

## LAB SPECIFIC OPERATING PROCEDURE (LSOP) for Hydrazine

Principal Investigator (PI):

Building:

Lab(s) Covered by LSOP:

Department:

Lab Phone Number(s):

### SECTION 1. PHYSICAL & CHEMICAL PROPERTIES

Formula : H4N2 Molecular weight : 32.05 g/mol CAS-No. : 302-01-2 EC-No. : 206-114-9 Index-No. : 007-008-00-3

a) Appearance Form: liquid, clear Colour: colorless b) Odor Ammonia odor c) Odor Threshold No data available d) pH No data available e) Melting point/freezing point 1.4 °C (34.5 °F) f) Initial boiling point and boiling range 113.5 °C (236.3 °F) at 1,013 hPa (760 mmHg) g) Flash point 52 °C (126 °F) - closed cup h) Evaporation rate No data available i) Flammability (solid, gas) No data available j) Upper/lower flammability or explosive limits Upper explosion limit: 99.99 %(V) Lower explosion limit: 4.7 %(V) k) Vapor pressure 13 hPa (10 mmHg) at 30.70 °C (87.26 °F) l) Vapor density 1.11 - (Air = 1.0)

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Hydrazine) NTP: RAHC - Reasonably anticipated to be a human carcinogen The reference note has been added by TD based on the background information of the NTP. (Hydrazine)

DOT (US) UN number: 2029 Class: **8 (3, 6.1) Packing group: I** Proper shipping name: Hydrazine, anhydrous Reportable Quantity (RQ): 1 lbs. Poison Inhalation Hazard: No


### SECTION 2. EXPOSURE CONTROL PARAMETERS

Hydrazine 302-01-2 TWA 0.010000 ppm

USA. ACGIH Threshold Limit Values (TLV) Remarks Upper Respiratory Tract cancer Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption TWA 0.01 ppm

USA. ACGIH Threshold Limit Values (TLV) Upper Respiratory Tract cancer Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption TWA 1.000000 ppm 1.300000 mg/m3 USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants Skin designation The value in mg/m3 is approximate. C 0.030000 ppm 0.040000 mg/m3 USA. NIOSH Recommended Exposure Limits

### SECTION 3. OSHA's (GHS)-SDS INFORMATION

Chemical Name	GHS Pictogram(s)	Generic Chemical Definition
Hydrazine		<p>Hydrazine is an <a href="#">inorganic compound</a> with the <a href="#">chemical formula</a> N<sub>2</sub>H<sub>4</sub> (also Written H<sub>2</sub>NNH<sub>2</sub>) It is a colorless flammable liquid with an <a href="#">ammonia</a>-like odor.</p> <p>Hydrazine is highly toxic and dangerously unstable unless handled in solution. As of 2015, the world hydrazine hydrate market amounted to \$350 million. <sup>[8]</sup></p> <p>Hydrazine is mainly used as a <a href="#">foaming agent</a> in preparing <a href="#">polymer foams</a>, but significant applications also include its uses as a <a href="#">precursor</a> to <a href="#">polymerization</a> catalysts, <a href="#">pharmaceuticals</a>, and agrochemicals. About two million tons of hydrazine hydrate were used in foam blowing agents in 2015. Additionally, hydrazine is used in various <a href="#">rocket fuels</a> and to prepare the gas precursors used in <a href="#">air bags</a>.</p> <p>Hydrazine is used within both nuclear and conventional electrical <a href="#">power plant</a></p>

		<p>steam cycles as an oxygen scavenger to control concentrations of dissolved oxygen in an effort to reduce corrosion.</p> <p><b>Hydrazines</b> refer to a class of organic substances derived by replacing one or more hydrogen atoms in hydrazine by an organic group.<sup>[9]</sup></p>
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**OSHA's GHS Signal Word is (DANGER)**

## SECTION 4. GHS HAZARD (H) CODES and PRECAUTIONARY STATEMENT (P) CODES

### (H)/Hazard Statement (s)

- Acute toxicity
- Acute aquatic toxicity
- Aquatic chronic toxicity
- Carcinogenicity
- Serious eye damage
- Flammable liquids
- H226 Flammable liquid and vapor.
- H301 Toxic if swallowed.
- H301 + H311 + H331 Toxic if swallowed, in contact with skin or if inhaled.
- H311 Toxic in contact with skin.
- H314 Causes severe skin burns and eye damage.
- H317 May cause an allergic skin reaction.
- H318 Causes serious eye damage.
- H330 Fatal if inhaled.

