The SPI Supplies Family of Vacuum Pump Fluids

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SPI® SUPPLIES

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Pump Fluid Types

Hydrocarbon Fluids

Pump fluids can be segmented by application (e. g. mechanical pump vs diffusion pump) or fluid type (e.g. perfluorinated polyether vs. silicone vs. polyphenyl ether vs. dioctyl sebacate vs. other hydrocarbon type fluids).

Hydrocarbon Pump Fluid SPI LOBO™ and Welch Duo-Seal®

High quality pump fluids for rotary vane (mechanical) pumps

Use either of these two pump fluids with confidence for all mechanical pumps pumping out diffusion pumps except for those diffusion pumps that are charged with perfluorinated polyether (PFPE) pump fluids (e.g. Fomblin®, Krytox®, or SPI-Tox™).

There is a fundamental incompatibility between fluorocarbon based pump fluids vs. hydrocarbon based pump fluids and the two fluids should not be mixed. Similarly, if you have a pump presently charged with one of the perfluorinated polyether that you want to convert to hydrocarbon usage, it is nearly impossible to clean the pump of the original fluid well enough for it ever to be able to run properly on a pure hydrocarbon pump fluid.

Apiezon AP 201

Apiezon AP 201 is an industrial booster or diffusion pump fluid with an exceptionally high degree of oxidation resistance. It is the original fluid that has world wide acceptance, not to be confused with other 201 copies.

For those not so familiar with this type of pump fluid, keep in mind that Apiezon AP201 is a vapor booster pump fluid rather than a basic diffusion pump fluid. Vapor booster pumps have developed from conventional diffusion pumps but are designed to have high pumping speed and high gas throughput in the range 0.5 to 10^{-4} mbar. They are usually large units most often employed in industrial plant applications.

Polyphenyl Ether

(Santovac® 5 and Santovac® 5P Ultra)

Both Santovac fluids, 5 and 5P Ultra, are the same five ring polyphenyl ether, and both provide an outstanding vacuum with low vapor pressure in electron microscopes and GC-MS systems. Both are highly resistant to oxidation when abused in the diffusion pump, such as exposure to air when hot. Indeed, it was designed for vacuums approaching UHV levels without the use of a liquid nitrogen trap of any type. When new, both Santovac fluids are pure polyphenyl ether (PPE). The only elements in the pure PPE base fluid are oxygen, hydrogen and carbon.

Dioctyl sebacate

Octoil®-S Diffusion Pump Fluid

This is the original fluid that was used in the diffusion pumps of electron microscopes starting in the mid-1960's. The good news was that it worked well, good vacuums could be attained, and perhaps even more importantly, it was low cost.

However, this fluid is very non-forgiving when exposed even to small amounts of oxygen when hot.

Perfluorinated Polyethers (Fomblin® and Krytox®)

While all diffusion pump fluids do have some low level of molecular species in the microscope column, the perfluorinated polyether species do not get polymerized in the presence of the ionizing radiation as is the case for hydrocarbon pump fluids.

The end result of this advantage is that the column runs cleaner, longer and whatever contamination in the column that might otherwise be present is present, but at much lower levels. Putting it another way, microscope downtime is greatly reduced since the column runs much cleaner for much longer periods of time.

Another benefit is that these fluids are far more heat stable and tend to break down more slowly than the hydrocarbon based alternatives.

Silicone Fluids Dow Corning®

Very high stability compared to other fluids

The Dow Corning® fluids exhibit outstanding oxidation resistance at elevated temperatures for a moderate cost. However, it is generally not recommended that this family of fluids be used in an electron microscope column.

If using silicone fluids in a vacuum evaporator to make carbon films which will later be analyzed by EDS, it is nearly impossible to obtain Si-free carbon films under those circumstances. Furthermore, these fluids should not be used in a mechanical pump which would mean that would be a basic incompatibility between the fluid in the diffusion pump vs. the fluid in the mechanical pump.