



TECHNICAL NOTE

Can glass vials be frozen and what do you need to know?

Most glass vials can tolerate temperatures down to -4°C , a common temperature for short-term storage of test samples without requiring special precautions. A glass vial containing mostly organic solvents can be stored at temperatures as low as -80°C . However, extra care should be taken with vials and closures made from polypropylene since these materials become increasingly brittle at temperatures below 0°C .

Here are some general guidelines to follow when freezing vials:

Storing Vials:

When storing vials, it is important that the vials avoid intense direct sunlight. The best results are obtained when the samples are kept in a plastic vial rack during storage and thawing.



Many liquids expand when frozen and this is particularly true when the sample is mostly water. When frozen water expands, it exerts considerable pressures on closed containers and may cause them to burst. Therefore, any vial or other container that will be stored below

the freezing point of water (0°C) should not be filled to the rim in order to allow adequate space for expansion.

For extreme low temperatures, snap caps are not recommended. The best low temperature vials should have large internal volumes and relatively small openings such as clear glass 8-425 screw thread vials or clear glass standard opening crimp top vials. It is possible to use large opening vials with good results, but handling precautions must be strictly followed including the use of a closed top cap or a bonded septum open top cap.

When storing vials for extended periods of time or at very low temperatures, a crimp seal or solid top screw thread cap is recommended.

Thawing Frozen Vials

Cold and frozen vials must be handled with extreme care. In general, glass vials will crack when exposed to rapid temperature changes (particularly for amber vials). Do not place cold vials directly on warm surfaces. Physical shock must be avoided. Sitting a cold vial on a metal surface greatly increases the potential for base breakage.

Be aware that very cold vials have a tendency to stick to any surface until completely thawed. Additionally, it is best to avoid disturbing vials until all traces of frozen liquid are gone and the contents have reached ambient temperature.

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Warming Frozen Vials:

Vials should be warmed gradually. It is very important to avoid rapid changes in temperature especially when warming the vial. It is not advisable to use water baths, heat guns, ovens, or other elevated heat sources to warm vials. Rather, it is generally best to thaw frozen vials by allowing them to come to room temperature slowly while sitting on a non-heat conductive surface at ambient temperatures. Vials stored at temperatures below -20°C should be allowed to equilibrate in a refrigerator (-4°C to 0°C) before finally being brought to room temperature. This two-stage process minimizes the possibility of stress fractures.

Considerations for PTFE/Silicone Septa:

Many materials used for septa have a lower temperature limit of about -40°C . PTFE/Silicone septa will maintain an adequate seal at temperatures down to -80°C , but care must be taken to avoid over-tightening closures. There should be no noticeable deformation of the septum when properly tightened.

Please note that we publish a lower usable temperature of -40°C for PTFE/Silicone septa. This limit refers to the temperature where

the piercing characteristics of the septum are maintained. Below this temperature, the septum begins to harden so that it cannot be easily pierced with a needle, but adequate sealing of a vial is maintained down to -80°C . When a PTFE/Silicone septum stored at -80°C is brought back to room temperature the piercing characteristics return to normal.



For more information, contact your sales representative