



Guidance Document

Flammable and Combustible Liquids

[This is a brief and general summary. Read the full MSDS for more details before handling.]

Introduction: Flammable and combustible liquids present a serious fire hazard because they ignite easily and burn rapidly. To fully understand this hazard for a specific material requires the knowledge of such properties as volatility, boiling point, flash point, flammable and/or explosive limits, and autoignition temperature. These properties are usually available from the material safety data sheet (MSDS) or other reference material.

In the USA a flammable liquid is one with a flashpoint below 100°F (38°C). A combustible liquid is less flammable, having a flashpoint between 100°F and 200°F (38 - 76°C). The flammable and combustible categories are further subdivided based upon flashpoint and boiling point.

<u>Category</u>	<u>Flashpoint</u>	<u>Boiling Point</u>	<u>Examples</u>
Class IA flammable liquids	below 73°F	below 100°F	ethyl ether, pentane
Class IB flammable liquids	below 73°F	equal to or greater than 100°F	acetone, benzene, hexane
Class IC flammable liquids	equal to or greater than 73°F	below 100°F	isopropanol, MIBK, xylene

Class II combustible liquids	equal to or greater than 100°F	below 140°F	acetic acid, cyclohexane
Class IIIA combustible liquids	equal to or greater than 140°F	below 200°F	naphthalene, phenol
Class IIIB combustible liquids	equal to or greater than 200°F	not specified	ethylene glycol, glycerine

Flashpoint - The most common property used for classification of flammable and combustible liquids is flashpoint. The flashpoint is the lowest temperature at which a liquid will give off sufficient vapor to ignite when a source of ignition is applied. It is the vapor that burns, not the liquid itself.

Flammable/explosive limits - The vapors must be mixed with air in certain proportions in order to burn. Each flammable or combustible liquid has its own upper and lower flammable/explosive limits. Concentrations below the lower limit are too lean to burn. Concentrations above the upper limit are too rich to burn.

Hazards: Fire and explosion are the primary hazards associated with flammable and combustible liquids. Keep in mind that many of these materials have additional hazards, including toxicity and carcinogenicity.

Sources of ignition: Flammable and combustible liquids can be ignited by heat, flame, hot object, electric spark or static electricity. Oxygen by itself does not burn, but it will support or accelerate combustion of flammable materials. Some materials that are nonflammable under normal conditions may burn if oxygen is enriched.

Use and Storage Guidelines

1. The main objectives are to avoid accumulation of flammable vapors and to control sources of ignition.
2. Quantities should be limited to the amount necessary for the work in process. Return obsolete materials to the Chemical Storage and Distribution Facility. Promptly submit all wastes for pickup by EHS.
3. Whenever possible use flammable and combustible liquids in a fume hood.
4. Flammable and combustible liquids should be stored in a flammable liquid cabinet, an approved cabinet designed and constructed to protect contents from external fires.
5. Store flammable and combustible liquids away from acids, bases and oxidizers.
6. No more than ten gallons of flammable and combustible liquids, combined, may be stored outside of a flammable storage cabinet.
7. No container for five gallon capacity or greater may be stored outside of a flammable storage cabinet.
8. All stored containers must be closed and properly labeled.
9. Storage in refrigerator must only be done in an appliance that has been specifically designed and constructed for flammable liquid storage. Standard household refrigerators must not be used. Refrigerators must be labeled as to whether they are suitable for flammable liquid storage.
10. Control all ignition sources. The more obvious sources include open flame from Bunsen burner, matches, smoking, etc. But be aware of less obvious sources including electrical equipment, static electricity and gas-fired heating devices. Common laboratory equipment is often not intrinsically safe (stirrers, Variacs, power strips, ovens, heat tape, hot plates, heat guns, etc.).
11. Do not heat flammable liquids with open flame. Use such alternates as steam bath, salt bath, oil bath, or heating mantle.
12. The pouring of flammable liquids can generate static electricity. Static electricity is more likely to develop in colder and drier atmospheres. Bonding or use of ground straps can prevent static electricity buildup. Grounding does not work with non-metallic containers (e.g. plastic bottle or drum). Contact must be made directly with the liquid.