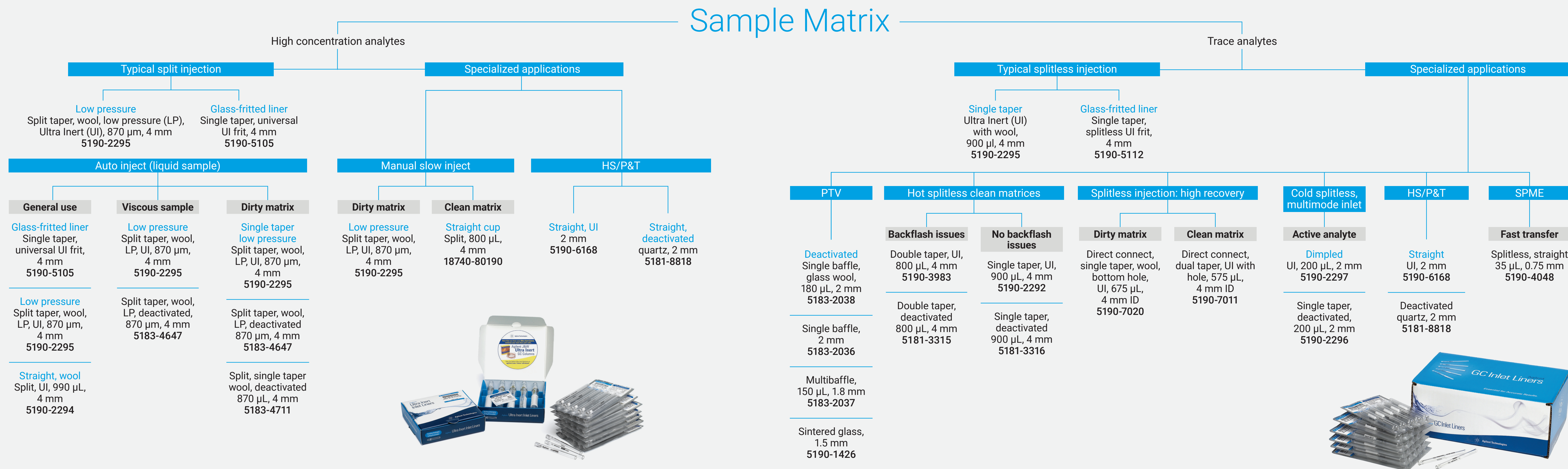


Selecting the Right Inlet Liner for Efficient Sample Transfer

GC inlets convert an injected liquid phase sample into gas for transfer onto the GC column. Selecting the wrong liner can lead to incomplete transfer, poor separation, and peak tailing—often incorrectly attributed to the GC system. As a result, you could waste valuable hours on troubleshooting.



What to consider when choosing a GC inlet liner

Sample concentration

- Use a split injection when compounds of interest are present in high concentration, or when you don't need low limits of detection. In a split injection, only the desired amount of sample is transferred onto the GC column—avoiding column overload and prolonging column life.
- Choose a splitless injection when compounds of interest are present at low concentration levels. This technique involves closing the split vent at the start of the injection, directing all the flow passing through the inlet to the column. At the end of a set period (the purge time), the split vent is opened to flush out any remaining vaporized solvent.
- Direct injection is best when compounds of interest are at trace levels, and contact between the sample and inlet seal (or wool) could cause degradation or adsorption. With direct injection, the sample is injected into a hot inlet, vaporizing the entire sample into the GC column.
- Use a multimode injection (MMI) for small volumes of active analytes with lower boiling points. Samples are injected into a cold inlet that is programmed to increase in temperature. This temperature increase first vaporizes the solvent to vent, then vaporizes the compounds of interest, introducing them onto the column. Not suitable for samples with high boiling points that vaporize partially.

GC solvent vapor volume

The volume of sample introduced into a heated liner increases greatly during vaporization. How much it expands is determined by the solvent, the inlet temperature, and the pressure inside the liner. See table.

Your liner volume needs to be large enough to accommodate the gaseous sample. If the diameter is too small, the sample will expand beyond the liner's capacity—causing sample loss through the septum purge flow and split line. When the sample doesn't transfer to the column, it can lead to peak tailing, poor peak area reproducibility, and carryover.

Analyte activity

Peak tailing or splitting is caused by secondary interactions between the analyte and the wall, frit, or glass wool found in some liners. For active analytes, an inert liner surface can help you avoid such interactions.

To optimize your GC method parameters, use our vapor volume calculator and solvent vent calculator. Find them both at www.agilent.com/chem/gc-calculators

Ready to purchase inlet liners? Visit www.agilent.com/chem/inlet-liners

Vapor volumes for a 1 μL injection of common GC solvents at different inlet pressures and temperatures

| Solvent | Inlet Pressure (KPa) | Inlet Temperature (°C) | | | | |
|----------------------------|----------------------|------------------------|------|------|------|------|
| | | 100 | 150 | 200 | 250 | 300 |
| Water (bp = 100 °C) | 66 | - | 1.17 | 1.30 | 1.44 | 1.58 |
| | 83 | - | 1.06 | 1.18 | 1.31 | 1.43 |
| | 105 | - | 0.95 | 1.06 | 1.17 | 1.28 |
| Methanol (bp = 65 °C) | 66 | - | 0.52 | 0.58 | 0.64 | 0.70 |
| | 83 | - | 0.47 | 0.53 | 0.58 | 0.64 |
| | 105 | - | 0.42 | 0.47 | 0.52 | 0.57 |
| Acetonitrile (bp = 82 °C) | 66 | - | 0.40 | 0.45 | 0.50 | 0.55 |
| | 83 | - | 0.37 | 0.41 | 0.45 | 0.50 |
| | 105 | - | 0.33 | 0.37 | 0.40 | 0.44 |
| DCM (bp = 40 °C) | 66 | 0.29 | 0.33 | 0.37 | 0.41 | 0.44 |
| | 83 | 0.26 | 0.30 | 0.33 | 0.37 | 0.40 |
| | 105 | 0.23 | 0.27 | 0.30 | 0.33 | 0.36 |
| Ethyl Acetate (bp = 77 °C) | 66 | - | 0.21 | 0.24 | 0.27 | 0.29 |
| | 83 | - | 0.20 | 0.22 | 0.24 | 0.26 |
| | 105 | - | 0.17 | 0.19 | 0.22 | 0.24 |
| Toluene (bp = 111 °C) | 66 | - | 0.20 | 0.22 | 0.24 | 0.27 |
| | 83 | - | 0.18 | 0.20 | 0.22 | 0.24 |
| | 105 | - | 0.16 | 0.18 | 0.20 | 0.22 |
| Pentane (bp = 36 °C) | 66 | 0.16 | 0.18 | 0.20 | 0.23 | 0.25 |
| | 83 | 0.15 | 0.17 | 0.19 | 0.21 | 0.22 |
| | 105 | 0.13 | 0.15 | 0.17 | 0.18 | 0.20 |
| Hexane (bp = 69 °C) | 66 | - | 0.16 | 0.18 | 0.20 | 0.22 |
| | 83 | - | 0.15 | 0.16 | 0.18 | 0.20 |
| | 105 | - | 0.13 | 0.15 | 0.16 | 0.18 |