

## Save Energy! Raise your Ultra Low Temperature (ULT) Freezer Temperature from -80° C to -70° C.

Ultra Low Temperature (ULT) freezers are common in life sciences, biochemistry and biology laboratories. They are not only expensive to procure, but also have significant operating costs and can account for 5% or more of a laboratory's electricity use<sup>1</sup>. Samples like DNA, RNA, antigens, bacteria, viruses, cell liners and more are being stored in these freezers. Today most ULT freezers operate between -80° and -86° C with a factory default setting often being -85° C. Energy costs to run a ULT freezer vary from \$750 to \$1000/year and there are 700 ULT registered freezers and approximately 400 unregistered UTL freezers on our campus.

Historically, the first ULT freezers operated at -60° C. Furthermore, 15 to 20 years ago most ULT freezers were running at -70° C and were referred to as 'minus seventies'. It is only recently that the modern -80° ULT freezers have become the industry norm. With energy conservation in mind, many higher education institutions are now looking at the option of raising the temperature of ULT freezers by 10° C without compromising the quality of research. Raising the temperature by 10° C has shown to save 10 to 15% of a freezer's electricity costs and possibly up to 30% for some older freezer models<sup>2</sup>. Present day researchers are often instructed to run ULT freezers at -80° C and thus are hesitant to raise the temperature for fear of compromising their samples. Studies have shown that DNA samples are stable with little or no denaturing when stored at temperatures as high as -20° C over 24 months<sup>3</sup>. Based on this information we recommend that laboratories performing only DNA research can opt for a residential freezer to save on up to 80% of their freezer related energy costs. In a related study Miller et. al. have demonstrated<sup>4</sup> that DNA, RNA, antigens and viruses are stable for twenty years at -70° C. Studies conducted at Wiley lab, University of Colorado also support that the above materials including competent cells are stable at -70° C for longer periods (personal communication by OCS staff).

Benefits of raising the temperature on your ULT freezer to -70° C include:

- Based on the make and model of the freezer up to 30% on energy savings
- Longer compressor life due to operation at warmer temperature of -70° C
- Less heat is generated in the laboratories and/or corridors where these freezers are placed
- Reduced greenhouse gases (GHG)

***Raise the temperature on your ULT freezer today to -70° C and help save on energy and reduce GHG emissions!***

References:

1. SRS Dept.-University of Edinburgh, S-Lab, VWR, Eppendorf, Cold Storage Study Outline (2014).
2. [http://labs21.lbl.gov/wiki/equipment/index.php/Category:Ultra\\_Low](http://labs21.lbl.gov/wiki/equipment/index.php/Category:Ultra_Low).
3. Wu J. et. al., Stability of Genomic DNA at Various Storage Conditions. Poster Presentation, QACO3 ISBER Meeting (2009).
4. Miller L. et. al., Twenty Year Stability Study of HIV, HBV, Antibodies, Antigen and Nucleic Acids in Plasma. Poster Presentation at the Annual ISBER conference (2013).

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*"I have been a biomedical researcher for almost 30 years and use an ULT freezer to store many valuable samples. After becoming engaged with the Sustainable Laboratory Program, our lab raised the temperature from -80 to -70C on our ULT freezer. It not only saves energy but also helps prolong the life of the freezer while preserving the integrity of our samples. We recommend that all U-M labs make the switch to -70C".*

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