Standard Operational Procedures

Standard operating procedures describe the safety measures that are required when using hazardous chemicals. An SOP can address a single chemical, a group of similar chemicals or a process. Any format of SOP is acceptable provided the minimum safety elements are addressed. To assist you in writing SOPs, a blank template and example SOPs are provided below.

- New Chemical SOP template
- Acetonitrile SOP
- Chloroform SOP
- Formaldehyde SOP
- Dichloromethane
- Perchloric Acid
- Potassium Cyanide
- Sodium Arsenite
- Sodium Azide
- Trichloroethylene
- Toluene SOP
- Benzene SOP
- Atrazine
- 1,4-Dioxane
- 1-chloro-1-methylpropene

New Chemical SOP template

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
Hazard Information
Routes of Exposure
Exposure Limits
Engineering Controls
Administrative Controls
Personal Protective Equipment
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-001 Last Reviewed August 7, 201

Acetonitrile SOP

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Highly flammable
• High chronic toxicity
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air
• Ingestion: treat as cyanide poisoning, do not induce vomiting
• Eye or skin: Rinse affected area for 15 minutes
If exposed by inhalation or ingestion seek medical attention. For other routes, seek medical attention if necessary.
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day).
OSHA PEL: 40 ppm (70 mg/m3
)
ACGIH TLV: 20 ppm (34 mg/m3
)
NIOSH REL: 20 ppm (34 mg/m3
)
Engineering Controls
• Chemical Fume Hood Never open acetonitrile outside of a chemical fume hood.
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of acetonitrile as a health hazard.
• Use as small a quantity as possible.
Acetonitrile 75-05-8
Health Hazard

ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-001 Last Reviewed August 7, 2018

Personal Protective Equipment

- Gloves
- Safety glasses or splash goggles
- Lab coat

Two pairs of nitrile gloves for short-term use. If longer term use, neoprene or rubber gloves are required. Change gloves immediately if a spill on gloves is observed. Wash hands after use.

OTHER SAFETY INFORMATION

Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.

Storage

- Store in a flammables materials storage cabinet.
- Keep away from heat or sources of ignition
- Keep tightly sealed

Incompatible materials include:
Acids, bases, oxidizing agents, reducing agents and alkali metals

Spill/Accident Procedures

For all spills:

- Wear two pairs of nitrile gloves
- Turn off sources of ignition (if safe)
- Evacuate the immediate area

Exposure:

- If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
- Follow procedures outlined in laboratory safety manual.

Small spills (less than 500 mL): Cover the spill with absorbent materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed.

Large spills (greater than 500 mL): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste acetonitrile must be collected for disposal. Empty bottles of acetonitrile may be rinsed and thrown in the dumpster.

By signing below, you indicate that you have reviewed this SOP and understand the contents thereof

Chloroform SOP

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Carcinogen
• Reproductive Toxicity
• Liver and Kidney Toxicity
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air
• Ingestion: Aspiration hazard if vomiting
occurs. Do not induce vomiting.
• Eye or skin: Rinse affected area for 15
minutes
If exposed by inhalation, ingestion or eye contact, seek
medical attention. For other routes, seek medical
attention if necessary.
Symptoms of Exposure
• Cough, shortness of breath, dizziness,
agitation, inebriation, nausea, vomiting
• Headache, drying out of skin
Exposure Limits
All exposure limits are Time Weighted Averages
(average exposure over an eight-hour day) unless
otherwise indicated.
OSHA PEL: 50 ppm (240 mg/m3
) ceiling
ACGIH TLV: 10 ppm (48 mg/m3
)
NIOSH REL: 2 ppm (9.5 mg/m3
)
Engineering Controls
• Chemical Fume Hood Never open chloroform outside of a chemical fume
hood.
Administrative Controls
• Designated area sign

• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of chloroform as a health hazard.
• Use as small a quantity as possible.

