



UNIVERSITY OF
ARKANSAS.

Facilities Management
Environmental Health & Safety

STANDARD OPERATING PROCEDURE

Acrolein

Department	
Principal Investigator	
Office Phone	
Office Location	
Laboratory Manager	
Lab Phone	
Locations covered by this SOP	
Research Start Date	
Expected Length of Research (months)	
Date SOP was Written	
SOP Version Number	
Date of Latest Revision	
Sections Revised/Modified	

This SOP is not complete until all fields are complete and it has been signed and dated by the PI, all relevant lab personnel, an EH&S representative, and all appropriate committees.

This SOP is meant to be an extension and companion to the University's Chemical Hygiene Plan (CHP) and the relevant laboratory's Laboratory Safety Manual.

SCOPE

The purpose of this Standard Operating Procedure (SOP) is to describe the standard procedures to be followed for the safe use of the particularly hazardous substance Acrolein under the Institutional Animal Care and Use Committee Protocol (IACUC) [Insert Protocol #](#)

INTRODUCTION

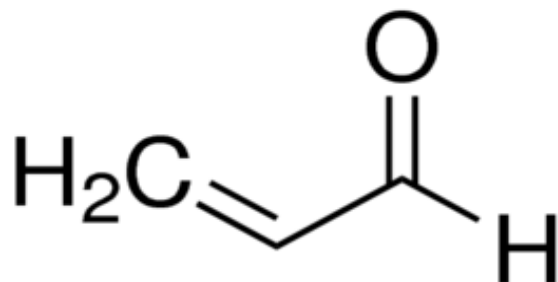
Acrolein is a highly flammable liquid, acutely toxic by oral ingestion, inhalation, and skin absorption. It is also corrosive, a suspect carcinogen, and a reproductive toxin. Acrolein is fatal if swallowed or inhaled; and if in contact with skin or eyes, Acrolein causes severe skin burns and eye damage. Symptoms of exposure are cough, shortness of breath, headache, and nausea.

RESPONSIBILITIES

It is the responsibility of the research project's Principal Investigator (PI) in coordination with the Laboratory Manager (as appropriate) to ensure the project is properly equipped and procedures are correctly followed during the course of work with this chemical. Personnel are responsible for reading and understanding information regarding proper use of equipment and procedures prior to participation in the project and obtaining the appropriate training. Additionally, the PI will review and annually update the SOP through the end of the research project.

PHYSICAL AND CHEMICAL PROPERTIES

Chemical Structure



Molecular Formula: C₃H₄O

Synonym(s): 2-Propenal

CAS# : 107-02-8

Physical State: Liquid

Appearance: clear, colorless to yellow liquid

Odor: burnt, sweet, pungent and may be smelled at 0.25ppm

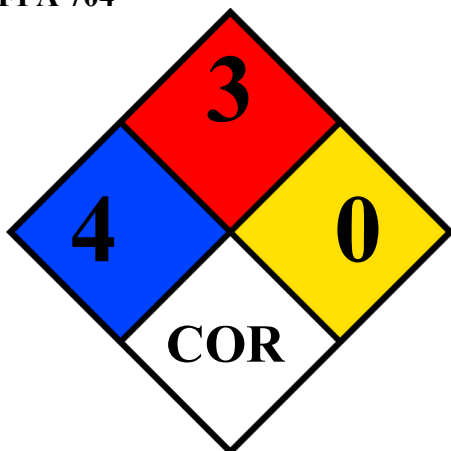
pH: 6 at 100 g/L at 25°C (77°F)

Melting Point/Boiling Point: -87°C (-125°F) / 53°C (127°F)

Special Hazards from Substance or Mixture: No data available

HAZARDS/TOXICOLOGY

NFPA 704



GHS Pictogram(s)



GHS Signal Word: Danger

Category/Classification: Aquatic toxin, Carcinogen, Corrosive, Toxin, Flammable liquid

Toxicology: OSHA TWA 0.1 ppm (0.3ppm STEL)

LD50 Oral – Rat – 26 mg/kg

LD50 Inhalation – Rat – 4 h – 18 mg/m³

LD50 Dermal – Rabbit – 200 mg/kg

LC50 – *Lepomis macrochirus* (Bluegill) – 0.08 – 0.12 mg/L – 96 h

IC50 – Algae – 0.05 mg/L – 72 h

Stability/Reactivity: Stable under recommended storage conditions with water and hydroquinone as stabilizers. Vapors may form explosive mixture with air. Avoid heat, flames, and sparks. May polymerize and release heat. Capable of forming peroxides.