H226 Flammable liquid and vapor

H301 + H311 Toxic if swallowed or in contact with skin

H314 Causes severe skin burns and eye damage.

H330 Fatal if inhaled.

H350 May cause cancer.

H410 Very toxic to aquatic life with long lasting effects.

### (P)/Precautionary Statement (s)

P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment

P242 Use only non-sparking tools.

P240 Ground/bond container and receiving equipment

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P243 Take precautionary measures against static discharge.

## SECTION 5. ADMINISTRATIVE CONTROLS

1.	Lab-specific safety training must be provided by the principal investigator (PI) or other qualified personnel to all researchers working with <b>Hydrazine</b> .
2.	The PI must perform a Workplace Hazard Assessment (WHA) form for Laboratories at, <a href="http://research.uhc.edu/wp-content/uploads/sites/1137/2015/09/workplace_hazard_assessment.pdf">http://research.uhc.edu/wp-content/uploads/sites/1137/2015/09/workplace_hazard_assessment.pdf</a>
3.	Researchers must <b>not work alone</b> with <b>Hydrazine</b> . Please note that UCONN Health/Storrs has a <b>Working Alone Policy</b> , found at <a href="http://content.research.uconn.edu/pdf/uch/rccs/ehs/policy-workingalone2017.pdf">http://content.research.uconn.edu/pdf/uch/rccs/ehs/policy-workingalone2017.pdf</a>
4.	Documentation of training is required and satisfied upon review and sign-off of this LSOP and submission to EH&S for approval.

5.	In addition to reviewing this document, you must review the Safety Data Sheet (SDS) for <b>Hydrazine</b> prior to use, and instruct your employees.
6.	Whenever possible, find <b>safer substitutes or reduce</b> the quantities of <b>Hydrazine</b> .
7.	Experiments should be performed <b>during normal business hours</b> (e.g.) 8:00 am-5:00 pm Mon-Fri) if possible.
8.	Multiple transfers of small volumes/quantities of <b>Hydrazine</b> are preferred over a single transfer of larger volumes/quantities.
9.	Any handling of <b>Hydrazine</b> requires supervision from the Lab supervisor, PI or other experience employee.

## SECTION 6. ENGINEERING CONTROLS

10.	Appropriate engineering controls-avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Wear the appropriate level of PPE per this document
11.	Chemical fume hoods must be running at over 90 linear feet/minute and tested by EH&S within the last year.
12.	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.
13.	Ensure that eyewash stations and safety showers are proximal to the workstation location and tested accordingly.
14.	EH&S certifies flow rates of fume hoods for UCONN Health, contact EH&S at 860-679-2723 for re-test.
15.	If the hood is not working properly, contact Facilities to repair the hood at 860-679-2125.
16.	Work with <b>Hydrazine</b> – the work must only be conducted in a <b>suitable/rated fume hood</b> .
17.	Sash height must be kept as low as possible to avoid escaping fumes and provide a physical barrier.

## SECTION 7. PERSONAL PROTECTIVE EQUIPMENT *(At a minimum, follow these PPE guidelines)*

### Eye and Face Protection

In case of eye contact-rinse thoroughly with plenty of water using an eyewash station for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses if possible.

18.	ANSI Z87.1-compliant safety glasses with side shields, or chemical splash goggles.
19.	Ordinary prescription glasses will NOT provide adequate protection unless they also meet ANSI standard and have compliant side shields.