Chloroform 67-66-3
Health Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-002 Last Reviewed August 16, 2018

Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat

Two pairs of nitrile gloves for short-term use. If longer term use, polyvinyl alcohol (PVA) or laminate gloves are required. Change gloves immediately if a spill on gloves is observed. Wash hands after use.

OTHER SAFETY INFORMATION

Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.

Storage
• Can be stored with flammable materials (except acetone).
• Keep tightly sealed

Incompatible materials include:
Acetone, strong bases, alkali metals, fluorine, dinitrogen tetroxide, potassium t-butoxide, powdered aluminum, nitrogen tetroxide, powdered magnesium, disilane, sodium methylate, triisopropylphosphine.

Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Evacuate the immediate area

Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.

Small spills (less than 500 mL in a hood or 20 mL outside a fume hood): Cover the spill with absorbent materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed.

Large spills (greater than 500 mL in a hood or 20 mL

outside a fume hood): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste chloroform must be collected for disposal. Empty bottles of chloroform may be rinsed and thrown in the dumpster.

By signing below, you indicate that you have reviewed this SOP and understand the contents thereof:

Printed Name Signature Date

Formaldehyde SOP

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Carcinogen
• Reproductive and Organ Toxicity
• Acute Oral, Dermal and Inhalation Toxicity
• Skin Corrosive
• Flammable liquid (in methanol)
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air. If difficulty breathing, give oxygen. Do not attempt mouth to mouth if victim inhaled formaldehyde.
• Ingestion: Do not induce vomiting.
• Eye or skin: Rinse affected area for 15 minutes
Medical attention is required for all routes of exposure.
Symptoms of Exposure
• Headache, dizziness, tiredness, nausea and vomiting, possible digestive tract perforation
• Rash, itching, swelling, difficulty breathing, tingling of extremities, chest pain, muscle pain, flushing
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day) unless otherwise indicated.
OSHA PEL: 0.75 ppm (2 ppm STEL)
ACGIH TLV: 0.1 ppm (0.3 ppm STEL)
NIOSH REL: 0.016 ppm (0.1 ppm ceiling, 20 ppm IDLH)
Engineering Controls
• Chemical Fume Hood Never open formaldehyde, formalin or paraformaldehyde outside of a chemical fume hood.

Formaldehyde/Formalin/Paraformaldehyde 50-00-0/30525-89-4
Health Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-003 Last Reviewed September 20, 2018
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of formaldehyde, formalin and paraformaldehyde as a health hazard.
• Use as small a quantity as possible.
Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat
Nitrile gloves are protective against formaldehyde in aqueous solution. If formaldehyde is in methanol solution (very typical), change gloves every 15 minutes (nitrile gloves are pervious to methanol after a relatively short period of time). Change gloves immediately if a spill on gloves is observed. Wash hands after use.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Can be stored with flammable materials in separate secondary containment tray.
• Keep tightly sealed
• Store paraformaldehyde away from water.
Incompatible materials include:
Strong oxidizing agents, strong bases, nitriles, acids, isocyanates, acid anhydrides, metals, acid chlorides.
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 100 mL in a hood or 10 mL outside a fume hood): Cover the spill with absorbent

materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed. If the spill is solid paraformaldehyde, soak the absorbent material with methanol (not water) and place on the spill. Wait until the solid paraformaldehyde is saturated, then scoop into a waste container. Contact EHS for collection and disposal. Clean area where paraformaldehyde had been with soap and water.

Large spills (greater than 100 mL in a hood or 10 mL outside a fume hood): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste formaldehyde must be collected for disposal. Empty bottles of formaldehyde may be rinsed and thrown in the dumpster.

Dichloromethane

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Carcinogen
• Reproductive Toxicity
• Liver and Kidney Toxicity
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air
• Ingestion: Aspiration hazard if vomiting
occurs. Do not induce vomiting.
• Eye or skin: Rinse affected area for 15
minutes
If exposed by inhalation, ingestion or eye contact, seek
medical attention. For other routes, seek medical
attention if necessary.
Symptoms of Exposure
• Cough, shortness of breath, dizziness,
agitation, inebriation, nausea, vomiting
• Headache, drying out of skin
Exposure Limits
All exposure limits are Time Weighted Averages
(average exposure over an eight-hour day) unless
otherwise indicated.
OSHA PEL: 25 ppm (87 mg/m3
)
ACGIH TLV: 50 ppm (174 mg/m3
)
Engineering Controls
• Chemical Fume Hood Never open dichloromethane outside of a chemical
fume hood.
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.

