

## Freeze Dryer Solvent Compatibility

Solvents and acids can cause several different problems with freeze dryers:

- Since the freezing points of solvents are very low, often then will not condense on the condenser. The result is solvents traveling to the vacuum pump. If allowed to enter the vacuum pump, they will degrade the oil and cause damage to the vacuum pump.
- Some chemicals will attack plastic and rubber compounds. For example, acetone will attack acrylic causing crazing and eventual failure. Rubber and plastic components that have been exposed to damaging compounds should be removed and flushed with water.
- Acids will corrode and degrade the condensing surface at welds and braze joints.

The oil in the vacuum pump should be checked often. If it is discolored, shows particles or is cloudy it must be changed. The useful life of vacuum pump oil can be extended if the vacuum pump is operated for an extended period of time after a free dry run. Using the gas ballast on the pump allows contaminants to be purged from the hot oil.

To prevent damage the pump when using solvents a secondary trap should be installed in-line between the condenser and the vacuum pump. There are two types of traps that should be considered. First a chemical trap, such as activated carbon or Sodasorb can be used. As an alternative, a liquid nitrogen trap can be used. The extremely cold temperature of the LN2 trap will condense and possibly freeze any solvents.

Component	Material	Acids			Buffers		Solvents						
		Acetic Acid 20%	Formic Acid	Trifluoroacetic Acid (TFA)	Calcium Chloride	Sodium Phosphate	Acetone	Acetonitrile	Carbon Tetrachloride	Cyclohexane	Dioxane	Methyl t-Butyl Ether (MTBE)	Pyridine
<i>Valve Stem</i>	Acetal (Delrin)	M	S	S	S		S						
<i>Condenser Lid</i>	Acrylic			S			S	S	S				
<i>Hoses, Gaskets &amp; Valve Bodies</i>	Neoprene	M	S	S			M	M	S	S	S	M	S
<i>Flask Top</i>	Silicon Rubber		M	S		S			S	S	S	M	S
<i>Chamber &amp; Fittings</i>	Stainless Steel				M								

M = Moderate degradation; Limited use.

S = Severe degradation; Infrequent use recommended; Immediate, thorough cleaning required.