


Standard Operating Procedure (SOP)			
<i>Title: Flammable and Combustible Liquids</i>			
<i>Approved by:</i>		<i>Effective Date:</i>	11/01/07
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PURPOSE

To provides information pertinent to the safe storage, use and handling of flammable and combustible liquids.

SCOPE

Unless stated elsewhere in this SOP, the requirements of this document apply to all principal investigators, faculty, staff, students, tenants, and contractors at WFUHS.

RESPONSIBILITIES

Environmental Health & Safety

- Maintain and update this document.
- Advise as needed.

Managers/Supervisors

- Apply guidelines of this document to facilities layout and flammable and combustible liquid storage and use.

Principal Investigators

- Apply guidelines of this document to chemical storage and use.

PERSONAL PROTECTIVE EQUIPMENT

Hand Protection

- Be sure to inspect gloves before, during, and after use to insure that they are not leaking. Change them and allow them to dry if they begin to swell.
- Never wear cotton, canvas, or other absorbent gloves around solvents. These will absorb and hold the solvent against your skin and is worse than using no gloves at all.
- For almost all of the organic solvents, the following gloves provide the best overall protection:
 - Solvent And Acid Resistant , Nitrile, 0.015"Thick
 - Use Neoprene Gloves When Using The Following Solvents:
 - Acetone
 - Cellosolve
 - Methyl Ethyl Ketone
 - Ethanol (Ethyl Alcohol)
 - Methanol (Methyl Alcohol)
 - Methyl Isobutyl Ketone
- Consult the Industrial Hygienist for other applications.

Arm And Body Protection

If there is a chance of splashing solvent during normal use, the following protective sleeves and aprons should be used:

- Sleeve/plastic protective
- Apron, laboratory, medium size, lightweight, translucent polyvinyl

Eye Protection

- Safety Glasses with side shields are required at all times as a minimum.
- However, if there is any chance of splashing solvent, or if working with overhead or pressurized lines, the following protective goggles or face shield shall be worn:
 - Goggle, American Optical, 710 SPLASH
 - Full Face Shield

Respiratory Protection

During normal operations, engineering controls adequately control solvent vapor concentrations in the breathing zone of the workers measured to date. However, during some cleanup operations, maintenance activities, paint spraying outside of a booth, etc., additional personal protective equipment is necessary. This equipment shall be specified by the Industrial Hygienists and employees must be trained prior to its use. All respirators shall be issued and fitted tested by EH&S.

GENERAL

- Flammable and combustible liquids can present a serious fire hazard because they burn rapidly and are sometimes difficult to extinguish.
- The properties of flammable and combustible liquids that make them so susceptible to fire are: flash point, ignition temperature, flammable or explosive limits, specific gravity, boiling point, vapor density and water solubility.
- Flash point is one important property of flammable and combustible liquids. In general, the lower the flash point, the easier the ignition and the greater the fire hazards. Flashpoint is the lowest temperature at which a liquid will give off sufficient vapor to ignite when a source of ignition is present.
- Flammable and combustible liquids are classified based on their flashpoint as follows:
 - Class I liquids have a flashpoint below 100°F and are called flammable liquids. An example of a Class I flammable liquids is Isopropyl alcohol with a flashpoint of 53°F. Class I is subdivided into:
 - Class IA having a flashpoint below 73°F and a boiling point below 100°F.
 - Class IB having a flashpoint below 73°F and a boiling point above 100°F.
 - Class IC having a flashpoint above 73°F and less than 100°F.
- Liquids with a flashpoint between 100°F and 140°F are called Class II Combustible liquids. Kerosene with a flashpoint of 120°F is an example of a Class II Combustible liquid.
- Liquids with a flashpoint of 140°F or greater are called Class III Combustible liquids. Class IIIA Combustible liquids have a flashpoint greater than 140°F but less than 200°F. ISOPAR M with a flashpoint of 175°F is an example of a Class IIIA Combustible liquid. Class IIIB Combustible liquids have a flashpoint

greater than 200°F. Dow Corning 200 Fluid with a flashpoint > 250°F is an example of a Class IIIB Combustible liquid.

