MICROSOLV

UV Light Pass Does Not Pass Through PTFE Tubing Easily - Tech Information

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Overview

PTFE (Polytetrafluoroethylene) is well-known for its exceptional resistance to chemical attack, thermal stress, and environmental exposure—including ultraviolet light. Its semi-crystalline structure allows it to reflect a significant portion of UV energy while transmitting some wavelengths without rapid degradation.

However, not all UV exposure is benign; the wavelength and intensity of the UV source determine whether PTFE remains stable or begins to degrade.

UV Transmission and Wavelength Effects

1. Transparency Across Most UV Wavelengths

PTFE shows general transparency across much of the UV spectrum, giving it a strong reputation for UV resistance.

2. Strong Absorption Below 240 nm

At wavelengths below 240 nm, PTFE begins to absorb UV intensely, leading to:

- Surface chemical bond breakage
- Localized heating
- Photothermal degradation

These high-energy photons can alter the tubing surface, making it unsuitable for applications involving deep-UV or excimer-based illumination.

3. No Degradation Above 400 nm

Visible and near-IR region exposure does not degrade PTFE, making it stable under typical laboratory lighting and higher wavelengths.

Influence of Wall Thickness - Thinner Walls Allow More UV Transmission

Thin-walled PTFE tubing will transmit more UV—particularly at longer wavelengths—than thick-walled tubing.

However, even when transmitting UV, thin walls may still suffer localized damage if the UV energy is concentrated or intense.

Degradation Under Intense UV Sources

PTFE's semi-crystalline microstructure can trap and scatter photons, making it vulnerable to:

- Localized photothermal degradation
- Surface morphology changes
- Structural weakening around irradiated zones

Excimer lasers and other high-intensity UV systems significantly increase degradation risk.

Practical Considerations for Laboratory Use

PTFE tubing can be safely used in:

- General UV-exposed environments
- Fluorescence-based systems (non-deep-UV)
- Outdoor or ozone-producing areas

Avoid using PTFE tubing in:

- Deep-UV applications (<240 nm)
- High-intensity UV irradiation paths
- Environments with focused laser exposure

Click ***HERE*** for PTFE Tubing Ordering Information.

NOTE: *While PTFE tubing is generally considered to be UV-resistant, exposure to intense UV sources such as excimer lasers can lead to localized photothermal degradation. This alters the surface morphology and is influenced by PTFE's semi-crystalline microstructure, which can trap photons and scatter light, affecting the extent and nature of the damage.*

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