

Smart Notes

QA

Preparing SARS-CoV-2 Research Samples for Cryogenic Storage using the Thermo Scientific CryoMed Controlled-rate Freezer

How can the Thermo Scientific™ CryoMed™ Controlled-rate Freezer be used to prepare research samples for long-term storage in an ultra-low temperature freezer or cryogenic storage device?

The SARS-CoV-2 (that causes Covid-19) disease outbreak that began in December 2019 is spreading rapidly throughout the world, putting pressure on testing laboratories to increase sample preparation and storage capabilities. While testing laboratories are busy processing samples, biorepositories are also ramping-up on equipment to prepare and store SARS-CoV-2 samples for future virology studies. The CryoMed Controlled-rate Freezer (CRF) offers laboratories and biorepositories around the world a solution for preparing samples for cryogenic storage.

Laboratories storing research samples for future studies should follow the ISBER Best Practices: Recommendations for Biorepositories 4th Edition guidelines for preserving samples for future use. According to the guidelines, LN₂ cryopreservation is optimal for long-term specimen storage, as these systems maintain specimen temperatures below the glass transition phase temperature of -132°C.



While storage below the glass transition temperature is important, the preparation of samples for storage below the glass transition temperature is equally important. Controlling the rate at which a specimen is frozen, allows for greater cellular viability once a sample is removed from a cryogenically frozen state. In order to safely prepare samples for cryogenic storage, a CRF should be utilized to safely usher specimens through the latent-heat of fusion threshold.

The CryoMed Controlled-rate Freezer offers 6 factory-set freezing profiles for end-users. In addition to the pre-set profiles, users may create up to 10 custom freezing profiles. For SARS-CoV-2 samples that are being stored cryogenically, CryoMed users should consider creating a custom freezing profile, using Pre-Set Profile #1 as the foundation, changing the termination temperature in Step 6 from -90°C to -140°C.

Pre-set Profile #1

Commonly used for 2.0 mL sample size, resulting in a 1°C rate from nucleation to 40°C and a 10°C per minute cooling rate to a 90°C end temperature

Steps	Time	Temperature
Step 1	Wait	at 4.0°C
Step 2	1.0 C/m S	to -4.0°C
Step 3	25.0 C/m C	to -40°C
Step 4	10.0 C/m C	to -12.0°C
Step 5	1.0 C/m C	to -40°C
Step 6	10.0 C/m C	to -90°C
Step 7	End	

For long-term storage of samples, Thermo Scientific offers two LN₂ cryogenic freezer platforms: the Thermo Scientific™ CryoExtra™ High Efficiency LN₂ Storage Tanks and the Thermo Scientific™ CryoPlus™ LN₂ storage devices. When choosing between the CryoExtra and CryoPlus platforms, customers should consider how many samples they will be storing and whether they will be storing in liquid phase or vapor phase states. For larger sample sizes being stored in vapor phase, the CryoExtra platform is best. The CryoExtra platform is offered in four capacities and can accommodate between 19,500 and 93,000 2 mL vials. For smaller sample sizes, the CryoPlus may be selected, accommodating both liquid or vapor phase storage, with a 2 mL vial capacity ranging from 6,318 to 39,000.

Conclusion

The CryoMed Controlled-rate Freezer in combination with the CryoExtra and CryoPlus platforms provide biorepositories and laboratories a complimentary product offering for preparing and cryogenically storing SARS-CoV-2 samples.

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