

CLEANING METHODS



SPI Supplies
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SPI-Pore™ Silver Membrane Media

Introduction

The SPI Silver Membrane filters can be cleaned and reused repeatedly, in most instances. The membrane should be cleaned immediately after each use, and handled carefully to avoid membrane punctures or tears. Various cleaning procedures can be used, depending on the nature, type, and degree of contamination. There are potentially five effective cleaning methods listed below, depending on circumstances that can be used to clean silver membranes.

Although the initial cost of the SPI Silver Membranes is higher than conventional "single use and discard" polymeric membranes, the silver is more economical in many applications because it can be used repeatedly by chemical cleaning, ignition cleaning, plasma etching and cleaning, or a combination of the three.

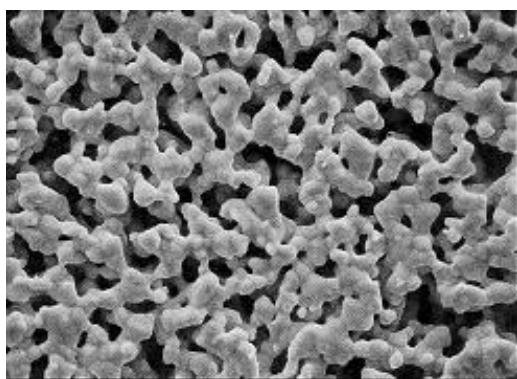


Figure 1. Scanning electron micrograph of surface of SPI Silver Membrane Filter. Horizontal distance is 60µm.

Chemical cleaning

Immerse in either a strong alkaline solution, a solvent, or an acid except nitric acid, sulfuric acid, and cyanide solutions.

Ignition cleaning

Placing the silver membrane filter in a laboratory muffle furnace for approximately 30 minutes will effectively remove organic contaminants from the membrane. Do not exceed the following temperatures:

Retention Rating (µm)	Maximum Temperature(°C/°F)
5.0	550/1022
3.0	400/752
1.2	350/662
0.8	300/572
0.45	300/572
0.2	250/482

One note of caution: If the contamination itself was pigmented, for example, with titanium dioxide pigment, then although the organics will be removed, the pigment particles will not be removed.

Combination cleaning

A combination of chemical and ignition cleaning is usually used to completely regenerate the membrane. Immerse in a 10% concentration of hydrofluoric acid for ten minutes, followed by ignition cleaning in a muffle furnace, following

the guidelines above mentioned. This allows reuse of the membrane up to ten times.

Ultrasonic cleaning

Low-intensity ultrasonics can be used to clean the silver metal membrane. The cleaning intensity and time will depend on the degree and type of contamination encountered. Do not use high-intensity ultrasonics.

Plasma etching/cleaning

The use of an oxygen plasma etcher/asher has several advantages over the other methods described above. For one thing, many laboratories do not have high temperature muffle furnaces but do have available a table top plasma etcher. Also, for the removal of pure organics, since it is a room temperature process, the membranes can be regenerated virtually an unlimited number of times. When the membrane contamination includes metal oxides, one can use argon, but great care must be taken since the argon can also slowly etch the silver, effectively increasing the pore size. A low power plasma cleaner in general, will not be effective for the removal of the levels of contamination being discussed here. However, for certain types of critical filtration experiments, an oxygen plasma cleaning (with low power, less than 10 watts) or oxygen plasma etching (at 100 watts, but still room temperature) will alter in a positive way the surface characteristics and therefore the wetting of the surface by the liquid to be filtered.

Revised by: Junhang Luo

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