Guest Author: Ramkumar Dhandapani, Ph.D.

Hello everyone! I am Dr. Ramkumar Dhandapani, your **Gas Chromatography (GC)** Guide, taking you from injection to detection.

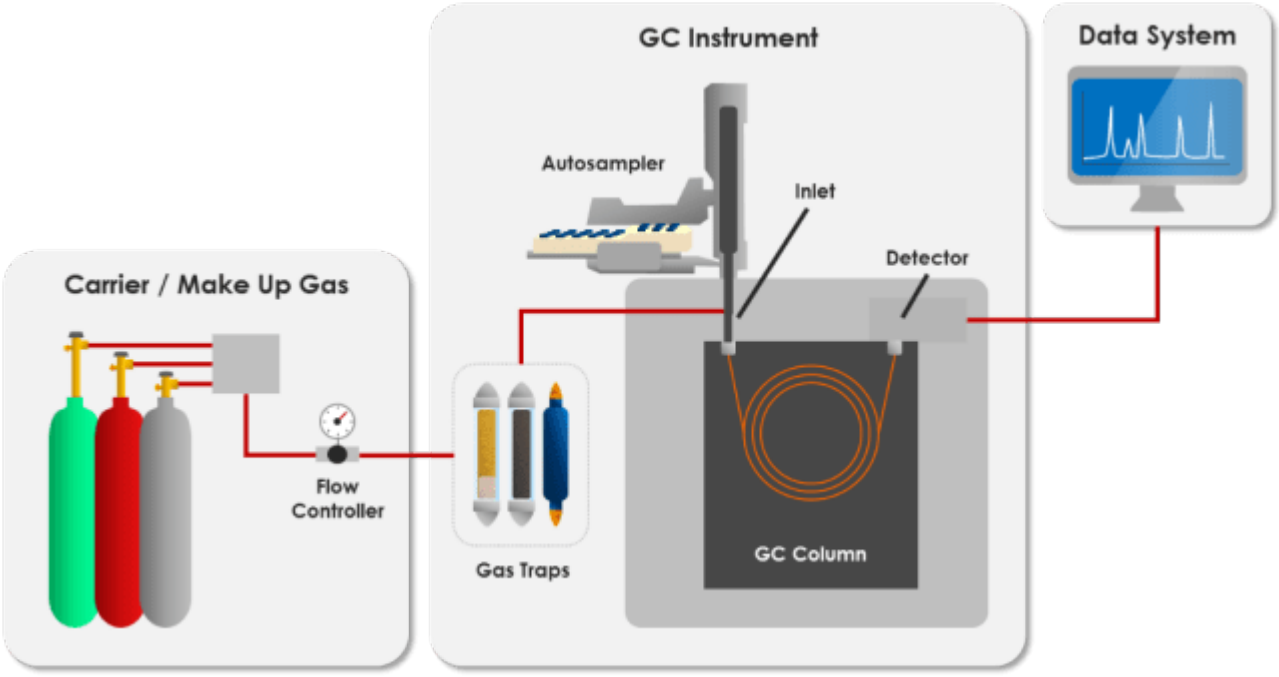
With a Ph.D. in Analytical Chemistry from Seton Hall University, 14 years of hands-on experience, and the GC Technical Manager at **Phenomenex**, it may come as no surprise that I am exceptionally passionate about GC separation. That is why I am excited to bring this new article series to life, “Dr. Ram Speaks GC, From Injection to Detection.” This series will help build a stronger understanding of GC as we explore various concepts and applications. You can expect to find answers and discussion on the following topics:

- Understanding basic concepts in GC
- Provide systematic ways to troubleshooting problems
- Choosing the right GC column for your application
- Understanding common GC myths
- Explore proved tips and tricks

Let’s start the journey the best way possible—the basics. The main components of a GC system are shown in figure below, which include:

