

Lab Energy Challenge



Preserve Samples and Save Energy

Ultra-Low Temperature Freezers (ULTs) preserve millions of precious samples at UBC, but freezers risk failure and need vigilant oversight. Implementing these freezer smart actions will not only reduce energy, but will also lengthen the life of the ULT by reducing burden on the compressor.

Chill Up Your ULT

Your ULT does not have to work so hard. Find out the temperature your samples need and store your samples at the temperature they require and no colder. Most cases show that samples only require -70°C storage or warmer.

Examples of Samples Stored at -70°C or Warmer at Other Universities

Sample Type	Temp (°C)	Department	University	
DNA, RNA, Proteins, antibodies, growth factors, protein samples	-70	Molecular, Cellular, Developmental Biology	CU-Boulder	<i>12% of ULTs inventoried at UBC in Life Science Centre, Michael Smith Labs, and Biosciences are already set at -70°C or higher.</i> <i>50% of ULTs at CU-Boulder are set at -70°C</i> <i>Studies show that genomic DNA quality remains the same when stored at -20°C & -80°C</i>
Yeast, Fungi, Bacteria, RNA, Animal Tissue	-70	Chemistry	UC Davis	
Ligands drugs, anti-cancer frozen cells	-70	Biochem	CU-Boulder	

ULT Back-Up

In the event of a power outage, thaw time should be a consideration. In testing done here at UBC, it took 4 hours (240 minutes) to warm a freezer from -80°C to -50°C in an empty ULT. Samples will not degrade instantly if a freezer fails, and there is time to transfer samples. Failure concerns can be alleviated by ensuring the back-up system (liquid Nitrogen, CO₂, etc.) is correctly configured and reliable. Check on the following for your back-up system:

- Ensure the CO₂ is delivered as liquid not a gas
- Ensure the “Withdrawal Mechanism” is set up properly for the CO₂ or LN₂
- Ensure the safety datasheet is present with the stored liquid

Liquid gas ULT Freezer back-up will activate when the temperature reaches a set point. It will last for several hours allowing time to transfer samples. Keeping the freezer at a temperature lower than the samples require is not a back-up method. Rely on a back-up system described above instead.

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ULT Chill Up FAQs

Is it safe to store samples at -70°C?

Most samples such as bacteria, proteins and viruses are generally safe at -70°C. In fact, seventeen years ago ULTs were set to -65°C or -70°C. The drive to continually lower freezer temperatures has more to do with marketing and selling freezers than it has to do with science.

Are other researchers storing at -70°C?

Many other prestigious universities have joined the Chill Up movement such as:

- CU-Boulder
- Dartmouth
- Harvard
- Stanford
- UC Davis
- UC Santa Barbara
- University of Pennsylvania

A list of samples stored at -70°C at CU-Boulder and UC Davis can be found [here](#).

When is chilling up to -70°C not a good idea?

ULTs that are only partially full may not be suitable for chilling up as they are more susceptible to larger temperature swings when the door is open.

What can you do to resolve temperature swings?

- Increase the thermal mass in the ULT by filling empty spaces with frozen jugs of water.
- Share ULT space with other users within the lab.
- Minimize door opening, maintain a good sample inventory and labelling system which will allow users to plan the sample location prior to opening the door.

Have further questions?

For more information, visit the [Freezer Management Toolkit](#) or contact green.labs@ubc.ca.

References and Further Resources

Stanford University, "Fact Sheet: Chill Up Your Ultra Low Temperature Freezer" (2015)

University of Edinburgh, "Freezers Best Practice" (2015)

SeraCare LifeSciences, Stability of Genomic DNA at Various Storage Conditions (2009)

De Paoli, "Biobanking in microbiology: From sample collection to epidemiology, diagnosis and research", FEMS Microbiology Reviews 29 pp. 897–910 (2005)

Biomatrix, "A Warmer Reception", European Pharmaceutical Contractor (2010)