• Label containers of dichloromethane as a health hazard.
• Use as small a quantity as possible.

Dichloromethane (methylene chloride)
75-09-2
Health Hazard

Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat

Two pairs of nitrile gloves for short-term use. If longer term use, polyvinyl alcohol (PVA) or laminate gloves are required. Change gloves immediately if a spill on gloves is observed. Wash hands after use.

OTHER SAFETY INFORMATION

Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.

Storage
• Can be stored with flammable materials
• Keep tightly sealed

Incompatible materials include:
Strong oxidizing agents, strong acids, amines

Spill/Accident Procedures

For all spills:
• Wear two pairs of nitrile gloves
• Evacuate the immediate area

Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.

Small spills (less than 500 mL in a hood or 20 mL outside a fume hood): Cover the spill with absorbent materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed.

Large spills (greater than 500 mL in a hood or 20 mL outside a fume hood): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and

exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste dichloromethane must be collected for disposal.

Empty bottles of dichloromethane may be rinsed and thrown in the dumpster.

By signing below, you indicate that you have reviewed this SOP and understand the contents thereof

Perchloric Acid

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Causes severe skin burns and eye damage
• May cause fire or explosion
• Strong oxidizer
• Corrosive to metals
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air. If not breathing, give artificial respiration.
• Ingestion: Do not induce vomiting. Rinse mouth with water.
• Eye or skin: Remove contaminated clothing. Rinse with plenty of water for 15 minutes. Wash skin with soap and water. If in eyes, continue rinsing with water during transport to hospital.
If exposed by any route, seek immediate medical attention.
Symptoms of Exposure
• Burning sensation
• Coughing, wheezing, shortness of breath, laryngitis
Special Use Requirements
Perchloric acid has special use requirements. These requirements are for use of perchloric acid at any concentration.
• Remove any organic materials from the area.
• After working with perchloric acid, the area must be decontaminated with a 10% sodium carbonate solution.
Engineering Controls
• Chemical Fume Hood Never open perchloric acid outside of a chemical fume hood.

Perchloric acid 7601-90-3
Health Hazard and Physical Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-005 Last Reviewed July 8, 2019
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of perchloric acid as a health and physical hazard.
• Use as small a quantity as possible.
Personal Protective Equipment
• Gloves
• Splash goggles
• Lab coat
Wash hands immediately after use. Splash goggles must be worn when working with solutions of perchloric acid greater than 1%.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Store in cabinet with other acids, but in a separate secondary container.
• Do not store in metal containers.
• Do not store near organic materials.
• Keep away from heat and open flames.
Incompatible materials include:
Strong bases, strong acids, amines, phosphorus halides, alcohols, organic materials, powdered metals, strong reducing agents
Spill/Accident Procedures
For all spills:
• Wear nitrile gloves, splash goggles and lab coat
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 50 mL in a hood): Cover spills of dry chemical with sand or other inorganic absorbent.
Do not use organic materials such as paper to absorb!

