GC Capabilities

Updated: June 10, 2014

Agenda

- Why Use GC?
- How Does GC Work?
- Who Uses GC?
- Workflow Overview
- Our Offering
- Resources
- Summary / Our Message

sigma-aldrich.com/analytical

Why Use GC?

Applicability (GC vs. HPLC)

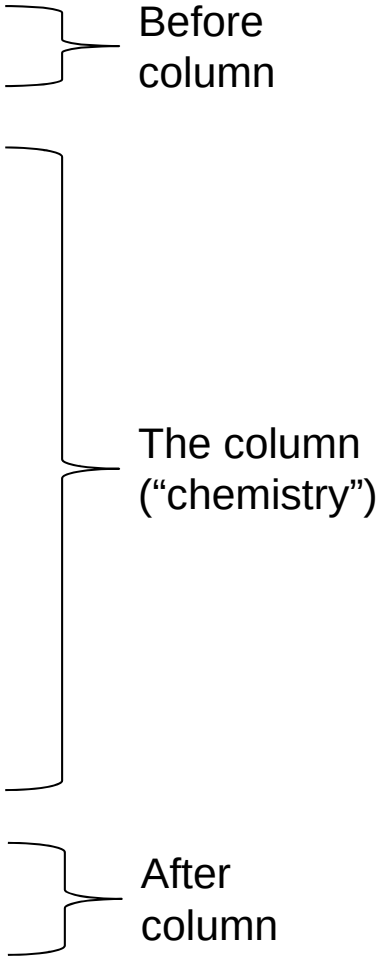
GC	HPLC
Higher efficiency (resolves more compounds per unit time)	Can adjust mobile phase polarity to fine tune separation
More universal (analytes do not have to have a chromophore)	Analytes must have a chromophore
Generally simpler to use; instruments are usually less expensive	More amenable to polar, non-volatile, and thermally labile compounds (most biochemicals, drugs, and metabolites)
Analytes must vaporize in injection port (derivatization can increase volatility)	Analyte must dissolve in mobile phase
Analytes must be thermally stable (not degrade at high temperature)	Non-destructive (can be used for preparative separations)

GC is an analytical technique used to separate compounds for identification and/or quantification.

How Does GC Work?