Incompatible Materials: Oxidizing agents, Oxygen, Bases, Strong Acids, Metal salts, Amines, Combustibles

EXPOSURE LIMITS, DETECTION, SIGNS, AND SYMPTOMS

The Occupational Safety and Health Administration permissible exposure limit (PEL) is 0.1 parts per million (ppm) as an 8-hour time weighted average (TWA). The 15-minute, TWA short-term exposure limit (STEL) is 0.3 ppm.

Acrolein is a clear, colorless to yellow liquid with a burnt, sweet, pungent odor. Most people begin to smell Acrolein in air at concentrations of 0.25 parts per million parts of air (ppm). If suspect odor is detected during Acrolein use exposures are most likely above the PELs and appropriate action must be taken.

Among the symptoms are severe irritation of the mucous membranes, burning of the throat, cough, difficulty breathing, tightness in the chest, nausea, vomiting and diarrhea, pulmonary edema, high blood pressure, and unconsciousness. Death is also possible from exposures to concentrations greater than 10 ppm.

ENGINEERING CONTROLS

Local Exhaust

Fume Hood

Location in lab:

Glove Box

Location in lab:

Biosafety Cabinet

Location in lab:

Clean Bench

Other:

Perform ALL work with Acrolein in a certified ducted chemical fume hood or other approved exhausted containment system. Inspect hood to ensure it is functioning properly prior to beginning work. Ensure the hood projected for use has a current certification and call EH&S (479-575-5448) if there are any issues or concerns.

Keep all items 6 inches back from the front edge of the hood to avoid blocking the airflow path and keep slot openings at the back of the hood free from blockage with large objects or numerous containers. If absolutely necessary to place large objects in the hood, elevate the objects 2 inches off the floor of the hood so air can pass under the object and out the back slots in the hood.

ADMINISTRATIVE CONTROLS

This SOP, the relevant manufacturer specific SDS (Appendix B), and any other pertinent documentation must be reviewed before the chemical(s) is used.

All policies, procedures, and recommendations in the University Chemical Hygiene Plan (CHP) must be followed in addition to this SOP as this document is considered an extension of the CHP.

TRAINING

Everyone working under the subject protocol, or having access to the laboratory during the protocol, should be trained on the CHP, this SOP and associated information (See Appendix A)

SPECIFIC LABORATORY PROCEDURES AND PRACTICES

Weighing, preparation and use

- 1) For weighing or use, transport Acrolein from the storage area to the chemical fume hood in a labeled, sealed non-breakable secondary container. Always remove Acrolein from its secondary container in a chemical fume hood in order to safely vent any accumulated vapor.
- 2) Perform all weighing and preparation of Acrolein solutions over plastic-backed absorbent pads in a chemical fume hood. Dispose of pads immediately upon contamination and after completion of tasks IAW with Appendix C.
- 3) Wear butyl gloves for all procedures involving preparation and handling of Acrolein.
- 4) Change gloves after each use, or immediately when torn, punctured, or contaminated and dispose appropriately. Wash hands thoroughly.
- 5) Do not work with Acrolein near sources of flame or ignition.
- 6) If applicable, a sharps container specifically for Acrolein will be in the immediate vicinity for safe sharps disposal.

- 7) Place all contaminated disposable items in a separate Acrolein hazardous waste bag or container before disposal.
- 8) Re-usable utensils, glassware, and other surfaces contaminated with Acrolein must be decontaminated at the end of the laboratory work session. Complete this inside a fume hood before removing any of the items. Dispose of all Acrolein contaminated waste as hazardous.
- 9) Clean all contaminated surfaces with soap and water or equivalent agent, then rinse and dry. Dispose materials as hazardous waste.
- 10) Use in areas free of ignition sources. When work completed, remove/dispose gloves and wash hands with soap and water.
- 11) Acrolein should only be handled in a fully functioning fume hood. Care should be taken to keep Acrolein vapors inside the fume hood to prevent the buildup of highly flammable vapors outside the hood
- 12) Know the location of the nearest fire extinguisher, eyewash, and safety shower before beginning work.
- 13) Never work alone. Make sure there is another worker present who is also trained in the Acrolein SOP.
- 14) Clean all areas where Acrolein is used with soap and water following each use. Collect waste material in absorbent material and properly label and store for disposal.

