Standard Operating Procedure

Cadmium Cyanide

*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**

Cadmium cyanide is an acute and chronic toxin. Contains cadmium, which is carcinogenic dependent on duration and exposure level. Very harmful if inhaled, swallowed or in contact with the skin or eyes. Can also be fatal if inhaled or ingested. Exposure can cause damage to the respiratory tract, kidneys, liver, and central nervous system.

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

CAS#: 542-83-6

Class: **Toxic, carcinogenic**

Molecular Formula: Cd(CN)2

Form (physical state): Powder

Color: White

Boiling point: 24.7oC

**Potential Hazards/Toxicity**

Cadmium is an acute toxin. Harmful if inhaled, ingested, or in contact with the skin. Cadmium cyanide has an LD50 oral toxicity of 16 mg/kg [Rat]. Cadmium is most efficiently absorbed through the respiratory tract, and may produce some irritation, cough, headache, or metallic taste. Severe exposures can produce shortness of breath, chest pain, and flu-like symptoms noting that inhalation symptoms can be delayed for up to 24 hours. Severe inhalation and ingestion can result in pulmonary edema, liver and kidney damage and death. Redness and pain can result from skin contact.

Cadmium is a known **carcinogen** and imposes a possible risk of impaired fertility and harm to unborn child.

Minor but repeated exposure may result in chronic health and cumulative poisoning effects such as bone softening, increased blood pressure, kidney damage, anemia, pulmonary fibrosis, emphysema, and loss of smell. Cadmium is a cancer hazard, with increased prostate and lung cancer. **Cadmium has a permissible exposure limit (PEL) of 5 ug/m3.** NOTE: People with pre-existing skin or eye conditions or blood, prostate, liver, kidney or respiratory problems may be more sensitive to cadmium. Cadmium cyanide has a threshold limit value - time weighted average (TWA) of **10 ug/m3.**

Cadmium is very toxic to aquatic organisms and long-term effects in aquatic environments. Do not expose to the environment, do not empty into drains.

**Risks of cyanide exposure:** Causes irritation to the eye. Contact with skin causes irritation and burns, and concentrated HCN vapor can be absorbed through skin. Can be fatal if swallowed and cause tissue anoxia, characterized by weakness, headache, dizziness, confusion, cyanosis (bluish skin due to deficient oxygenation of the blood), weak and irregular heartbeat, collapse, unconsciousness, convulsions, coma and death. Inhalation of high concentrations may cause central nervous system effects and can be fatal Prolonged/repeated contact may cause skin necrosis and ulceration of the skin. Cyanide acts by inhibiting cytochrome oxidase impairing cellular respiration. Chronic exposure to cyanide solutions may lead to "cyanide" rash with itching and vesicular eruptions with secondary infection. Small amounts of cyanide over long periods of time causes loss of appetite, headache, weakness, and respiratory irritation.

**Personal Protective Equipment (PPE)**

**Respirator Protection**

When using cadmium cyanide, or cadmium compounds, a dust respirator is suggested.

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**

Gloves must be worn, nitrile gloves are recommended.

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

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 properly fitting safety glasses or chemical splash goggles. Face shields are also recommended

**Skin and Body Protection**

Flame resistant lab coats must be worn and be appropriately sized for the individual and buttoned to their full length. Laboratory coat sleeves must be of sufficient length to prevent skin exposure while wearing gloves. Full length pants and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area. The area of skin between the shoe and ankle should not be exposed.

**Hygiene Measures**

Wash thoroughly and immediately after handling. Remove contaminated clothing and wash before reuse.

**Engineering Controls**

Handle using a chemical fume hood with good ventilation and electrically grounded lines and equipment.

**First Aid Procedures**

**If inhaled**

Move into the fresh air immediately and give oxygen. If not breathing give artificial respiration. Get medical attention immediately.

**In case of skin contact**

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**In case of eye contact**

Check for and remove any contact lenses. Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Seek immediate medical attention and continue eye rinse during transport to hospital.

**If swallowed**

Do NOT induce vomiting unless directed by medical personnel. Never give anything by mouth to an unconscious person. Seek medical attention immediately.

**Special Handling and Storage Requirements**

To keep contamination to a minimum, all work with cadmium should be done in a properly designated area with secondary containment and proper labeling. Wash hands thoroughly after handling. Minimize the generation and accumulation of dust. Avoid contact with eyes, skin, and clothing. Keep containers tightly closed. Store in a cool, dry and well-ventilated area away from incompatible substances.

**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”]**

Using proper personal protective equipment as outlined above, decontaminate equipment and bench tops using soap and water and properly dispose of all cadmium 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 Cadmium cyanide, 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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