Millipore®
Preparation, Separation,
Filtration & Monitoring Products

Technical Brief

Best Practices for Safe Handling and Storage of Filtration Devices Containing Mixed Cellulose Ester Membranes

Introduction

Mixed cellulose esters (MCE), such as nitrocellulose and cellulose acetate, are chemically-modified cellulose derivatives that have been historically used to manufacture membranes used in late-stage prefiltration applications. The symmetric pore structure of a MCE-based membrane (Figure 1) renders it a reliable and highly retentive membrane for critical prefiltration applications.

MCE-containing devices demonstrate good filtration performance and high retention, even at high flow rates; they are cost-effective, non-fiber releasing and available in many pore sizes and membrane-layering configurations to suit a wide variety of filtration needs for many applications. Low protein-binding varieties of MCE-based membranes offer excellent process economics for applications in which recovery of expensive proteins is essential.

Mixed cellulose esters are used in our prefiltration and clarification cartridges and capsules, which includes Milligard®, Polysep™ II and Multimedia Durapore® products.

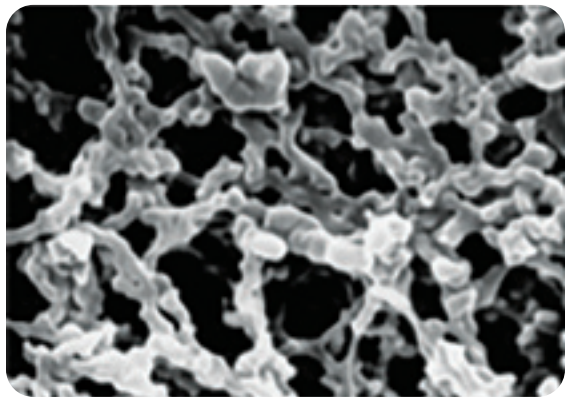

Figure 1. SEM image of Milligard® membrane.

Exposure to Adverse Conditions

Devices containing MCE membrane can be sensitive to excursions in temperature and/or relative humidity. At elevated environmental conditions, MCE can degrade to form nitrogen oxides, which are converted to nitrous and nitric acids upon exposure to heat and humidity; the acidic nitrogen products further react with the MCE to form acetic acid. As a result of the acidic byproducts, the filter develops a yellow or brown appearance (Figure 2) and an acrid odor.

Figure 2. Milligard® cartridge that was kept at recommended storage conditions (top) compared with one that has been exposed to excess heat and/or humidity (bottom).

Storage and Sterilization Conditions

To prevent the MCE membrane from degrading prematurely, the validation guides for Milligard®, Polysep™ II and Multimedia Durapore® filters recommend appropriate sterilization conditions for both cartridges and capsules. It is important to adhere not only to the recommended sterilization conditions to ensure optimum filter performance, but also to the recommended environmental storage conditions (Table 1). Shelf life letters are available upon request from your local technical services representative. Nonconformance to these sterilization and storage conditions could compromise the MCE membrane.

Conclusions

Due to the sensitivity of MCE membrane devices to excessive heat and humidity, it is imperative to follow the recommended storage and sterilization conditions. If a compromised MCE-containing filter is used, a drop in effluent pH may occur as a result of nitric acid and acetic acid from the compromised filter, and additional flushing will be necessary.

If you detect a brown, yellow or acrid-smelling Milligard®, Polysep™ II or Multimedia Durapore® filter, contact your local technical services representative.

Table 1. Recommended storage and sterilization conditions of MCE-containing filters.

		Storage	Autoclave	Steam-in-Place
Milligard®	Cartridges	15-25 °C, 30–70% RH	10× 30 minutes @ 121 °C	10× 30 minutes @ 121 °C, 1 bar (14.5 psi) Maximum differential pressure 0.34 bar (5 psid)
	Capsules	15-25 °C, 30–70% RH	3× 30 minutes @ 121 °C	N/A
Polysep™ II	Cartridges	15-30 °C, 30–70% RH	10× 30 minutes @ 121 °C	10× 30 minutes @ 121 °C, 1 bar (14.5 psi) Maximum differential pressure 0.34 bar (5 psid)
	Capsules	15-30 °C, 30–70% RH	3× 30 minutes @ 121 °C	N/A
Multimedia Durapore®	Cartridges	15-30 °C, 30-70% RH	6× 30 minutes @ 123 °C	6× 30 minutes @ 123 °C, 1.18 bar (17.1 psi) Maximum differential pressure 0.34 bar (5 psid)
	Capsules	15-30 °C, 30-70% RH	3× 60 minutes @ 123 °C	N/A

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