Agilent Technologies

Common issues of aqueous injections on Capillary Columns.

The most common issues of aqueous injections on Capillary columns are caused due to following reasons.

1. Injector problems: Back flash due to the large expansion volume of water.
2. Column Problems: Stationary phase degradation due to,

   •Solvent - stationary phase mismatch.

   • Poor wet ability of many stationary phases by water.

   • Puddles.

   These causes,

   •Damage to stationary phase.

   • Change in Retention Times.

   • Change in Selectivity.

   • Increase in Bleed.

Recommendations & Precautions:

Recommendations to Minimize BACKFLASH:
•Large volume liner
•Small injection volume
•Low expansion solvent
•Low injector temperature
•High carrier gas flow rates
•High head pressures

Recommendations to Minimize Column Problems:

- For water injections on all columns with bonded stationary phases, no change in polarity, selectivity, retention, efficiency, activity, bleed, is observed.
- For non-bonded phases, like CycloSil B, water injections can wash out part of the non-bonded stationary phase which results in loss of resolution, retention, and, possibly, efficiency.

Amount of wash-out is dependent on:

1. Temperature at 130o C and 200o C it is minimal; at 60o C it is noticeable.

2. Solubility of phase material: It is greater in liquid water. Amount of wash-out is gradual. Most likely it is dependent on solubility of phase in water (cyclodextrin = high) but there is no change in selectivity & no increase in bleed. For bonded PLOT columns, no negative effects of injecting water were observed. Non-bonded PLOT columns (e.g., Alumina and Mole sieve) are not suitable for water injections. Observe manufacturers recommendations.

For all phases, the time to bleed down, or recondition, a column after injecting water is dependent on the run temperature (Low-temperature injections will take a lot longer than high-temperature injections.) Periodic bake-out is recommend if injecting water at <80o C.

Non-polar columns (bonded and cross-linked): Safe to inject and rinse with water.

Polar columns (bonded and cross-linked): Water injections are safe water-rinsing not recommended for Non-bonded columns. Water injections can wash out stationary phase - use with caution.