Sweep contents into a non-metal container collection by EHS. If the spill is liquids, cover with absorbent material and then place the absorbent materials in a glass container for collection by EHS. Clean area with soap and water once spill is removed.
Large spills (greater than 50 mL in a hood or any amount outside a fume hood): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.
Waste Disposal Waste perchloric acid must be collected for disposal.
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-005 Last

Potassium Cyanide

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Acute oral, dermal and inhalation toxicity
• Organ Toxicity
• Corrosive to metals
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Fatal if inhaled. Remove to fresh air. Do not use mouth to mouth; give artificial respiration through pocket mask, one-way valve or other respiratory medical device.
• Ingestion: Fatal if swallowed. Do not induce vomiting.
• Eye or skin: Fatal in contact with skin. Rinse with plenty of water for 15 minutes.
If exposed by any route, seek immediate medical attention.
Symptoms of Exposure
• Exposure can be fatal.
• May cause tightness in chest, flushing, headaches, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions and shock.
• Cyanosis (blue skin) can occur.
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day) unless otherwise indicated.
OSHA PEL: None indicated
ACGIH TLV: 1.88 ppm (5 mg/m3
) ceiling- skin
NIOSH REL: 1.88 ppm (5 mg/m3
) ceiling, 9.39 ppm (25
mg/m3

) IDLH
Engineering Controls
• Chemical Fume Hood Never open potassium cyanide outside of a chemical fume hood.
Potassium cyanide 151-50-8
Health Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-006 Last Reviewed July 8, 2019
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of potassium cyanide as a health hazard.
• Use as small a quantity as possible.
• Ensure no acid or water is in the area.
Potassium cyanide reacts with acids to form hydrogen cyanide, which can reach toxic levels before it is ever detected by odor.
Personal Protective Equipment
• Gloves
• Safety glasses (for dry chemical) or splash goggles (for solutions)
• Lab coat
• Tyvek sleeves (for amounts exceeding 1 gram).
Two pairs of nitrile gloves must be worn when handling potassium cyanide. Wash hands immediately after use. Splash goggles must be worn when working with solutions of potassium cyanide greater than 1%.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Avoid exposure to moisture.
• Can be stored with other dry chemicals but in a dedicated section for toxic chemicals.
• Keep away from heat and open flames.
Incompatible materials include:
Acids, strong oxidizing agents, bases, powdered metal salts, aldehydes, peroxides, metals.
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves, safety glasses and lab coat

• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 1 g in a hood): Small spills may be cleaned by sweeping up dry powder and placing them in a container. If the spill is a liquid, cover with absorbent material and then place the absorbent material container. After the solid has been removed or the liquid has been absorbed, clean the area with pH 10 buffer and then rinse with dilute bleach.
Large spills (greater than 1 g in a hood or any amount outside a fume hood): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.
Waste Disposal Waste potassium cyanide must be collected for disposal.
Empty bottles of potassium cyanide must be collected by EHS. DO NOT rinse them! Do not throw them in the trash!
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-006 Last Reviewed July 8, 2019
By signing below, you indicate that you have reviewed this SOP and understand the contents thereof:
Printed Name Signature Date
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-006 Last Reviewed July 8, 201

Sodium Arsenite

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Acute oral, dermal and inhalation toxicity
• Organ Toxicity
Routes of Exposure
• Ingestion
• Inhalation
• Skin absorption
If exposed by:
• Inhalation: Remove to fresh air. Do not use mouth to mouth; give artificial respiration through pocket mask, one-way valve or other respiratory medical device
• Ingestion: Do not induce vomiting.
• Eye or skin: Rinse with plenty of water for 15 minutes.
If exposed by any route, seek immediate medical attention.
Symptoms of Exposure
• Exposure can be fatal.
• May cause headaches, nausea and vomiting. Prolonged exposure can cause brain damage.
• May cause eye, skin and respiratory tract irritation
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day) unless otherwise indicated.
OSHA PEL: None indicated
ACGIH TLV: 0.002 ppm (0.01 mg/m3
)
NIOSH IDLH: 5 ppm (26.6 mg/m3
)
Engineering Controls
• Chemical Fume Hood Never open sodium arsenite outside of a chemical fume hood.
Administrative Controls

• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of sodium arsenite as a
health hazard.
• Use as small a quantity as possible.
Sodium arsenite 7784-46-5
Health Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-007 Last Reviewed July 8, 2019
Personal Protective Equipment
• Gloves
• Safety glasses (for dry chemical) or splash
goggles (for solutions)
• Lab coat
• Tyvek sleeves (for amounts exceeding 5
grams).
Two pairs of nitrile gloves must be worn when
handling sodium arsenite. Wash hands immediately
after use. Splash goggles must be worn when working
with solutions of sodium arsenite greater than 1%.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual
for transport of chemicals.
Storage
• Can be stored with other dry chemicals but in
a dedicated section for toxic chemicals.
• Keep away from heat and open flames.
Incompatible materials include:
Strong oxidizing agents, strong acids
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves, safety glasses
and lab coat
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency
medical attention, dial 911 (or 9-911 from
landline).
• Follow procedures outlined in laboratory
safety manual.
Small spills (less than 10 g in a hood): Small spills may
be cleaned by sweeping up dry powder and placing
them in a container. If the spill is a liquid, cover with
absorbent material and then place the absorbent

material container. Clean area with soap and water once spill is removed.

Large spills (greater than 10 g in a hood or any amount outside a fume hood): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste sodium arsenite must be collected for disposal.

By signing below, you indicate that you have reviewed this SOP and understand the contents thereof:

Sodium Azide

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Acute oral and dermal toxicity
• Organ Toxicity
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air. Do not use mouth to mouth; give artificial respiration through pocket mask, one-way valve or other respiratory medical device
• Ingestion: Fatal if swallowed. Do not induce vomiting.
• Eye or skin: Fatal in contact with skin. Rinse with plenty of water for 15 minutes.
If exposed by any route, seek immediate medical attention.
Symptoms of Exposure
• Exposure can be fatal.
• May cause headaches, nausea and vomiting.
Prolonged exposure can cause brain damage.
• May cause eye, skin and respiratory tract irritation
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day) unless otherwise indicated.
OSHA PEL: None indicated
ACGIH TLV: 0.11 ppm (0.29 mg/m3
) ceiling
NIOSH REL: 0.1 ppm (0.3 mg/m3
) ceiling
Engineering Controls
• Chemical Fume Hood Never open sodium azide outside of a chemical fume hood.

Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of sodium azide as a health hazard.
• Use as small a quantity as possible.
Sodium azide 26628-22-8
Health Hazard

• Do not use metal scoops with sodium azide. Use scoops made from other materials.
Personal Protective Equipment
• Gloves
• Safety glasses (for dry chemical) or splash goggles (for solutions)
• Lab coat
• Tyvek sleeves (for amounts exceeding 5 grams).
Two pairs of nitrile gloves must be worn when handling sodium azide. Wash hands immediately after use. Splash goggles must be worn when working with solutions of sodium azide greater than 1%.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Not not store in metal containers or in metal cabinets.
• Can be stored with other dry chemicals but in a dedicated section for toxic chemicals.
• Keep away from heat and open flames.
Incompatible materials include:
Benzoyl chloride, potassium hydroxide, bromine, carbon disulfide, chromyl chloride, copper, dibromalonitrile, dimethyl sulfate, lead, barium carbonate, acids (especially sulfuric and nitric), metals, metal salts, water.
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves, safety glasses and lab coat
• Evacuate the immediate area
Exposure:

• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.

Small spills (less than 10 g in a hood): Cover spills of dry chemical with sand. Sweep contents into a nonmetal container collection by EHS. If the spill is liquids, cover with absorbent material and then place the absorbent materials in a non-metal container for collection by EHS. Clean area with soap and water once spill is removed.

Large spills (greater than 10 g in a hood or any amount outside a fume hood): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste sodium azide must be collected for disposal. Empty bottles of sodium azide must be collected by EHS. DO NOT rinse them! Do not throw them in the trash!

