

# ASSIST INFORMATION SHEET:

## Refrigerators and freezers in science

*Refrigerators and freezers are generally a standard piece of school science laboratory equipment. Although not a mandatory requirement, having access to them is definitely useful.*

Domestic refrigerators or freezers are commonly used in school science laboratories and may be used to store materials for dissections, certain chemicals, enzymes, microbial cultures, perishable items (foodstuffs) and ice for use only in science practical activities.

### General operating conditions for refrigerators and freezers:

- Follow the manufacturer's instructions for proper siting location including provision of adequate ventilation and the need to keep away from heat sources.
- The optimal operating temperature for a refrigerator is the range of 0°C–4°C and for a freezer is minus 18°C<sup>1</sup>. The temperature can be checked using suitable thermometers.
- Units should not be overfilled to allow cold air to effectively circulate to maintain even temperatures throughout.
- Freezers should be defrosted regularly to prevent ice build-up. This will allow for upright storage of containers and proper functioning. A frost-free model can be purchased instead.

### Science ASSIST recommends the following:

- Refrigerators/freezers should be located in the science preparation area away from the chemical store, flammable liquids cabinet and any areas that are accessible by students.
- Food and drink for human consumption should never be stored in a laboratory refrigerator/freezer. Signage should be used to indicate this (See below).
- Flammable chemicals should never be stored in domestic refrigerators as they contain sources of ignition (See notes below). Signage should be used to indicate this (See below).
- Corrosive chemicals that produce corrosive vapours/fumes should not be stored in refrigerators due to the lack of ventilation and their ability to corrode metal.
- Incompatible chemicals should not be stored in the same refrigerator.
- Chemicals stored in refrigerators should be included in the annual stocktake, stored in closed containers and properly labelled with the contents, owner, date of acquisition or preparation and nature of any potential hazard. The labels used should be water resistant.
- Plastic trays can be used as secondary containment to capture spills.
- Regular housekeeping should be conducted to assess the condition of refrigerator/freezer contents. Check for cracked caps, blurred labels, old chemicals and any leaking chemicals. Leaks and spills should be cleaned up immediately. Units should be cleaned regularly, and stock be rotated to ensure that older items are used first.
- Dissection materials used in practical activities should be:
  - of good quality i.e. fresh and passed relevant health inspections
  - stored in the refrigerator when fresh for no more than 24–48 hours prior to dissection
  - wrapped individually or in class sets in air-tight packaging when freezing to enable easy defrosting and to avoid freezer burn. They should be frozen for no more than 12 months to maintain the quality of the material. Frozen material should be defrosted overnight in a refrigerator and used within 24 hours.

## Signage

- There is no requirement to have the refrigerator/freezer locked, but it is recommended that appropriate signage is used such as 'No foodstuffs for human consumption to be stored in this refrigerator/freezer' to avoid contamination of food for human consumption<sup>2</sup> and 'Not suitable for flammable chemicals' to avoid storage of flammable chemicals<sup>3</sup>.
- It is also recommended that signage, such as 'Do not turn off power' be placed near the power point to prevent accidental shutting off of the power. In the case of power outage, relevant contact details should be available to arrange alternate storage.

## Considerations for storage of flammable chemicals

Domestic refrigerators have ignition sources within their electrical components and these include switches, internal lights, heating elements and motors. Due to the presence of ignition sources, flammable chemicals should never be stored in domestic refrigerators.

'Where flammable substances must be kept below room temperature, the refrigerators where they are stored must be spark-free to prevent ignition of the vapours inside. (Note that) Spark-free refrigerators are designed to eliminate generation of sparks inside the body of the unit only. These appliances within a chemical store are a source of ignition for flammable substances stored outside the refrigerator'<sup>4</sup>.

Australian Standard 2243.2:2006 – *Safety in Laboratories Part 2 Chemical Aspects*, Section 4.4.3-part (c) states that: 'A refrigerator may be used to store flammable chemicals provided it has been designed and manufactured to eliminate ignition sources. It may be possible for a domestic refrigerator to be modified by a competent person to eliminate ignition sources.'<sup>3</sup>

Spark-free laboratory refrigerators and freezers are available from scientific suppliers. See the Science ASSIST [School science suppliers](#) list.

**Note:** Short term cooling of a flammable chemical can be achieved using an ice bath.

## References and further reading

<sup>1</sup> 'Fridge temperature guide', Choice website. <https://www.choice.com.au/home-and-living/kitchen/fridges/articles/temperature-guide> (2 June 2017)

<sup>2</sup> Standards Australia. 2005. AS/NZS 2243 *Safety in Laboratories, Part 1: 2005 Planning and Operational Aspects*. Sydney, Australia.

<sup>3</sup> Standards Australia. 2006. AS/NZS 2243 *Safety in laboratories Part 2: Chemical Aspects*. Sydney, Australia. This extract is reproduced with permission from SAI Global Ltd under License 1407-c117.

<sup>4</sup> Science ASSIST. 2016. *Guidelines for the design and planning of secondary school science facilities in Australian schools*. <https://assist.asta.edu.au/resource/4175/guidelines-design-and-planning-secondary-school-science-facilities-australian-schools>, ASTA, p 24.

'Handling food in the home', CSIRO website. <https://www.csiro.au/en/Research/Health/Food-safety/Food-handling> (26 February 2015)

'Freezer storage times', Food Safety Information Council website. <http://foodsafety.asn.au/freezer-storage-times/> (Accessed January 2018)

University of Queensland Occupational Health and Safety Unit. 2010. *Guidelines for the storage of flammable solvents in refrigerators*. The University of Queensland website. [http://www.uq.edu.au/ohs/OHYG/OHYG%20-%20storage\\_of\\_flammable\\_solvents.pdf](http://www.uq.edu.au/ohs/OHYG/OHYG%20-%20storage_of_flammable_solvents.pdf) (October 2010)