

## Discussion and Notes

Keep a copy of these safety training notes and a signed attendance sheet to verify regular safety training. Regulatory inspectors will usually request proof of safety training.

The important CSB safety message and the accompanying video, "After the Rainbow," may be viewed on the CSB website <http://www.csb.gov/csb-releases-safety-message-on-preventing-accidents-in-high-school-chemistry-labs/>

Another safety reminder video released by the CSB, called Back to School Safety Message, can be found here: <https://www.youtube.com/watch?v=f6VAHO1Bhs0>

All Flinn Scientific Canada chemical labels and Safety Data Sheets are GHS-compliant. For free online access to all Flinn SDS, go to <https://www.flinnsci.ca/sds/>

## Prevent Tragic Accidents with Flammable Liquids

*Girl in Flames Runs from School Lab Explosion! Lab Accident Sends Teacher and Students to Hospital! Teacher Charged After Experiment Goes Awry!*

These real news headlines have appeared as a result of accidents involving flammable liquids in science labs. Fires in science labs are always tragic, all the more so because they can easily be prevented. In a Safety Alert, the United States Chemical Safety Board (CSB) delivered a clear and unequivocal message—with better attention to good safety practices, and safety training, accidents like these can be avoided. The purpose of this safety note is to review essential safety practices for using flammable liquids.

### General Safety Precautions

Always keep flammable liquids away from heat, sparks, open flames and other sources of ignition. Use the smallest amounts possible in experiments and demonstrations, and always cap solvent bottles when not in use. Most flammable liquids are volatile organic compounds that are also slightly toxic by inhalation and are body tissue irritants. Mild headaches or dizziness may be symptoms of overexposure to organic vapours. Always work with flammable organic liquids in a hood or well-ventilated lab. Wear chemical splash goggles, chemical-resistant gloves, and a chemical-resistant apron.

### Classifying Flammable Liquids

OSHA classifies flammable liquids into four categories based on their flash points and boiling points. The flash point is the minimum temperature at which a liquid forms a vapour above its surface in sufficient concentration that it may be ignited with a spark or flame. GHS criteria and hazard statements for flammable liquids are shown in the following table, along with common examples.

| GHS Hazard Statement                  | Flash Point                  | Boiling Point   | Examples  |
|---------------------------------------|------------------------------|-----------------|---|
| Extremely flammable liquid and vapour | < 23 °C (73 °F)              | ≤ 35 °C (95 °F) | Ethyl ether   |
| Highly flammable liquid and vapour    | < 23 °C                      | >35 °C          | Methyl alcohol, Ethyl alcohol, Acetone, Toluene, Hexane |
| Flammable liquid and vapour           | ≥ 23 °C and ≤ 60 °C (140 °F) | Not specified   | Glacial acetic acid, n-Butyl alcohol                    |
| Combustible liquid                    | >60 °C and ≤ 93 °C           | Not specified   | Kerosene  |

To understand these criteria in context, consider a liquid exposed to a spark. A liquid with a flash point less than 100 °F (38 °C) can be ignited by a spark at or near room temperature. Combustible liquids may require more than a spark to ignite them at room temperature, but are dangerous when heated. Holding a flame above a combustible liquid will quickly heat the vapours above the flash point and may start a fire.

The Safety Data Sheet (SDS) of a substance lists the GHS hazard category and the accompanying hazard statement, along with its flash point, NFPA code and hazard rating (if available), and the autoignition temperature. The autoignition temperature is the temperature at which the material will initiate a self-sustained fire even without an ignition source.

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*Flinn Scientific Canada maintains a comprehensive database of tested lab procedures for thousands of science topics. Please contact us if you need an activity for a specific topic, principle or concept. We are delighted to share!*

## Safety Checklist for Working with Flammable Liquids

- Work with flammable liquids in the hood or a well-ventilated lab equipped with a purge fan. The lab must also be furnished with an ABC fire extinguisher, fire blanket, safety eyewash, and safety shower.
- Never use flammable liquids around an ignition source. Organic liquid vapours are heavier than air and will quickly travel great distances along a lab bench or floor to an ignition source.
- For demonstrations involving highly flammable liquids and vapours, dispense the liquid in small amounts before beginning the demonstration.
- Cap the solvent bottle and move it far away from the demonstration area.
- Never add fuel to a fire! Do NOT pour a flammable liquid onto a hot surface, flame or other ignition source, and NEVER add more liquid once a demonstration is underway.

## Always Follow a Written Procedure

Comprehensive safety training goes beyond safety precautions for specific chemicals to build a “Safety First” culture. Before doing any lab activity, instructors must identify all physical, chemical and biological hazards, evaluate their relative risk, and adopt safe WRITTEN procedures to protect against these hazards. You must have a written procedure before doing any lab activity!

## Common Lab Fire Captured on Video

We have reenacted a lab fire using methyl alcohol to reinforce the safety precautions described in this note and demonstrate that these accidents are totally preventable. Please click on the following link <https://www.flinnsci.ca/common-school-laboratory-accidents2/vsc0670/> to view our dramatic Common School Laboratory Accidents video. It is only through education that we can ensure this type of accident will never occur again!

## Safety Training Will Prevent Accidents

Safety experts know that it’s easy to prevent the LAST accident you may have heard about. How do you prevent the NEXT one? Make safety a leading indicator for educational success in your school by encouraging all instructors to complete the Flinn Scientific Canada Laboratory Safety Course. Please visit the Flinn lab safety site at <http://labsafety.flinnsci.com> to learn about this comprehensive safety education program, available online, absolutely free, for all science instructors!

## Thank You for Your Support

Please continue to support our efforts to improve safety in science labs by ordering your laboratory chemicals and science supplies from Flinn Scientific Canada.

