

Flammable and Combustible Liquids-Generic Procedures for Safe Handling and Storage¹

Chemicals which exist, at ambient temperatures, in a liquid form with sufficient vapor pressure to ignite in the presence of an ignition source are called flammable or combustible liquids (note that the flammable/combustible liquid itself does not burn; it is the vapor from the liquid that burns). Flammables generate sufficient vapor at temperatures below 100° F (37.8° C), whereas combustibles generate sufficient vapor at temperatures at or above 100° F. Invisible vapor trails from these liquids can reach remote ignition sources causing flashback fires. In addition, these liquids become increasingly hazardous at elevated temperatures due to more rapid vaporization. For these reasons, precautionary measures must be observed when handling and storing flammables and combustibles. Common examples of flammable materials include: toluene, benzene, acetone, ethers, cyclohexane, and alcohols.

Flammable Liquids

Class IA – Liquids having a flashpoint <73° F, and a boiling point <100° F.

Class IB – Liquids having a flashpoint <73° F, and a boiling point ≥100° F.

Class IC – Liquids having a flashpoint ≥73° F, and <100° F.

Combustible Liquids

Class II – Liquids having a flashpoint ≥100° F, but <140° F.

Class IIIA – Liquids having a flashpoint ≥140° F, but < 200° F.

Handling

- Appropriate PPE (gloves, lab coat, and safety goggles) must be worn when working with flammable/combustible liquids.
- Do not heat flammable chemicals with an open flame.
- Flammable chemicals should be used only in lab hoods (or other well ventilated areas) and away from sources of ignition. Similarly, combustibles should not be used near ignition sources, and it is recommended that they be used in lab hoods whenever possible.
- For highly flammable chemicals, static electricity or hot surfaces can serve as ignition sources. Do not use electrical devices with cracked or frayed electrical wiring.
- Transfer flammable liquids from containers of 5 gallon capacity or less inside a laboratory hood (or other area with similar ventilation) to prevent accumulation of a flammable concentration of vapors.
- Transfer flammable liquids from containers greater than 5 gallons in a well-ventilated area outside the laboratory building, or in an approved flammable storage room.
- When transferring flammable liquid from a bulk container (generally greater than 5 gallons), the containers must be electrically bonded and grounded. The friction of flowing liquid may be sufficient to generate static electricity, which in turn may discharge, causing a spark and ignition.
- Fire extinguishers appropriate for the fire hazards present must be available in all laboratories and storage areas.

¹Additional topics, such as appropriate PPE, spill procedures, disposal, etc., must be added in order to use this document as a stand alone training tool to satisfy lab specific training requirements.

Storage

The Nevada State Fire Marshall, through incorporation of the International Fire Code, mandates maximum storage quantities for flammable and combustible liquids. The National Fire Protection Association provides additional recommendations for management of flammable and combustible liquids. The maximum allowable storage quantities of flammable and combustible liquids (including waste material) in laboratories are summarized below:

- The maximum allowable quantity of flammable liquid (Class I) per laboratory that can be used in operations in an open environment is as follows:
 - Class IA: 10 gallons
 - Class IB: 15 gallons
 - Class IC: 20 gallons
 - Class IA, IB, IC combined: 30 gallons (containing less than the allowable quantity of each individual class)

Note: The maximum allowable quantities can be doubled in laboratories protected by an approved automatic sprinkler system.

- Containers larger than 5 gallons shall not be stored in the lab.
- Flammable/combustible liquid stored in glass containers shall not exceed 4 liters.
- Flammable/combustible liquids (if required) must only be stored in laboratory-safe refrigeration equipment (no spark source in the interior) never in household refrigerators.
- Flammables and combustibles must not be stored near oxidizers, corrosives, combustible material, or near heat sources. Make sure all chemicals stored near flammable and combustibles are compatible.

Flammable Liquid Storage Cabinets

- Maximum storage quantities per individual flammable liquid storage cabinet are:
 - 60 gallons of flammable or combustible liquid.
 - 120 gallons of flammable and combustible liquid combined.
- Flammable cabinets do not have to be vented for fire protection purposes.
- Do not remove vent bungs from flammable cabinets unless the cabinets are properly ventilated.
- Storage cabinets must be labeled “Flammable-Keep Fire Away.”

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