Trichloroethylene

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Carcinogen
• Reproductive Toxicity
• Liver and Kidney Toxicity
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air
• Ingestion: Do not induce vomiting.
• Eye or skin: Rinse affected area for 15
minutes
If exposed by inhalation, ingestion or eye contact, seek medical attention. For other routes, seek medical attention if necessary.
Symptoms of Exposure
• Cough, shortness of breath, dizziness,
agitation, inebriation, nausea, vomiting
• Headache, drying out of skin
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day) unless otherwise indicated.
OSHA PEL: 100 ppm (537 mg/m3
), 200 ppm (1.07
g/m3
) ceiling
ACGIH TLV: 10 ppm (53.7 mg/m3
)
NIOSH REL: 1000 ppm (5.37 g/m3
) IDLH
Engineering Controls
• Chemical Fume Hood Never open trichloroethylene outside of a chemical fume hood.
Administrative Controls

• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of trichloroethylene as a
health hazard.
• Use as small a quantity as possible.
Trichloroethylene 79-01-6
Health Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-010 Last Reviewed July 8, 2019
Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat
Two pairs of nitrile gloves for short-term use. If longer
term use, polyvinyl alcohol (PVA) or laminate gloves
are required. Change gloves immediately if a spill on
gloves is observed. Wash hands after use.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual
for transport of chemicals.
Storage
• Can be stored with flammable materials
• Keep tightly sealed
Incompatible materials include:
Strong oxidizing agent, strong bases, amines, alkali
metals, metal powders
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency
medical attention, dial 911 (or 9-911 from
landline).
• Follow procedures outlined in laboratory
safety manual.
Small spills (less than 500 mL in a hood or 50 mL
outside a fume hood): Cover the spill with absorbent
materials. Place absorbent materials in bag or bucket
for collection by EHS. Clean area with soap and water
once spill is removed.
Large spills (greater than 500 mL in a hood or 50 mL
outside a fume hood): If the spill is in a chemical fume
hood, contact the EHS director (864-710-2933). If he

cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste trichloroethylene must be collected for disposal.

Empty bottles of trichloroethylene may be rinsed and thrown in the dumpster.

By signing below, you indicate that you have reviewed this SOP and understand the contents thereof

Toluene SOP

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Highly flammable
• May be fatal if swallowed and enters airways
• May cause dizziness or drowsiness
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air. If not
breathing give artificial respiration.
• Ingestion: Rinse mouth with water and then
drink plenty of water; do not induce vomiting.
• Eye or skin: Rinse affected area for 15
minutes
If exposed by inhalation, ingestion or eye contact seek
medical attention. For other routes, seek medical
attention if necessary.
Exposure Limits
All exposure limits are Time Weighted Averages
(average exposure over an eight-hour day).
OSHA PEL: 200 ppm (750 mg/m3
)
ACGIH TLV: 20 ppm (75 mg/m3
)
NIOSH REL: 100 ppm (375 mg/m3
), 500 ppm (1775
mg/m3
) IDLH
Engineering Controls
• Chemical Fume Hood Never open toluene outside of a chemical fume hood.
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of toluene as a health

hazard.
• Use as small a quantity as possible.
Toluene 108-88-3
Health Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-011 Last Reviewed July 8, 2019
Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat
Two pairs of nitrile gloves for short-term use. If longer term use, PVA or laminate film gloves are required. Change gloves immediately if a spill on gloves is observed. Wash hands after use.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Store in a flammables materials storage cabinet.
• Keep away from heat or sources of ignition
• Keep tightly sealed
Incompatible materials include:
Acids, bases, strong oxidizing agents, halogenated compounds.
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Turn off sources of ignition (if safe)
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 500 mL): Cover the spill with absorbent materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed.
Large spills (greater than 500 mL): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of

a hood, then call 911, pull the fire alarm and exit the building.

Waste Disposal Waste toluene must be collected for disposal. Empty bottles of toluene may be rinsed and thrown in the dumpster.

