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pH Compatibility of PEEK Tubing and Fittings - Tech Information

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Overview

PEEK (PolyEtherEtherKetone) is a popular material for HPLC tubing and fittings because it offers excellent mechanical strength and broad solvent compatibility. However, while PEEK withstands a wide range of chemical environments, pH extremes—especially on the acidic end—can affect long-term performance.

Understanding the recommended pH limits helps maintain the integrity and service life of PEEK components.

General Recommended pH Range

Manufacturer Guidance

- Many PEEK manufacturers specify a usable pH range of 2 – 14 for HPLC tubing and fittings.

This is based on short-term and general laboratory use where the tubing is not exposed continuously to harsh conditions.

Caution With Low pH (0–6)

Why Extra Care Is Needed

- Long-term exposure to pH 0–6 solutions is not advisable.
- PEEK is manufactured using phosphoric acid, and traces of this reagent may remain in the polymer granulate.
- Because phosphoric acid is reactive with the PEEK structure, highly acidic environments may:
  - Accelerate surface degradation
  - Increase brittleness over time
  - Reduce pressure-handling stability

Implication for HPLC Users

- For acidic mobile phases, especially those with medium to high ionic strength, consider minimizing prolonged exposure of PEEK parts.

Recommended Practices for Long-Term Use

For Acidic Environments

- Use a higher pH starting point whenever possible for long exposures.

- Consider switching to stainless steel or titanium components when very low pH is required for extended periods.

For Routine HPLC Use

- Short-term exposure within the pH 2–14 window is typically acceptable.
- Regular inspection for discoloration, swelling, or surface changes helps detect early degradation.

For High Ionic Strength Buffers

- Because ionic strength increases reactivity, increase caution when preparing acidic buffers in contact with PEEK.

Why PEEK Can Be Sensitive at Low pH

Material Background

- Traces of phosphoric acid in the polymer granulate indicate that PEEK can be susceptible to strong acids—even those present at moderate concentrations.
- Acidic attack can compromise the polymer chain structure, especially under elevated temperature or pressure.

Click HERE for PEEK laboratory tubing ordering information

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