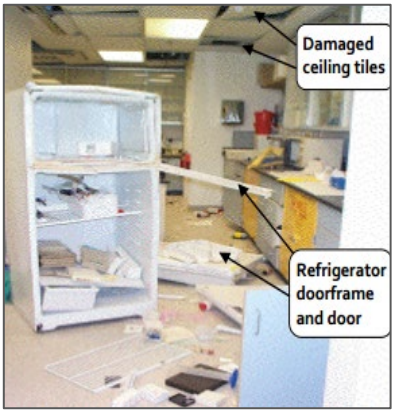
Flammable Storage in Refrigerators and Freezers

Mindfulness Minute: Incorporate safety into your workflow by considering the hazards associated with the storage of flammable chemicals in refrigerators and freezers.

Flammable liquids are defined as those that have a flash point below 93 °C or 199.4 °F (consult the SDS for a chemical's flash point). Flammable chemicals can release vapors. If these flammable vapors accumulate in a refrigerator or freezer that is ***not*** *for flammable storage or explosion-proof, they can ignite and cause a fire and even an explosion as the pressure builds up and is rapidly released upon ignition. Other refrigerators and freezers, including household units and some units that are marketed for lab use, do* ***not*** *have mechanisms to prevent ignition of these flammable vapors.*



University of Vermont: Refrigerator explosion due to flammable liquids storage.

Follow this list of dos and don'ts for safe flammable storage:

Do find a safe alternative to cooling flammable chemicals if an appropriate refrigerator or freezer is not available, such as an ice bath.

Do label refrigerators and freezers that are not designed for flammable material storage to prohibit flammable material storage (labels provided by EHS).

Don't store any amount of flammable liquids in a non-flammable storage or explosion-proof refrigerator. Even small amounts can lead to fires and explosions.

Safety features of flammable storage and explosion-proof units:

Flammable storage and explosion-proof units must meet the requirements of NFPA 45 (the National Fire Protection Agency's Standard of Fire Protection for Laboratories using Chemicals) and must be certified by an appropriate agency like UL or CSA.

- Thermostat and compressor components are located outside of the storage area within a vapor-proof enclosure.
- The interior storage area is sealed, vapor-proof, and free of any spark-generating components (i.e.: lights, icemaker, thermostat).
- Internal electrical connections are made by hardwiring to prevent sparking and accidental disconnection.
- The unit is manual defrost.
- The unit is clearly marked to indicate that it meets the requirements for the safe storage of flammable material and is marked with the appropriate certification from an agency like UL, CSA, etc.
- The unit bears a label stating "FLAMMABLE STORAGE - KEEP FIRE AWAY"
- Explosion-proof units differ from flammable storage units in that they have a spark-free exterior in addition to the above criteria and are used specifically for hazardous locations where flammable vapors, combustible dust, etc. are present in the environment outside the unit.

Flammable material storage refrigerator with appropriate markings.

References:

https://www.ehs.harvard.edu/sites/default/files/flammable_liquid_refrigeration_freezing_fact_sheet.pdf
https://research.wayne.edu/oehs/lab-safety/refrigeration-freezing-flammable-liquids
https://policy.ku.edu/procurement/purchasing-procedure-refrigerator-freezer-laboratory-teaching-research