



Flammable & Combustible Liquids - Hazards

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What are flammable and combustible liquids?

Flammable and combustible liquids are liquids that can burn. They are classified, or grouped, as either flammable or combustible by their flashpoints. Generally speaking, flammable liquids will ignite (catch on fire) and burn easily at normal working temperatures. Combustible liquids have the ability to burn at temperatures that are usually above working temperatures.

There are several specific technical criteria and test methods for identifying flammable and combustible liquids. Under the Workplace Hazardous Materials Information System (WHMIS), flammable liquids have a flashpoint below 37.8°C (100°F). Combustible liquids have a flashpoint at or above 37.8°C (100°F) and below 93.3°C (200°F).

Flammable and combustible liquids are present in almost every workplace. Fuels and many common products like solvents, thinners, cleaners, adhesives, paints, waxes and polishes may be flammable or combustible liquids. Everyone who works with these liquids must be aware of their hazards and how to work safely with them.

What is a flashpoint?

The flashpoint of a liquid is the lowest temperature at which the liquid gives off enough vapour to be ignited (start burning) at the surface of the liquid. Sometimes more than one flashpoint is reported for a chemical. Since testing methods and purity of the liquid tested may vary, flashpoints are intended to be used as guides only, not as fine lines between safe and unsafe.



Does the liquid itself burn?

Flammable and combustible liquids themselves do not burn. It is the mixture of their vapours and air that burns. Gasoline, with a flashpoint of -40°C (-40°F), is a flammable liquid. Even at temperatures as low as -40°C (-40°F), it gives off enough vapour to form a burnable mixture in air. Phenol is a combustible liquid. It has a flashpoint of 79°C (175°F), so it must be heated above that temperature before it can be ignited in air.

What are flammable or explosive limits?

A material's flammable or explosive limits also relate to its fire and explosion hazards. These limits give the range between the lowest and highest concentrations of vapour in air that will burn or explode.

The lower flammable limit or lower explosive limit (LFL or LEL) of gasoline is 1.4 percent; the upper flammable limit or upper explosive limit (UFL or UEL) is 7.6 percent. This means that gasoline can be ignited when it is in the air at levels between 1.4 and 7.6 percent. A concentration of gasoline vapour in air below 1.4 percent is too "lean" to burn. Gasoline vapour levels above 7.6 percent are too "rich" to burn. Flammable limits, like flashpoints however, are intended as guides not as fine lines between safe and unsafe.

What is an Autoignition Temperature?

A material's autoignition or ignition temperature is the temperature at which a material self-ignites without any obvious sources of ignition, such as a spark or flame.

Most common flammable and combustible liquids have autoignition temperatures in the range of 300°C (572°F) to 550°C (1022°F). Some have very low autoignition temperatures. For example, ethyl ether has an autoignition temperature of 160°C (356°F) and its vapours have been ignited by hot steam pipes. Serious accidents have resulted when solvent-evaporating ovens were heated to temperatures above the autoignition temperature of the solvents used. Autoignition temperatures, however, are intended as guides, not as fine lines between safe and unsafe. Use all precautions necessary.



How can flammable and combustible liquids be a fire or explosion hazard?

At normal room temperatures, flammable liquids can give off enough vapour to form burnable mixtures with air. As a result, they can be a serious fire hazard. Flammable liquid fires burn very fast. They also give off a lot of heat and often clouds of thick, black, toxic smoke.

Combustible liquids at temperatures above their flashpoint also release enough vapour to form burnable mixtures with air. Hot combustible liquids can be as serious a fire hazard as flammable liquids.

Spray mists of flammable and combustible liquids in air may burn at any temperature if an ignition source is present. The vapours of flammable and combustible liquids are usually invisible. They can be hard to detect unless special instruments are used.

Most flammable and combustible liquids flow easily. A small spill can cover a large area of workbench or floor. Burning liquids can flow under doors, down stairs and even into neighbouring buildings, spreading fire widely. Materials like wood, cardboard and cloth can easily absorb flammable and combustible liquids. Even after a spill has been cleaned up, a dangerous amount of liquid could still remain in surrounding materials or clothing, giving off hazardous vapours.

What is the danger of flashback?

Vapours can flow from open liquid containers. The vapours from nearly all flammable and combustible liquids are heavier than air. If ventilation is inadequate, these vapours can settle and collect in low areas like sumps, sewers, pits, trenches and basements. The vapour trail can spread far from the liquid. If this vapour trail contacts an ignition source, the fire produced can flash back (or travel back) to the liquid. Flashback and fire can happen even if the liquid giving off the vapour and the ignition source are hundreds of feet or several floors apart.



Can flammable or combustible liquids be hazardous to my body?

The most obvious harm would be the danger of a fire or explosion. After the immediate danger of a fire, there are sometimes other properties of these liquids that may be hazardous to the body. Flammable and combustible liquids can also cause health problems depending on the specific material and route of exposure (breathing the vapour/mist, eye or skin contact, or swallowing). Some flammable and combustible liquids are corrosive. Many undergo dangerous chemical reactions if they contact incompatible chemicals such as oxidizing materials, or if they are stored improperly.

The Material Safety Data Sheet and the supplier's labels on the containers should tell you about all the hazards for the flammable and combustible liquids that you work with.

An example is 2-propanol (also known as: dimethylcarbinol, isopropanol, or isopropyl alcohol). It is a colourless liquid with a sharp odour like rubbing alcohol or resembling that of a mixture of ethanol and acetone. It is flammable liquid and vapour. Vapour is heavier than air and may spread long distances. Distant ignition and flashback are possible. It is also considered to be a mild central nervous system depressant. High vapour may cause headache, nausea, dizziness, drowsiness, incoordination, and confusion. It may also be irritating to the respiratory tract or eyes.