Technical Note

Contamination vs. Carryover

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What is Contamination?

Contamination can also be referred to as ghost peaks which is where unknown analytes are present in your chromatogram. These peaks are not expected to be present in your sample and can be of varying peak shape, height and resolution. Contamination peaks can occur at any retention time.

What is Carryover?

Carryover is where peaks from a previous injection are present in your chromatogram. Generally carryover will decrease with increasing subsequent 'blank' injections.

Why are contamination and carryover problematic?

Peaks caused by contamination and/ or carryover can be problematic in your analysis as it can lead to the misidentification of compounds and incorrect quantitative results. These peaks can co-elute with your target analytes which can lead to issues with peak height, shape and resolution of your target analytes.

What causes contamination and carryover and how to resolve it?

There are many things which can cause contamination and carryover and that is one of the reasons why it is important to keep maintenance schedules and records with any changes made to your instrument. When troubleshooting, it may be helpful to be able to track which samples have been run on the instrument so a sample log could be useful.

Carryover and contamination may be caused by a contaminated syringe or solvent wash. This can be easily resolved by replacing the solvent wash and cleaning or replacing the wash vial and rinsing or replacing the syringe. You simply may need to increase number of solvent washes your syringe performs between injections to ensure your syringe is clean for the next injection.

Backflash can be problematic to your system, this is where your sample volume injected exceeds the volume of your liner. For more information about backflash, see our technical note in the SCION knowledge centre. There are many solutions to this issue which include, injecting a smaller amount of sample or using a liner with a larger volume capacity or with packing. You may also consider using a pressure-pulse injection or lowering your injector temperature.

Another option to consider is that your analysis run time may be too short. This can cause compounds from the previous run to appear in your next chromatogram if there wasn't sufficient time for them to elute. This can easily be resolved by increasing your run time or in more extreme cases by adding a 'burn off' method between injections.

You may also consider adjusting your method to increase your oven temperature at the end of your run for a few minutes to ensure everything has eluted from the column after all your target analytes have been identified. It is important to be aware of your column's maximum temperatures which can usually be found in the information provided from the manufacturer or on the column box.

If you believe your column is contaminated you have the option to 'bake out' your column by increasing the oven temperature with flow through the column. Bake out temperatures can range from 10 °C above your method maximum temperature to your columns maximum isothermal temperature. You can 'bake out' your column for a few hours to overnight. If issue persist then the column may also be cut at either end and reinstalled. See our column care technical note for more information.

If you suspect your injector or detector may be contaminated then it may be worth considering baking them out, cleaning or replacing consumables and parts. Refer to the user manual and our other technical notes for more information before doing this.

Contamination may be coming from the sample itself. The solution to this issue could be as simple as to vial your sample again in a new clean vial or more severe where you need to investigate the sample preparation.

Prevention

A key way to avoid contamination is to ensure your sample preparation technique is highly selective for your target analytes and removes unwanted contaminants within your sample matrix. Use the necessary purity and grade of gases, solvents and analytical standards. Ensure solvents and analytical standards are stored as per the manufacturer's guidance.

Keep maintenance schedules and logs to ensure regular maintenance is conducted and recorded e.g. changing consumables such as liners, septa and ferrules. Leak check your system periodically. Frequently change solvent wash vials and ensure they don't run out during your analysis.