By signing below, you indicate that you have reviewed this SOP and understand the contents thereof:

Benzene SOP

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Highly flammable
• May be fatal if swallowed and enters airways
• May cause genetic defects
• May cause cancer (leukemia)
• Causes damage to organs through repeated exposure
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air. If not breathing give artificial respiration.
• Ingestion: Rinse mouth with water and then drink plenty of water; do not induce vomiting.
• Eyes: Rinse affected area for 15 minutes
• Skin: Wash with soap and water.
If exposed any route seek medical attention.
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day).
OSHA PEL: 10 ppm (32 mg/m3
)
ACGIH TLV: 0.5 ppm (1.6 mg/m3
)
NIOSH REL: 0.1 ppm (0.32 mg/m3
)
Engineering Controls
• Chemical Fume Hood Never open benzene outside of a chemical fume hood.
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of benzene as a health hazard.

• Use as small a quantity as possible.
Benzene 71-43-2
Health Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-012 Last Reviewed September 13, 2019
Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat
Two pairs of nitrile gloves for short-term use. If longer term use, PVA or laminate film gloves are required. Change gloves immediately if a spill on gloves is observed. Wash hands after use.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Store in a flammables materials storage cabinet.
• Keep away from heat or sources of ignition
• Keep tightly sealed
Incompatible materials include:
Acids, bases, strong oxidizing agents, halogenated compounds, metallic salts
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Turn off sources of ignition (if safe)
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 50 mL): Cover the spill with absorbent materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed.
Large spills (greater than 50 mL): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the

building.
Waste Disposal Waste benzene must be collected for disposal.
Empty bottles of benzene may be rinsed and thrown
in the dumpster.
By signing below, you indicate that you have reviewed this SOP and understand the contents thereof

Atrazine

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Harmful if swallowed
• May cause allergic skin reaction
• Very toxic to aquatic life with long-term effects
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air. If not breathing give artificial respiration.
• Ingestion: Rinse mouth with water.
• Eyes: Rinse affected area for 15 minutes
• Skin: Wash with soap and water.
If exposed by inhalation, ingestion or on skin, seek medical attention. If eye exposure, seek medical attention if necessary.
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day).
OSHA PEL: None published
ACGIH TLV: 5 mg/m3
NIOSH REL: 5 mg/m3
Engineering Controls
• Chemical Fume Hood Never open atrazine outside of a chemical fume hood.
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of atrazine as a health hazard.
• Use as small a quantity as possible.
Atrazine 1912-24-9
Health Hazard
ARKANSAS STATE UNIVERSITY EHS

LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-013 Last Reviewed September 13, 2019
Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat
Nitrile gloves are an excellent barrier to atrazine. Change gloves immediately if a spill on gloves is observed. Wash hands after use.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Can be stored with other dry chemicals but in a dedicated section for toxic chemicals.
• Keep tightly sealed
Incompatible materials include:
Strong acids, strong bases, strong oxidizing agents
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Turn off sources of ignition (if safe)
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 2 kg): Small spills may be cleaned by sweeping up dry powder and placing them in a container. If the spill is a liquid, cover with absorbent material and then place the absorbent material container. Clean area with soap and water once spill is removed.
Large spills (greater than 2 kg): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.
Waste Disposal Waste atrazine must be collected for disposal. Empty bottles of atrazine may be rinsed and thrown in the dumpster.
By signing below, you indicate that you have reviewed this SOP and understand the contents

thereof

1,4-Dioxane

Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Highly flammable
• Causes serious eye irritation
• May cause respiratory irritation
• Suspected of causing cancer
• Peroxide-forming solvent
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air
• Ingestion: Do not induce vomiting, rinse mouth with water
• Eye or skin: Rinse affected area for 15 minutes
If exposed by any route, seek medical attention.
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day).
OSHA PEL: 25 ppm (90 mg/m3)
ACGIH TLV: 20 ppm (72 mg/m3)
Engineering Controls
• Chemical Fume Hood Never open 1,4-dioxane outside of a chemical fume hood.
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of 1,4-dioxane as a health and physical hazard.
• Use as small a quantity as possible.
1,4-Dioxane 123-91-1
Health and Physical Hazard

ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-015 Last Reviewed December 16, 2019
Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat
Two pairs of nitrile gloves for short-term use. If longer term use, butyl rubber gloves are required. Change gloves immediately if a spill on gloves is observed.
Wash hands after use.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Store in a flammables materials storage cabinet.
• Keep away from heat or sources of ignition
• Keep tightly sealed
• Monitor for formation of explosive peroxides
Incompatible materials include:
Oxygen, oxidizing agents, halogens, reducing agents, perchlorates, trimethylaluminum
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Turn off sources of ignition (if safe)
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 500 mL): Cover the spill with absorbent materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed.
Large spills (greater than 500 mL): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.
Waste Disposal Waste 1,4-dioxane must be collected for disposal.