Administering

PERSONAL PROTECTIVE EQUIPMENT

All personal protective equipment (PPE) recommended here is considered in addition to that outlined in the CHP. Relevant links to help determine the appropriate PPE can be found at the EH&S website (www.enhs.uark.edu).

Body

- Lab Coat
- Flame Resistant Lab Coat
- Barrier Lab Coat
- Splash Apron
- Shoe Cover
- Other:

Gloves

- Latex
- Nitrile
- Butyl Rubber (thickness: 0.3 mm)
- Neoprene
- Silver Shield
- Cold Weather
- Double Gloves
- Other:

Eyes

- Safety Glasses/Goggles
- Face Shield
- Other:

Respiratory

- None needed
- N-95 Respirator
- Half-Face Respirator
- Full-Face Respirator (Cartridge: multi-purpose combination)
- SCBA
- Tethered

A respirator is not required when the PEL will not be reached. Respirators should only be used when all other controls are not sufficient or when regulations specifically require their use. If a PEL does not exist, respirators can be used to prevent harmful exposure from air contaminants. If a potential exposure hazard cannot be eliminated, please contact the EH&S Respiratory Protection Program administrator (479-575-5448) to discuss respiratory protection or to enroll in the program. Program enrollment includes medical evaluation, training and fit testing for an appropriate respirator IAW Occupational Safety and Health Administration (OSHA) Respiratory Protection Standard (29 CFR 1910.134).

All personnel using a respirator must be trained, fit-tested, and signed-off for use by an EH&S representative.

Hygiene

Avoid contact with eyes, skin, and clothing. Wash hands before each break and before leaving the laboratory or other designated area.

Environmental

Take precautions to prevent all spills and/or releases. Do not let product enter drains.

EMERGENCY PROCEDURES

Phone Numbers

Emergency: 911

EH&S: 479-575-5448

UAPD: 479-575-2222

Pat Walker Health Center: 479-575-4451

In an emergency, call 911.

Fire

In the case of a fire, call 911. Pull the nearest fire alarm and alert others in the area to evacuate. Stay in a safe location near the scene and be available when emergency responders arrive to provide information about the incident and answer questions. Once you are in a safe location, notify your supervisor and the EH&S department immediately. Tell them the chemical(s) detailed in this SOP are involved in a fire.

Medical

For non-emergency medical care contact Pat Walker Health Center or your personal physician. For emergencies, call 911. Avoid further contamination while assisting victim.

Exposure

- Inhalation: Move into a fresh air location. Consult a physician.
- Ingestion: Do NOT induce vomiting. Rinse mouth with water. Consult a physician.
- Injection: For sharps injury (needle stick or subcutaneous exposure), scrub exposed area thoroughly using warm water and antiseptic soap for 15 minutes and consult a physician.
- Eye Contact: Rinse with plenty of water for at least 15 minutes in an emergency eyewash station. Consult a physician. Continuing rinsing eyes during transport to hospital.
- Skin Contact: Remove any contaminated clothing. Wash with plenty of water for at least 15 minutes in an emergency shower station. Consult a physician. Take victim to hospital immediately.

Spills

Once you are in a safe location, notify your supervisor and the EH&S department immediately. Tell them the chemical(s) detailed in this SOP are involved in a spill. Spills must be cleaned up immediately by properly protected and trained personnel. All other persons should leave the area. Clean up spills using the content of the on-site spill kit. Do not attempt to clean up any spill if not trained or comfortable. If the spill is out of control or a person is injured, exposed, or suspected of being exposed, call 911 immediately then notify your supervisor and EH&S.

Spills Inside Fume Hood

- 1) If the spill is in a fume hood, close the sash and secure the area.
- 2) Notify your supervisor and EH&S.
- 3) Adhere to all required PPE detailed in this SOP.
- 4) Wipe up spilled liquids with absorbent pads.
- 5) Clean area thoroughly with soap and water or an equivalent agent. Rinse and dry.
- 6) Double bag all waste in plastic bags labeled with a Hazardous Waste label from EH&S. Keep waste away from incompatible materials. Submit a pick-up request on the EH&S website (www.enhs.uark.edu) for a hazardous waste pick-up.

