefore be handled under inert atmosphere. If not handled properly, this can pose a serious threat to the health and safety of laboratory personnel, emergency responders and chemical waste handlers. This SOP helps to understand how to properly store, handle and dispose of Diethyl Zinc.

Diethyl Zinc is used in organic synthesis as a source of the ethyl synthon in addition reactions to carbonyl groups. Because of its high reactivity toward air, it was used in small quantities as a hypergolic or "self igniting" liquid rocket fuel -- it ignites on contact with oxidizer, so the rocket motor need only contain a pump, without a spark source for ignition. In microelectronics, diethyl zinc is used as a doping agent.

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

CAS#: 557-20-0

Class: **Pyrophoric**

Molecular Formula: C4H10Zn

Form (physical state): Liquid

Color: Colorless

Boiling point: 117 °C (243 °F) - lit.

**Potential Hazards/Toxicity**

**Emergency Overview**

* Pyrophoric liquid that decomposes violently in water
* Fumes may cause Zinc Fume Fever (ZnFF) and a hypothermic reaction

**OSHA Hazards**

Flammable liquid, Pyrophoric, Corrosive

***Pictogram***



**Potential Health Effects**

**Inhalation** May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

**Skin** May be harmful if absorbed through skin. Causes skin burns.

**Eyes** Causes eye burns.

**Ingestion** May be harmful if swallowed.

**Signs and Symptoms of Exposure**

Cough, Shortness of breath, Headache and Nausea

**Personal Protective Equipment (PPE)**

**Respiratory Protection**

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

**Note:** Self-Contained Breathing Apparatus - SCBA must be used during spill / emergency response.

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**

Please use the glove box gloves and sleeves or if this chemical is handled in a closed system in a certified fume hood use appropriate chemical resistant gloves.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with Diethyl Zinc

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**

Safety goggles & face shield.

**Skin and Body Protection**

Fire/flame resistant lab coat (100% cotton based). Cotton based clothing/attire. Full length pants or equivalent. Close toed shoes (safety shoes)

 **Hygiene Measures**

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

**Engineering Controls**

Diethyl Zinc should be used in a glove box filled with inert gas, or in a closed system in a certified fume hood.

**First Aid Procedures**

**Note:** Prompt medical attention is required in all cases of exposure to Diethyl zinc and its by-products.

Rescue personnel should be equipped with appropriate protective equipment (e.g. Self-Contained

Breathing Apparatus - SCBA) to prevent unnecessary exposure and must be aware of the fire and explosion potential of Diethyl zinc.

**If inhaled**

May cause Zinc Fume Fever (ZnFF). Move exposed personnel to an uncontaminated area quickly using Self-Contained Breathing Apparatus - SCBA. If breathing is difficult, give oxygen. If breathing has stopped, apply artificial respiration. Medical assistance should be sought immediately. Keep victim warm and quiet.

**In case of skin contact**

Contact may cause severe burns. Fumes may cause irritation.

Immediately flush affected areas with large quantities of water.

Remove affected clothing as rapidly as possible only if not stuck to skin.

**In case of eye contact**

Contact may cause severe burns. Fumes may cause irritation.

Persons with potential exposure to Diethyl zinc should not wear contact lenses. Flush contaminated eyes with large quantities of water for at least 15 minutes. Hold eyelids open to ensure complete flushing.

**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 inhalation of vapor or mist.
* Keep away from sources of ignition.
* Take measures to prevent the build-up of electrostatic charge.
* To be handled always in a glove box or under inert atmosphere.

**Conditions for safe storage**

* Keep container tightly closed in a dry and well-ventilated place.
* Store under an inert atmosphere.
* Dry nitrogen is a suitable inert gas. **Note:** Dry nitrogen containing less than 5 ppm oxygen and less than 5 ppm of moisture is recommended.
* 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.
* Air sensitive.

**Chemical stability**

Stable under recommended storage conditions.

**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”]**

All dry hazardous waste must be double bagged (*use only see through/transparent bags*) and affixed with an on-line waste tag.

On the on-line waste tag for the dry waste generated from Diethyl zinc;

In the contents section, mention as Dry Waste            99%

                                                      Diethyl zinc 1%

                                                      Type: Solid

 **Note:** This is just an example of the waste composition in %

**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 Diethyl Zinc., 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.

**Principal Investigator SOP Approval**

Print name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Approval Date:

I have read and understand the content of this SOP:

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| --- | --- | --- |
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