

Chemical Storage Guidelines: Flammable Materials

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Many chemicals require special storage to minimize serious risk for personal injury and damage to property and equipment. Safe storage of chemicals begins with the identification of chemicals to be stored and their hazards. Material safety data sheets (MSDSs) may not provide enough information for safe storage and chemical segregation. There are many published methods for storing and separating chemicals into compatible families. Another resource is the National Oceanic Atmospheric Administration (NOAA), which has a "reactivity information" database for common hazardous chemicals. www.response.restoration.noaa.gov/chemaids/react.html.

Flammable liquids

Flash point is the lowest temperature at which a liquid can form an ignitable mixture (vapor) with air. Flammable liquids vaporize and form flammable mixtures when containers are left open, leaks or spills occur, or the liquids are heated. Vapor mixed with air can ignite with exposure to a spark or a flame. Flammable liquids form flammable vapors at temperatures below 100° F (hot summer day). At normal room temperatures, extremely flammable liquids form vapor below 73° F.

The handling and use of flammable liquids and their vapors may cause health hazards from

ingestion, inhalation, or skin contact. Health effects vary, depending on the particular chemical, the chemical concentration, and route of exposure. Dangers include toxicity, reactivity, instability, or corrosivity of the material. The ability of a chemical to either burn or support burning is a potentially disastrous physical hazard. Combustion byproduct contaminants are also a concern because they are different from those of the original flammable material. Byproducts include fumes, gases, smoke, and dust particles. They can produce toxic effects, as in fire fatalities resulting from poison gases.

Examples of common flammable liquids are listed below. Always refer to the MSDS for specific product information and chemical composition. The NIOSH Pocket Guide is another information resource, www.cdc.gov/niosh/npg/npg.html.

Flammable Flash point < 200° F		Extremely flammable Flash point <73° F (23° C) Boiling point <100° F (38° C)
Boiling point is the temperature at which liquid boils.		
Diesel oil Furniture polish Kerosene Oil-based paints Fuel oil	Nail polish remover Paint thinner Rubber cement Turpentine Gasoline	Charcoal starter fluid Cigarette lighter fluid Spray paints Wood stains

Information excerpted from the Handbook of Chemical and Environmental Safety in Schools and Colleges.

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Chemical Storage Guidelines: Flammable Materials *continued*

The storage of flammable substances requires considerable care and thought to protect people and property from fire and explosion. Inappropriate storage can result in hazardous chemical interactions. Keep flammable materials away from incompatible chemicals. For example, the NIOSH Pocket guide (www.cdc.gov/niosh/npg/npgd0648.html) identifies turpentine as incompatible and reactive with strong oxidizers, chlorine, chromic anhydride, stannic chloride, and chromyl chloride.

The following is a general guide for the storage and segregation of flammables. Do not store flammables with the following:

- Oxidizing agents such as chlorates, nitrates, perchlorates, permanganates, and peroxides. They usually do not combust on their own but provide the oxygen to accelerate the combustion rate of other chemicals.
- Corrosive chemicals (acids or bases that destructively attack organic and non-organic material). Common acids include sulfuric acid (battery acid), acetic acid, and nitric acid. Although acetic acid and nitric acid are both acids, they are incompatible and require further segregation. Common alkalis (bases) include ammonium hydroxide, calcium oxide (lime), and sodium hydroxide (lye).
- Materials susceptible to spontaneous heating and/or explosions. Hydrogen peroxide contacting combustible material can result in spontaneous combustion. Picric acid can be explosive.
- Substances that react with air or moisture to create heat (water-reactive materials react with water to release a gas that is flammable or presents a health hazard). Sulfuric acid is a corrosive that reacts violently with water, giving off an irritating and toxic fume.

Avoid storing flammables in direct sunlight or near other heat sources; eliminate all sources of ignition. Keep the area dry and cool. Use explosion-proof refrigerators designed for chemical storage when chemicals require extra cool temperatures. Most flammable vapors are heavier than air and settle low. Provide adequate ventilation to prevent the accumulation of large amounts of vapor.

Store flammable materials in a designated and approved fireproof cabinet or storage rooms as required by 1910.106, **Flammable Liquids**. Cabinets must be labeled; **FLAMMABLE – KEEP FIRE AWAY**. Metal cabinets must be constructed with

at least 18-gauge sheet iron and double-walled, with 1½ inch air space. The doorsill must be at least 2 inches above the bottom of the cabinet. **NFPA 30, Flammable and Combustible Liquids Code**, does not require venting for fire protection purposes. Vent openings must be sealed with bungs according to manufacturer's instructions. However, if the cabinet is vented, it should be vented from the bottom directly outdoors.

Storage rooms have specific construction and ventilation requirements; see 1910.106. Check local fire codes for additional storage requirements.

Store flammable solids in fireproof storage cabinets but not with flammable liquids. Flammable solids such as sulfur, calcium carbide, and white phosphorus can ignite in the presence of air or oxygen and continue to burn until the material is spent.

Before storing flammables, ask:

- Is the inventory of flammables appropriate to the workload?
- Does the quantity of in-use or stored liquids outside of flammable-storage cabinets or storage rooms exceed 1910.106 requirements?
- Are containers closed and stored in appropriate fireproof storage containers, cabinets, or rooms when not in use?
- Are approved safety cans in use, and are they in good condition?
- Are flammables stored with compatible chemicals?
- Are flammable liquids stored in areas where vapors cannot collect and away from electrical motors and other sources of ignition?
- Are containers labeled appropriately and expiration dates observed?
- Are bonding and grounding provisions in place for transfer of flammables?
- Are fire extinguishers available?
- Are there established procedures for the cleanup of spills and the disposal of chemicals and clean-up materials?

Resources

Handbook of Chemical and Environmental Safety in Schools and Colleges, published by J.B. Lippincott Company
NFPA 30, Flammable and Combustible Liquids Code,
2000 Edition

Related Resource Links:

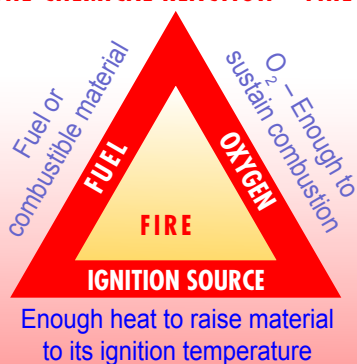
1910.106, Flammable Liquids, rule:
osha.oregon.gov/OSHArules/div2/div2H.pdf

Federal OSHA, Chemical Reactivity Hazards:
www.osha.gov/SLTC/reactivechemicals/index.html

Flammable Liquids Fact Sheet:
osha.oregon.gov/OSHApubs/factsheets/fs12.pdf

GHS-aligned Hazard Communication Standard
guidebook: osha.oregon.gov/OSHApubs/4960.pdf

THE CHEMICAL REACTION – FIRE



OR-OSHA (12/14) FS-13

The Standards and Technical Resources Section of Oregon OSHA produced this fact sheet to highlight our programs, policies or standards. The information is from field staff, research by technical resources staff, and published materials. We urge readers to also consult the rules, as this fact sheet information is not as detailed.

