Contaminants including PFAS leaching into an analysis - Tips & Suggestions

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PFAS and Other Contaminants Leaching into an Analysis – Tips & Suggestions for Analytical Chemists

Have you ever encountered unexpected contamination in your chromatographic analysis—particularly from Teflon-like compounds? PFAS (Perfluoroalkyl Substances) can leach into your system from a surprising range of sources, from pipette tips to HPLC components. Identifying the origin of these contaminants is often complex and requires a systematic approach.

Understanding the Challenge

In HPLC systems, contamination can stem from multiple components. One notable case involved a customer using LC-MS/MS who observed persistent ghost peaks. After extensive troubleshooting, the source was traced to the solvent filters and column frits. While stainless steel (SS) parts are generally considered inert, they were found to be retaining contaminants.

The culprit? Packaging materials. These SS components had been stored in standard polypropylene (PP) bags. PP commonly contains additives like plasticizers and stabilizers, which can leach out and adsorb onto metal surfaces. During each HPLC run, trace amounts of these compounds were released, leading to contamination detectable by mass spectrometry. Switching to additive-free “barefoot” PP bags resolved the issue.

Sample Prep and Consumables: Hidden Sources of PFAS

If pipette tips are suspected, consider not only the tips themselves but also their holders and packaging. Even if the tips are not made with any PFA, they may still be exposed to PFAS-like compounds through contact with packaging materials or manufacturing residues.

Other common sources of PFAS and plasticizer contamination include:

- **Sample preparation containers** (especially plastics)
- **Tubing** (PTFE, FEP, or other fluoropolymer-based materials)
- **Autosampler vial septa** (often made with PTFE liners)
- **Solvent reservoirs and filters**
- **Column frits and connectors**

Recommendations for Minimizing Contamination

1. **Audit your workflow**: Review every component that comes into contact with your sample—from pipetting to injection.

2. **Switch to low-additive materials**: Use natural or “barefoot” PP, glass, or certified PFAS-free consumables.
3. **Pre-rinse and condition**: Flush new components with high-purity solvents before use.
4. **Use blanks and controls**: Regularly run solvent blanks to monitor background contamination.
5. **Consult manufacturers**: Ask for detailed material composition and additive profiles for consumables and system parts.
6. **Lab gloves and wiping materials** can also transfer plasticizers or surfactants if they’re not specifically certified for trace-level analysis.
7. **Cleaning agents and surfactants**, particularly those used on glassware, may contain nonionic fluorinated compounds.

NOTE: *PFAS contamination is subtle but impactful, especially in trace-level analysis. A proactive approach to materials and packaging can significantly improve data integrity and reproducibility.*

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