

Analyte Recovery Changes Between Days - Case Study - Troubleshooting

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Overview

A customer reported a case involving sunscreen analysis using a 95:5 methanol/DI water diluent and AQ™ Brand 0.45 µm nylon syringe filters. Peak areas were consistent throughout a single day, but the same solution analyzed the next day produced higher peak areas.

Because the intra-day results were stable and reproducible, the syringe filters are unlikely to be the cause of the discrepancy. Instead, the issue points to sample stability and inter-day variability unrelated to filtration.

Why Filters Are Not the Cause

Filters generally impact analyte recovery only when:

- They adsorb analytes
- They introduce extractables
- They fail structurally

However, none of these would result in stable intra-day data followed by altered results the next day. If a filter were the problem, the variability would appear during the same day, not across days.

AQ™ nylon filters are specifically engineered for:

- Low extractables
- Minimal adsorption
- Compatibility with methanol/water solutions

This further supports that filtration is not driving the variation.

Most Likely Cause: Sample Stability

Analytes in solution are rarely indefinitely stable. Over time, chemical or physical changes can occur, including:

Chemical Degradation

- Hydrolysis (common in sunscreen actives and ester-containing compounds)
- Oxidation (especially in methanol/water mixtures)
- Isomerization

These processes can reduce analyte concentration or create new species that alter detector response.

Physical Changes

- Precipitation of analytes or excipients
- Adsorption to container walls
- Phase separation in mixed-solvent systems

If any of these occur, re-dissolved material or breakdown products may produce higher or lower peak areas on subsequent days.

Other Possible Contributors

Although stability is the most likely root cause, other factors can contribute to inter-day variability:

Container or Vial Adsorption

Compounds may adsorb into glass or plastic over time and later desorb unpredictably. Low-binding vials should be used if adsorption is suspected.

Instrument Precision and Qualification

Ensure the HPLC system is within qualification limits for:

- Detector linearity and response
- Injector accuracy and precision
- Pump flow accuracy
- Autosampler wash efficiency

Any drift in these areas can cause day-to-day recovery shifts.

Environmental Conditions

Changes in:

- Room temperature
- Light exposure
- Storage conditions

can influence sample stability and detector response.

Recommended Troubleshooting Steps

1. Prepare a fresh sample and compare day-1 and day-2 performance.
 2. Examine solution clarity for precipitation or phase changes.
 3. Store samples consistently, ideally refrigerated or protected from light.
 4. Use low-adsorption vials for sensitive analytes.
 5. Run system suitability tests to confirm instrument stability.
 6. Check method stability data if available.
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Ordering Information

For ordering details and images of AQ™ syringe filters: Click [HERE](#) for ordering information and pictures of syringe filters.

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