

Guidelines for Storage of Flammable Alcohols in Laboratory Refrigerators and Freezers

This document provides guidance for limited storage of small quantities of flammable alcohols (ethanol, isopropanol, and methanol) in laboratory refrigerators and freezers. This will apply principally for Life Science laboratories storing biological samples (DNA, RNA, proteins, tissues, and whole organisms).

Definitions: (by the [Globally Harmonized System of Classification and Labeling of Chemicals](#))

- Flammable liquids have a flash point of less than 60 °C (140 °F).
- Combustible liquids have a flash point between 60 °C (140 °F) and 93 °C (200 °F).
- Flash point is the temperature at which a material emits sufficient vapor to ignite in the presence of an ignition source.
- Ethanol – CH₃CH₂OH, CAS #64-17-5, B.P. = 78 °C, Flash point = 17 °C.
- Isopropanol – (CH₃)₂CHOH, CAS #67-63-0, B.P. = 83 °C, Flash point = 12 °C.
- Methanol – CH₃OH, CAS #67-56-1, B.P. = 65 °C, Flash point = 11 °C.

Cold Storage of Flammable Liquids Requirements:

1. All stored containers of flammable and combustible liquids must be capped.
2. Flammable liquids cannot be stored in laboratory refrigerators and freezers, unless:
 - The refrigerator/freezer is specifically designated as a flammable materials storage refrigerator/freezer which complies with National Fire Protection Association (NFPA) 45, and is Underwriter's Laboratory (UL) listed, **OR**
 - The refrigerator/freezer is specially designed as being an explosion-proof refrigerator/freezer and complies with OSHA 29 CFR 1910.307 and is UL listed for Class 1, Groups C and D hazardous locations.
3. **EXCEPTION:** A limited risk is associated with cold storage of small-quantities of ethyl, isopropyl, and methyl alcohols (and their aqueous solutions) used for preserving biological samples (DNA, RNA, proteins, tissues, and whole organisms). Storage of these materials in non-rated (not flammable materials storage or explosion-proof) refrigerators or freezers will be allowed, provided:
 - The total quantity of alcohol solution per refrigerator or freezer unit does not exceed 2 L for full-sized (more than 10 cubic feet capacity) units or 1 L for compact (less than 10 cubic feet capacity) units, **and**
 - The quantity of alcohol solution in any single container does not exceed 500 mL, **and**
 - The alcohol solution is stored in closed primary containers, **and**
 - The primary containers are sealed in secondary containment, **and**
 - The secondary containment is durable (not readily breakable), **and**
 - The secondary containment is sealed by an air-tight closure, **and**
 - The secondary containment is not degraded by the alcohol.

<http://ora.research.ucla.edu/SafetyCommittee/CPSC/Pages/home.aspx>

Notes:

This guidance applies to pure alcohols as well as aqueous solutions. As the following data illustrate, even diluted ethanol solutions still fall within the flammable liquids category.

100% ethanol	Flash point = 17 °C
70% ethanol	Flash point = 21 °C
50% ethanol	Flash point = 24 °C
20% ethanol	Flash point = 36 °C

The definitions of flammable and combustible liquids used here were set by the [Globally Harmonized System of Classification and Labeling of Chemicals](#). However, Fire Codes may use the definitions and classifications addressed in Subsection 3.3.33 and Chapter 4 of [NFPA 30](#) wherein a lower flash point temperature of 38 °C (100 °F) was used to define flammable liquids. Even with this lower temperature definition, the alcohols and their aqueous solutions discussed in this guidance would still fall into the flammable category.

Many hard-sided plastic or metal containers are acceptable for secondary containment, but they must be sealed by an air-tight closure and not degraded by the stored alcohol. These are often available at grocery stores, department stores, or online. Given the huge variety of sizes, construction materials, and seal mechanisms, it is recommended that users select a candidate container and then subject it to pure alcohol for a two week period to see that it maintains its integrity.

Questions can be sent to: cpsc@research.ucla.edu

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