### Skin and Body Protection

In case of skin contact If skin contact occurs, and/or skin or clothing are on fire, immediately remove all clothing and drench in the safety shower with copious amounts of water for no less than 15 minutes to remove any remaining contaminants. If possible to do so without further injury, remove any remaining jewelry or clothing.

20.	Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
21.	Full contact Material: butyl-rubber Minimum layer thickness: 0.3 mm Break through time: 480 min Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)
22.	Splash contact Material: Nitrile rubber Minimum layer thickness: 0.11 mm Break through time: 30 min Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)
23.	Body Protection-Complete suit protecting against chemicals, <b>Flame retardant antistatic protective clothing</b> . The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
24.	Long pants, closed-toe/closed-heel shoes, covered legs, and ankles.

## SECTION 8. SPECIAL HANDLING & STORAGE REQUIREMENTS

### Conditions for safe handling

25.	Precautions for safe handling of <b>Hydrazine</b> is to avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build-up of electrostatic charge.
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26.	Conditions for safe storage, including any incompatibilities of <b>Hydrazine</b> is to keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
27.	Eliminate or substitute for a less hazardous material when possible.
28.	Design your experiment to use the least amount of material possible to achieve the desired result.
29.	Do not exceed the scale of procedures specified in Protocol/Procedure section without approval of the PI.
30.	Verify your experimental set-up and procedure prior to use.
31.	Know the location of the nearest eyewash, safety shower and fire extinguisher before beginning work.
32.	Upon leaving the work area, remove any personal protective equipment worn and wash hands.
33.	At the end of each project, thoroughly decontaminate the work area according to the material being handled.

### Conditions for safe storage

34.	Conditions for safe storage, including any incompatibilities Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
35.	Storage class (TRGS 510): Flammable liquids

## SECTION 9. SPILLS, ACCIDENTS & EMERGENCY PROCEDURES

36.	<b>Call 911 or 7777</b> from landline if <b>Life Threatening</b> and call EH&S at <b>860-679-2723 for Non-Life Threatening</b> Spill Coordination efforts.
37.	Evacuate the laboratory and inform others in the immediate area to leave the work area. Evacuate the laboratory calmly yet safely, and rally at the <b>Emergency Assembly Area (EAA)</b> as designated by the Fire Department
38.	The <b>(EAA)</b> is a pre-determined safe zone for employees to meet during an emergency.
39.	Upon evacuation, also try to <b>minimize damage; isolate/contain</b> if able. (e.g.) open hoods to accelerate dissipation in air, hit HVAC purge button to increase laboratory air changes, disconnect electrical sources etc.
40.	Upon Evacuation, close door(s) to lab and post a <b>“NO ENTRY”</b> sign(s) or other warning information on the door.
41.	The <b>Emergency Evacuation Attendants (EEA)</b> are those who have been assigned take roll call of employees and report to the <b>Emergency Evacuation Coordinator (EEC)</b>
42.	No one shall be permitted to leave the <b>Emergency Assembly Area (EAA)</b> until the scene has been determined safe for re-entry by the On-Scene <b>Emergency Coordinator (EC)</b> -Senior Fire Department Official.
43.	<b>Do not re-enter</b> the lab/area until instructed to do so by the On-Scene <b>Emergency Coordinator (EC)</b> -Senior Fire Department Official.
44.	Should the <b>Emergency Assembly Area (EAA)</b> be compromised, <b>evacuees will be instructed by Emergency Evacuation Attendants (EEA’s) or the Emergency Evacuation Coordinator (EEC) to re-locate to a secondary Emergency Assembly Area (SEAA)</b>
45.	EH&S recommends that individual labs discuss emergency response and readiness at their laboratory meetings and practice drill. EH&S can aid in this effort along with Public Safety.
46.	Report Spills, accidents which are also deemed non-life threatening or non-emergency situations to your respective PI/Supervisor and EH&S.

