

# 50 Years of Innovation in Gas Chromatography

## 1970s

### Fused Silica Capillary Column

Provides increased precision and sensitivity, and dramatically improves ability to separate similar compounds

- Increased the number of pesticides that can be detected in food
- Allows regulation and enforcement of environmental pollutants that could not be found previously
- Allows analysis of fuels for extreme toxic chemicals, avoiding environmental contamination after combustion



## 1980s

### Electronic Pneumatic Control

Provides precise carrier gas pressure control, increasing the precision and accuracy of compound retention times making it easier to identify and quantify

- Increased reliability of retention times allows for comparison between reference samples and unknown harmful mixtures
- Consistent retention times allows for quality control of food production
- Reliable results for high boiling point compounds

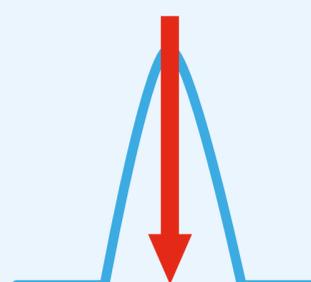


## 1990s

### Retention Time Locking

Delivers the same retention time for the same method day to day, column to column, instrument to instrument, regardless of detection system

- Decreased training time and ensured quality control across the laboratory or multiple laboratory sites
- Specific and unchanging retention times allows mass spec libraries of different compounds with the same mass pattern to be different
- Creates very narrow isolation windows for triple quads, which provides the best low level sensitivity and precision



## 2000s

### Capillary Flow Technology

Precisely delivers carrier flow and splits with an oven mountable, low thermal mass device. Set up as flow splitters, backflush, Dean's switch, GCxGC, and purged union, these devices provide the ability to separate challenging samples in a single system

- Less time in sample preparation by separating high boiling point contamination, keeping it from the most sensitive parts of the GC or GC/MSD system
- Perform extensive separations and provide complete detection of contaminant compounds on one system in a single injection, saving time and money
- The backflush device decreases sample preparation time by removing the sample matrix before it reaches the analytical column and mass spec source. GCxGC devices provide complete separations without need for cryo-cooling



## 2010s

### Inert Flow Path

Completely inert flow path (IFP) from inlet to detector, eliminating potential compound degradation anywhere the compound may reside

- Lower detection limits of active compounds and increased length of time between cleaning, due to active compound degradation. Compounds respond better for a longer period of time reducing unplanned down time
- IFP eliminates the chance that extremely active compounds (i.e. pesticides) will breakdown to other compounds on a clean system
- IFP increases the detectability of highly active compounds such as sulfur (analyzed for in fuel production) for a longer period of time



## Today

### A World Class GC Portfolio

With the launch of the Intuvo 9000 system in 2016, and the Agilent 8860 and 8890 systems in 2019, Agilent is refining the way the GC laboratory operates. New levels of performance, reliability, and cost effectiveness, continue Agilent's industry-leading legacy

#### Intuvo 9000

- Direct Heating: Through-put is improved. Unlike conventional GC systems, Intuvo uses direct conductive heating to temperature program the entire flow path and analytical column. Direct heating uses less power, is smaller, and can be heated and cooled much faster
- Click-and-Run Connections: Unplanned downtime and associated business disruption is eliminated. Ferrules are eliminated and advanced direct face seal connections are made with an audible and tactile 'click' instead
- Guard Chip and Trim-free Column: Trimming is eliminated and productivity is improved while reducing the skill set necessary to operate a GC system. Intuvo has a simple, disposable Guard Chip which traps unwanted material. The new trim-free planar column can be installed faster and more reliably than conventional columns

#### Agilent 8860 and 8890

- Onboard dual core processors and embedded sensors enable a smart connected GC, which is more self-aware and able to perform self-diagnosis to help pre-empt failures, all to reduce unplanned downtime and increase productivity
- Glass capacitive touchscreen interface provides responsiveness like a phone or tablet. With the 8890 touch-screen, a wide range of functionality is available including editing of methods and sequences and performing maintenance routines. The 8860 touch-screen standard functionality includes screens for configuration, set points and signal plot to show that the run is going as planned
- Unique 6th generation microchannel-based electronic pneumatic control (EPC) architecture, provides a gas contaminant such as particulates, water and oils over previous generation Agilent GC designs