Spills Outside Fume Hood

- 1) If there is a risk of fire and/or exposure, evacuate the room and pull the nearest fire alarm and alert others in the area to evacuate. Stay in a safe location near the scene and be available when emergency responders arrive to provide information about the incident and answer questions. Once you are in a safe location, notify your supervisor and the EH&S department immediately. Tell them the chemical(s) detailed in this SOP are involved in a large spill.
- 2) If there is no risk for fire or exposure, evacuate the room and secure the area. Immediately notify EH&S and your supervisor. Tell them the chemical(s) detailed in this SOP are involved in a large spill. Stay in a safe location near the scene and be available when EH&S arrives to provide information about the incident and answer questions.
- 3) Complete all incident reporting as appropriate.

Special Instructions

Acrolein is a “P-listed” chemical requiring special disposal considerations and any waste where Acrolein is the sole ingredient must be segregated and appropriately disposed.

SPECIAL HANDLING AND STORAGE REQUIREMENTS

Precautions for safe handling: Do not over purchase; only purchase what can be safely stored in the laboratory. Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Use explosion-proof equipment. Keep away from sources of ignition. Take measures to prevent the build up of electrostatic charge. Check for peroxides periodically. Metal containers involving the transfer of Acrolein should be bonded and grounded. Only use in designated area. Do not transport or ship Acrolein before contacting EH&S for arrangements.

Conditions for safe storage: Keep container tightly closed and in a dry and well-ventilated area. Reseal open containers and keep upright. Store at 2-8°C (35-46°F). Keep away from light (light sensitive). Store under inert gas. Relieve pressure periodically and always open container with care. Heat- and air-sensitive. Store as flammable liquid. Ensure all wastes are kept under the control of the person generating and disposing.

DISPOSAL AND DECONTAMINATION

Follow EH&S waste storage, labeling, and pick-up procedures outlined in the CHP and Appendix C.

Note that Acrolein is an Environmental Protection Agency (EPA) P-Listed (acutely toxic) chemical, which has stringent requirements for waste disposal. Unused and waste Acrolein pure liquid/solutions must be sealed in labeled chemically compatible sturdy containers (no more than one quart in volume) for pickup as hazardous Acrolein waste by EH&S.

The bottle Acrolein was received in, even when empty, must be managed and collected as hazardous waste. This also includes empty vials, syringes, pipette tips, and other containers if the Acrolein was the sole active ingredient in the container. These items are a hazardous waste and should not be placed in a red sharps container. A container specific for the Acrolein sharps and other waste items is required and will be kept in the designated fume hood. Each container must be labeled in accordance with Appendix C.

Re-usable utensils, glassware, and other surfaces contaminated with Acrolein must be decontaminated at the end of the laboratory work session. Complete this inside a fume hood before removing any of the items. Dispose of all Acrolein contaminated waste as hazardous.

Animal carcasses and tissue debris will be placed in double zip lock bags labeled in accordance with Appendix C (Hazardous Waste Label sticker on the outside of the bags) and kept in a freezer in the designated area.

Clean all contaminated surfaces with soap and water or equivalent agent, then rinse and dry. Collect and dispose of all materials as hazardous waste.

There will be a total of three different containers provided to be used for all the hazardous waste. A one (1) gallon plastic bucket will be used strictly for broken glass. A sharps container will be used strictly for syringes and needles. Ziplocks, plastic bags, and a thirty (30) gallon poly blue drum will be used for all other waste and packed in accordance with Appendix C.

NOTE

Any deviation from or modification/revision of this SOP requires the approval from the PI, EH&S, and any pertinent committee representation.

CURRENT PERSONNEL

Name	Date Assigned

DOCUMENTATION OF TRAINING

Prior to conducting any work with the chemical(s) detailed in this SOP, the PI must

- Provide all laboratory personnel with appropriate training on the procedures and all specific hazards.
- Provide all personnel with a copy of the SOP and the manufacturer specific safety data sheet (SDS) and any other pertinent documentation for the chemical(s) detailed in this SOP.
- Ensure that all laboratory personnel have received all appropriate training and are current with any necessary refreshers.

I have read and understand the content of this SOP, completed lab/procedure specific training, and reviewed the SDS and all other provided pertinent documentation:

Name	Title/Representing	Signature	Date

SOP ANNUAL REVIEW

Name	Title/Representing	Signature	Date

ADDITIONAL RESOURCES

Appendix A: Specific Training

Appendix B: Manufacturer Specific Safety Data Sheet (SDS)

Appendix C: Chemical/Biological Mixed Waste Packing and Labeling Instructions