## SECTION 10. FIRST AID PROCEDURES *(Have your SDS Available for First Responders)*

<b>First Aid- Eyes</b>	<ol style="list-style-type: none"> <li>1. Remove contact lenses (if applicable)</li> <li>2. Forcibly hold eyelids open and flush eyes under eyewash for 15 minutes</li> <li>3. If pain persists after 15 minutes, dial <b>911</b></li> <li>4. Keep flushing eyes until emergency personnel arrives</li> <li>5. Report incident to PI/Supervisor and EH&amp;S.</li> </ol>
<b>First Aid- Skin</b>	<ol style="list-style-type: none"> <li>1. Remove contaminated clothing (if applicable)</li> <li>2. Flush affected area(s) under safety shower for 15 minutes</li> <li>3. If pain persists after 15 minutes, dial <b>911</b></li> <li>4. Keep rinsing affected area until emergency personnel arrives</li> <li>5. Report incident to PI/Supervisor and EH&amp;S.</li> <li>6. Needle stick/puncture exposure-wash the affected area with antiseptic soap/warm water for 15 minutes.</li> </ol>

<b>First Aid- Inhalation</b>	<ol style="list-style-type: none"> <li>1. Move to fresh air</li> <li>2. Dial <b>911</b></li> <li>3. Report incident to PI/Supervisor and EH&amp;S.</li> </ol>
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**SECTION 11. HAZARDOUS WASTE MANAGEMENT-(GENERAL)**

48.	All hazardous wastes must be labeled with “Hazardous Waste” stickers or tags, use full chemical names to describe the waste (i.e. no chemical abbreviations or symbols), have 100% of the constituents by volume identified and be stored in containers with tight-fitting caps or lids, and be segregated by chemical compatibility.
49.	Hazardous wastes must be stored at or near a green (S.A.A.) aka “Satellite Accumulation Area” sign prior to disposal by EH&S.
50.	Hazardous wastes must accumulate under the control of the generator, with a container maintained in good condition, free of exterior residues on container or in the spill tray. All spills and residues must be immediately cleaned up.
51.	Hazardous wastes must be transferred within a chemical fume hood but then be removed for temporary storage with the generator’s respective (SAA). When chemical waste is being transferred is the only time that it may remain open. Closed, means that no liquid will spill from a waste collection container, should the container be knocked over/inverted.
52.	All <b>Hydrazine</b> solutions and contaminated solids will be collected and characterized by EH&S as chemical hazardous waste

**SECTION 12. SPECIFIC PROCEDURE *(left blank intentionally; please see & follow instructions)***

*(Document the Experiment Information with regard to use of Hydrazine, too include the procedures for disposal of the waste and the selection and application of correct PPE)*

**Instructions As Follows:** \_\_\_\_\_  
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**SECTION 13. APPROVAL**

I have reviewed, understand and agree to follow this LSOP regarding **Hydrazine** liquids and solids. Failure to follow the LSOP and lab-specific training guidelines for research with **Hydrazine** is a violation of the [University Health & Safety Policy](#) and [University Code of Conduct](#). Further approval from the PI is required if any of the following events occur:

- A change in the agreed-upon experimental set-up is planned
- Signs of a failure in safety design or equipment are observed
- Signs or symptoms of a chemical exposure to any personnel are observed
- Unexpected and/or potentially dangerous experimental results occur (e.g., fire, uncontrolled buildup of heat and/or pressure, etc.)

**PLEASE ENSURE THAT THIS LSOP AND THE SDS ARE REVIEWED, TRAINED UPON AND UNDERSTOOD BY END USERS. THIS FORM IS DESIGNED TO NOT ONLY PROVIDE UCONN HEALTH WITH RISK MITIGATION BUT FOR THE PRINCIPAL INVESTIGATOR AS WELL. PLEASE SEND A COPY OF THE COMPLETED LSOP TO EH&S FOR REVIEW AND APPROVAL. EH&S APPRECIATES YOUR COOPERATION WITH THIS MATTER.**

Researcher Signature	Date	Trainer Signature	Training Date


**SECTION 14. PRINCIPAL INVESTIGATOR CERTIFICATION**

I approve the contents of the lab-specific standard operating procedure listed above:

**PI Signature:**

**Date:**

**Date sent to EH&S for Review and Approval:**

**Date:**