



Standard Operating Procedure



FLAMMABLE LIQUIDS

This standard operating procedure (SOP) is intended to provide general guidance on how to safely work with flammable liquids. This SOP is generic in nature and only addresses safety issues specific to flammable liquids.. In some instances, several general use SOPs may be applicable for a specific chemical.

The National Fire Protection Agency (NFPA) considers any chemical to be flammable if it has a flashpoint below 37.8°C (100°F). There are three classes of flammable liquids per the NFPA:

- Class 1A. Liquids having a flashpoint below 73°F (23°C) and having a boiling point below 100°F (38°C).
- Class 1B. Liquids having a flashpoint below 73°F (23°C) and having a boiling point above 100°F (38°C).
- Class 1C. Liquids having a flashpoint at or above 73°F (23°C) and below 100°F (38°C).

OSHA defines a flammable liquid as any liquid having a flashpoint at or below 199.4°F (93°C). Flammable liquids are divided into four categories as follows:

- Category 1 shall include liquids having flashpoints below 73.4°F (23°C) and having a boiling point at or below 95°F (35°C).
- Category 2 shall include liquids having flashpoints below 73.4°F (23°C) and having a boiling point above 95°F (35°C).
- Category 3 shall include liquids having flashpoints at or above 73.4°F (23°C) and at or below 140°F (60°C). When a Category 3 liquid with a flashpoint at or above 100°F (37.8°C) is heated for use to within 30°F (16.7°C) of its flashpoint, it shall be handled in accordance with the requirements for a Category 3 liquid with a flashpoint below 100°F (37.8°C).
- Category 4 shall include liquids having flashpoints above 140°F (60°C) and at or below 199.4°F (93°C). When a Category 4 flammable liquid is heated for use to within 30°F (16.7°C) of its flashpoint, it shall be handled in accordance with the requirements for a Category 3 liquid with a flashpoint at or above 100°F (37.8°C).

Potential Hazards/Toxicity

Physical Hazards

Flammable liquids usually have high vapor pressures at room temperature and their vapors, mixed with air at the appropriate ratio, can ignite and burn. As with all solvents, their vapor pressure increases with temperature and therefore as temperatures increase, they become more hazardous.

The concentrated vapors of flammable liquids may be heavier than air and can cause vapor trails which can travel to reach an ignition source, resulting in a flashback fire. Fire can also result from reactions between flammables or combustibles and oxidizers.

Health Hazards

In addition to the fire hazard, many flammable liquids pose health hazards as well. Effects from acute inhalation exposures range from irritation to CNS depression, nausea and dizziness. In extreme situations, coma can result. Chronic exposures may lead to liver or kidney damage. Skin absorption can lead to similar long term effects as inhalation exposures. Skin contact with solvents may result in defatting and drying of the skin. Some flammable liquids also have additional health hazards, i.e., benzene is also a known human carcinogen.

As the hazards may vary by compound, users must familiarize themselves with the specific hazards of the compounds they are working with, which can be found on the chemical's Safety Data Sheet (SDS). SDSs are available through UNC Asheville's use of the Quartz chemical ordering System.

Personal Protective Equipment (PPE)

The University's Personal Protective Equipment Policy can be found here:

<https://ehs.unca.edu/personal-protective-equipment>

Eye Protection

Safety glasses must be worn whenever handling flammable liquids. If there is a potential for splashes, goggles and/or a face shield must be worn.

Hand Protection

Gloves must be worn when handling flammable liquids. Exam style nitrile gloves (minimum 4 mil thickness) should be adequate for handling these compounds in general laboratory settings. However, if skin contact is likely or large amounts are being used, then a utility grade glove should be worn over the exam style nitrile. To ensure that the appropriate utility grade glove is selected, use the glove selection guide below or contact EH&S.

http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf

Skin and Body Protection

Long pants or clothing that covers the body to the ankles and closed-toe solid top shoes must be worn when handling flammable liquids. Lab coats must be worn.

Engineering Controls

Fume Hood

Fume hoods, or other locally exhausted ventilation, must be used when handling flammable liquids.

Storage/Handling

- Minimize the storage of flammable liquids outside rated storage cabinets. The volume stored outside of rated cabinets must be < 10 gallons per laboratory. Written permission from the Chemical Hygiene Officer is needed if storage limits are surpassed.
- Refrigerators used for the storage of flammable liquids must be designed/rated for this purpose.
- Keep flammables segregated from incompatible materials, including oxidizers.
- Store at/below eye level.
- Metal surfaces or containers through which flammable liquids flow must be properly grounded, to discharge static electricity.
- Never heat flammable liquids by using an open flame. Use steam baths, water baths, oil baths, heating mantles or hot air baths.
- If flammable liquids must be heated in an oven, make sure the oven is appropriately designed for flammable liquids (no internal ignition sources and/or vented mechanically).
- When heating flammable liquids, ensure that the autoignition temperature of the solvent is above the oven temperature or its internal elements.
- Do not distill flammable liquids under reduced pressure.

Waste Disposal

Flammable liquids must be collected as hazardous waste.

Emergency Procedures

Fire Extinguishers

ABC dry powder fire extinguishers are appropriate for fires involving corrosive materials.

Eyewash/Safety Showers

An ANSI approved eyewash station and safety shower that can provide quick drenching or flushing of the eyes must be immediately available within a 10 second travel time from where these compounds are used. Ensure the locations of the eyewashes and safety showers, and how to activate them, are known prior to an emergency.

First Aid Procedures

If inhaled

Remove to fresh air and call University Police for immediate medical attention.

In case of skin contact

Go to the nearest emergency shower if contaminated. Yell for assistance and rinse for 15 minutes, removing all articles of clothing to ensure contaminate is completely removed. Call University Police for immediate medical attention.

In case of eye contact

Go to the nearest emergency eyewash. Yell for assistance and rinse for 15 minutes. Call University Police for immediate medical attention.

Spills

Small Spill (inside a fume hood)

If a small spill occurs inside a fume hood, lab personnel should be able to safely clean it up by following standard spill clean up procedures:

- Alert others in immediate area of spill.
- Wear appropriate PPE.
- If available, cover spill with acid/base neutralizer.
- If neutralizer is not available, confine spill to small area with adsorbent material.
- Collect residue, place in container, label container, and dispose of as hazardous waste.
- Clean spill area with soap and water.

Large Spill/Any spill outside a fume hood

- Call University Police.
- Evacuate the spill area.
- Post someone or mak-off the hazardous area with warning signs to keep other people from entering.
- Stay nearby until emergency personnel arrive and provide them with information on the chemicals involved.

Authorized Research Group Signature/Date