- It is the vapors of a flammable or combustible liquids that burn, not the liquids themselves.
 - The vapors must be mixed with air in certain proportions in order to burn. The proportions are referred to as the flammable or explosive limits. The lower flammable limit is the minimum concentration of vapor that must be present in air for ignition. The upper flammable limit is the maximum concentration of vapor that can be present in air and still burn.
 - Concentrations less than the lower flammable limit are too lean to burn. Concentrations greater than the upper flammable limit are too rich to burn.

COMMON FLAMMABLE AND COMBUSTIBLE LIQUIDS

Acetone
Ethyl Alcohol
Isopropyl Alcohol (Ipa)
Methyl Alcohol
Methyl Ethyl Ketone
Naphtha (Vm&P)
Toluene

Storage Limits

Observe the following storage limits:

- Open shelf/floor storage of chemicals
 - Glass, plastic, or metal containers - 10 gallons
 - Safety cans – 25 gallons
- Storage in Flammable storage cabinets
 - Classes 1A, 1B, 1C, II (Flashpoint <140 F) - 60 gallons Total
 - Class III (Flashpoint > 140 F) – 60 gallons Total

Use and Storage of Flammable and Combustible Liquids

- Flammable liquids and combustible liquids should be stored in a flammable liquid cabinet.
- If they have a flashpoint greater than 200 degrees F or no flashpoint. Store in a chemical storage locker.
- In order to promote good safety and housekeeping, the following rules apply to Flammable Storage Cabinets:
 - Use Flammable Storage cabinets to store small quantities of paints and flammable material necessary for current usage. Dispose of all unrelated, unneeded material.
 - Stored containers must be closed, and each labeled for contents, toxicity, flammability, and reactivity.
 - Keep storage neat, orderly, and clean at all times.
 - Storage of other material such as paper, rags, paint brushes, etc., is prohibited.
 - The area for 25 feet surrounding this cabinet shall be free of fire hazards and parked vehicles.
 - When doubt exists about storage, usage, etc., contact the WFUHS EH&S.

- Flammable and combustible liquids should be stored separately and away from acids, bases and/or oxidizers.

Health Hazards Associated with Flammable and Combustible Liquids

Routes Of Exposure

There are many organic solvents used in our operations, either as pure materials or as complex mixtures in tradename products. These solvents may commonly enter the body either by breathing the vapors in air or by absorption through the skin. Ingestion is another possible, but unlikely, route of entry into the body. Inhalation is the most important route entry of the three, but skin exposure can lead to health impairment, as well as local effects on the affected tissue.

Health Hazards

In general, organic solvents acts as central nervous system depressants, resulting in dizziness, headache, and lack of coordination if inhaled in excessive quantities. In addition, some solvents can have toxic effects on organ systems in the body, such as the kidneys and liver.

Most of the organic solvents can defat the skin, removing its natural protective oils leading to dryness, scaling, cracking, and dermatitis. Broken skin will allow for much greater absorption of chemicals into the body and continued contact of solvents with the skin will delay healing. Solvents are also injurious if they come into contact with the eyes.

Some solvents have been found to cause cancer in laboratory animals. Benzene, for instance, has been linked to increased incidence of leukemia in humans. There are many more solvents about which the health effects in humans and animals are unknown. Caution dictates that ****any**** chemical be treated with respect and that contact be eliminated or at least minimized during all operations.

First Aid

In general, if a person has inhaled, ingested, or come into direct contact with these materials, the person must be removed from the source of contamination as quickly as possible when it is safe to do so. Medical help must be summoned. In the case of an exposure directly to the skin or eyes it is imperative that the exposed person be taken to an emergency shower or eyewash immediately. Flush the affected area for a minimum of 15 minutes, then get medical attention.