- Carrier Gas
- Gas traps
- Autosampler
- GC column
- Oven

- Detector



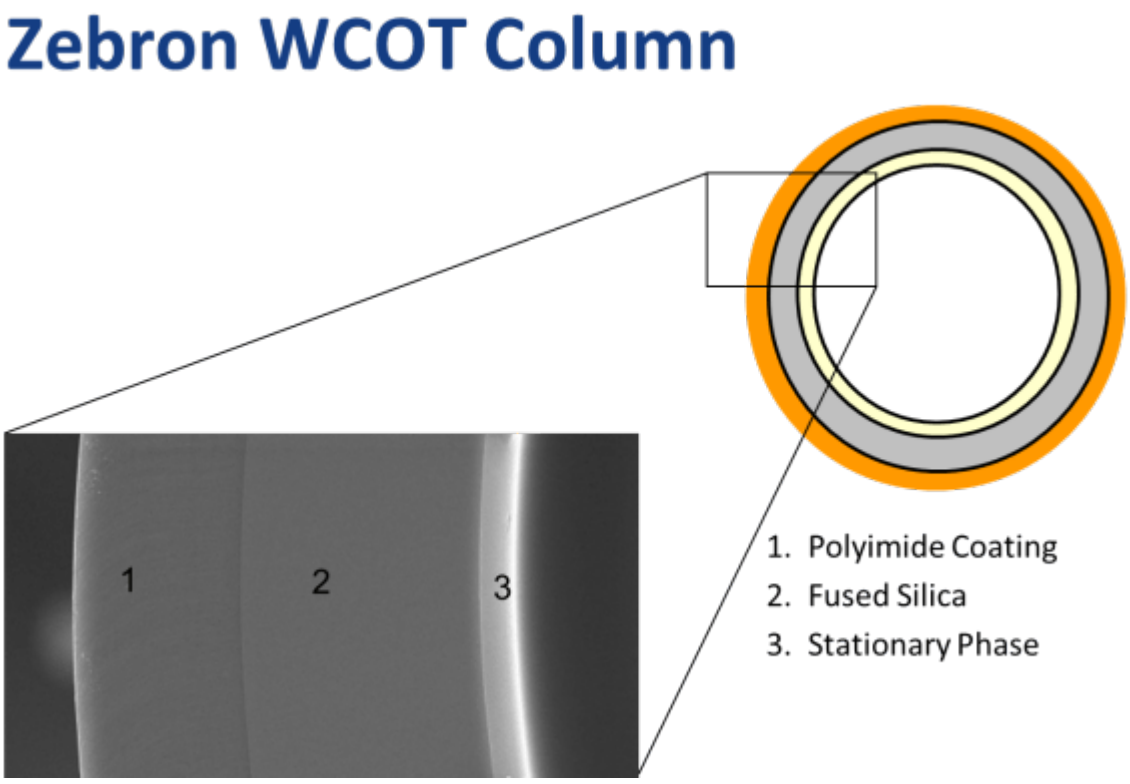
Breakdown of the GC Instrument:

- **Carrier Gas**: The carrier gas serves as the mobile phase. It is important that the carrier gas is of high purity, very inert, and suitable for the detector. Helium, nitrogen, and hydrogen are the common carrier gas choices.
- **Gas Traps**: Scrubbing system that traps even ppm level of hydrocarbons, moisture, and oxygen and can extend a GC column's lifetime.
- **Autosampler**: Injects samples sequentially into the GC system through the inlet.
- **Inlet**: Introduces sample into the GC system. Cool on column, split, splitless, and PTV (programmed temperature vaporization) are some of the inlet systems.
- **GC column:** This is considered the heart of GC, where the separation of analytes takes place. Shown below is a cross section of **Zebron™** GC WCOT

(wall coated open tubular) column, which has 3 distinct regions:

1. Polyimide
2. Fused Silica
3. Stationary Phase

All 3 layers are exceptionally important to develop a decent **GC method**. The outer polyimide coating gives flexibility to the column and extends its temperature limit. The purity of fused silica helps to attain symmetric peaks for active analytes, and the inner layer of stationary phase helps to separate analytes. In GC, separation is primarily based on boiling point (Van der Waals interaction) although other intermolecular interactions can have an influence on the selectivity.



- **Oven**: This controls the temperature and helps to manipulate the retention of analytes. The oven can be operated in isothermal mode, temperature ramp, or a combination of both isothermal and ramp called programmed temperature GC.
- **Detector:** Helps to detect the analytes that come out of the GC column. Flame ionization detector, thermal conductor, electron capture, and mass spec are some of the most common GC detectors.

Stay tuned for the next article in “Dr. Ram Speaks GC, From Injection to Detection”, where we talk about steps that need to be considered before buying a **GC column.**

Good Luck!

Summary

Article Name

Dr. Ram Speaks GC, From Injection to Detection: Part 1

Description

Dr. Ramkumar Dhandapani, takes his readers on a journey as he guides them injection to detection in gas chromatography (GC) applications