Empty bottles of 1,4-dioxane may be rinsed and
thrown in the dumpster.
By signing below, you indicate that you have reviewed this SOP and understand the contents thereof

1-chloro-1-methylpropene

ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-016 Last Reviewed January 6, 2020
Chemical Name: CAS #:
Hazard Classification:
Location Used: Principal Investigator:
Processes for Which Chemical Is Used:
HAZARDS AND PROTECTION
Hazard Information
• Highly flammable
• Toxic in contact with skin
• Fatal if inhaled
• May cause cancer
• Causes irritation to eyes, skin and respiratory tract
Routes of Exposure
• Ingestion ● Skin Absorption
• Inhalation
• Eye absorption
If exposed by:
• Inhalation: Remove to fresh air. If not breathing give artificial respiration.
• Ingestion: Rinse mouth with water; do not induce vomiting.
• Eyes: Rinse affected area for 15 minutes
• Skin: Wash with soap and water. Take victim to hospital immediately.
If exposed any route seek medical attention.
Exposure Limits
All exposure limits are Time Weighted Averages (average exposure over an eight-hour day).
There are no published exposure limits for this chemical. Limit exposure as much as practical.
Engineering Controls
• Chemical Fume Hood Never open 1-chloro-2-methylpropene outside of a chemical fume hood.
Administrative Controls
• Designated area sign
• Particularly hazardous substance label
• Post designated area sign before each use.
• Label containers of 1-chloro-2-methylpropene as a health hazard.

• Use as small a quantity as possible.
1-chloro-2-methylpropene 513-37-1
Health and Physical Hazard
ARKANSAS STATE UNIVERSITY EHS
LABORATORY CHEMICAL STANDARD OPERATING PROCEDURE
CS-016 Last Reviewed January 6, 2020
Personal Protective Equipment
• Gloves
• Safety glasses or splash goggles
• Lab coat
Two pairs of nitrile gloves for short-term use. If longer term use, Viton (fluorinated rubber) gloves are required. Change gloves immediately if a spill on gloves is observed. Wash hands after use.
OTHER SAFETY INFORMATION
Transportation Follow guidance given in the laboratory safety manual for transport of chemicals.
Storage
• Store in a flammables materials storage cabinet.
• Keep away from heat or sources of ignition
• Keep tightly sealed
Incompatible materials include:
Strong bases, strong oxidizing agents
Spill/Accident Procedures
For all spills:
• Wear two pairs of nitrile gloves
• Turn off sources of ignition (if safe)
• Evacuate the immediate area
Exposure:
• If anyone exposed requires emergency medical attention, dial 911 (or 9-911 from landline).
• Follow procedures outlined in laboratory safety manual.
Small spills (less than 50 mL): Cover the spill with absorbent materials. Place absorbent materials in bag or bucket for collection by EHS. Clean area with soap and water once spill is removed.
Large spills (greater than 50 mL): If the spill is in a chemical fume hood, contact the EHS director (864-710-2933). If he cannot be reached (does not answer phone, do not leave voicemail), then call 911, pull the fire alarm and exit the building. If the spill is outside of a hood, then call 911, pull the fire alarm and exit the building.
Waste Disposal Waste 1-chloro-2-methylpropene must be collected

for disposal.
Empty bottles of 1-chloro-2-methylpropene may be
rinsed and thrown in the dumpster.
By signing below, you indicate that you have reviewed this SOP and understand the contents thereof:
Printed Name Signature Date