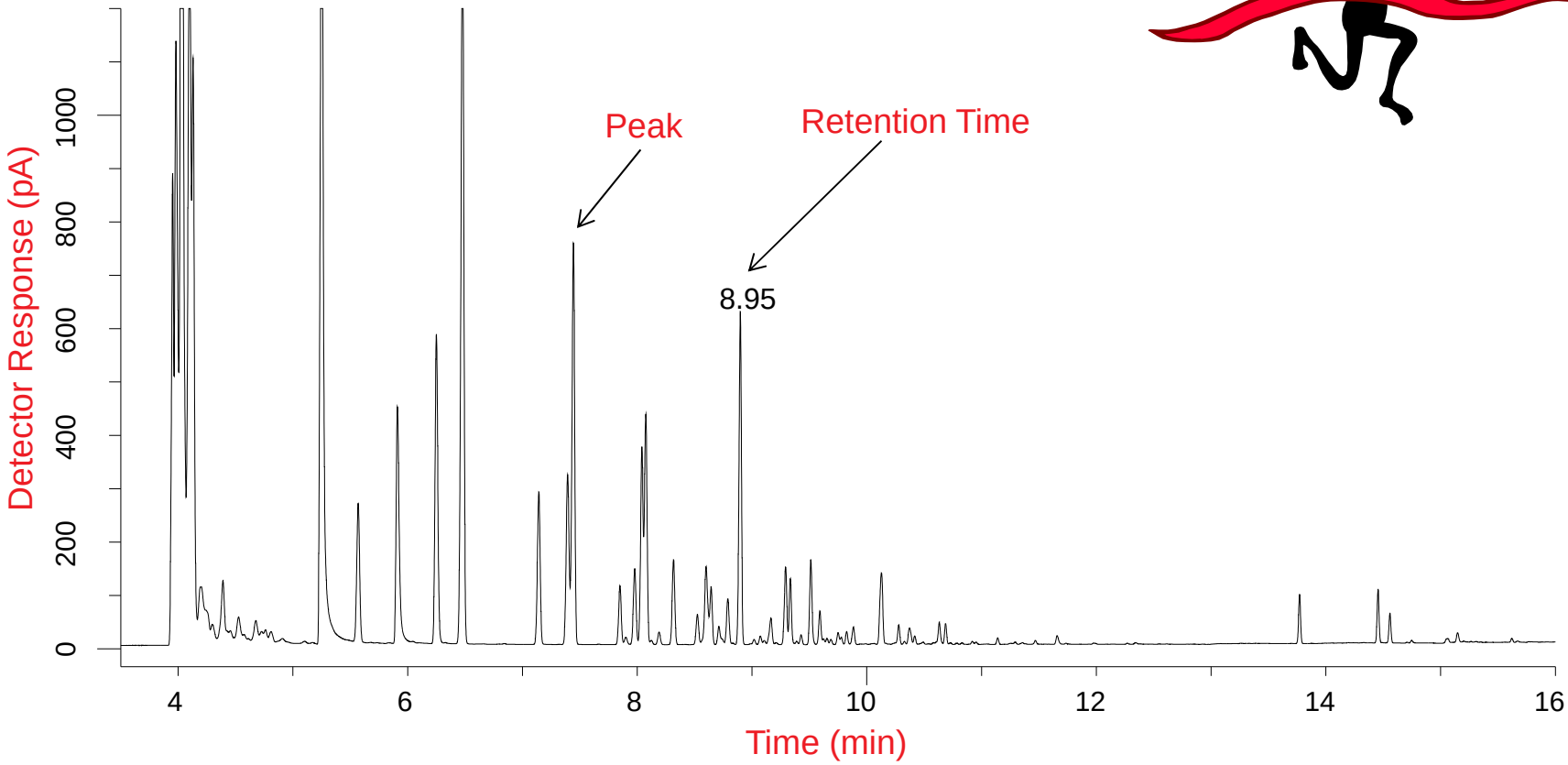
Summary of the Technique

- Sample introduced into injector, then vaporized
- Vaporized compounds carried into and through column by carrier gas (helium, hydrogen, nitrogen, etc.)
- Compounds partition between column stationary phase and carrier gas
- Strength of compound-stationary phase interaction determines retention time
- Oven temperature can be altered to influence these strengths
- At column outlet, detector creates a signal when compounds pass by



How Does GC Work?

Example GC Chromatogram



A chromatogram is the result of a GC separation.

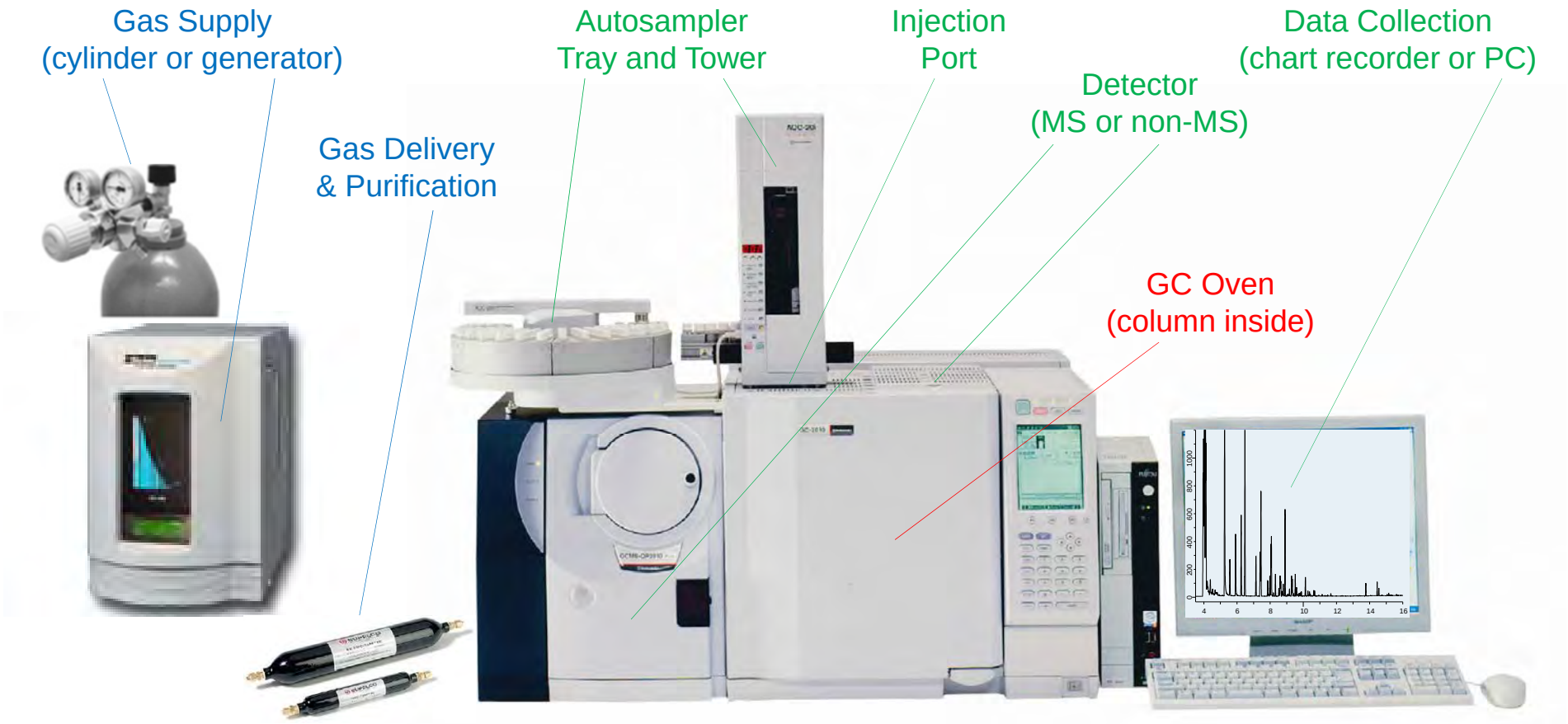
Who Uses GC?

Testing Labs	Industries	Research
Environmental	Petroleum	Academic
Industrial Hygiene	Biofuel	Government
Petroleum	Chemical	Hospital
Biofuel	Agriculture	
Chemical	Food and Beverage	
Agriculture	Flavor and Fragrance	
Food and Beverage	Cosmetic and Personal Care/Cleaning Product	
Flavor and Fragrance	Pharmaceutical	
Cosmetic and Personal Care/Cleaning Product		
Pharmaceutical		
Clinical		
Forensic		

Workflow Overview

Three Distinct Areas

Workflow Areas:
- GC Columns
- GC Accessories
- Gas Purification/Management



We offer many consumables to serve this entire technology workflow.

We do not offer bottled gas (but we do offer regulators and other gas delivery items).

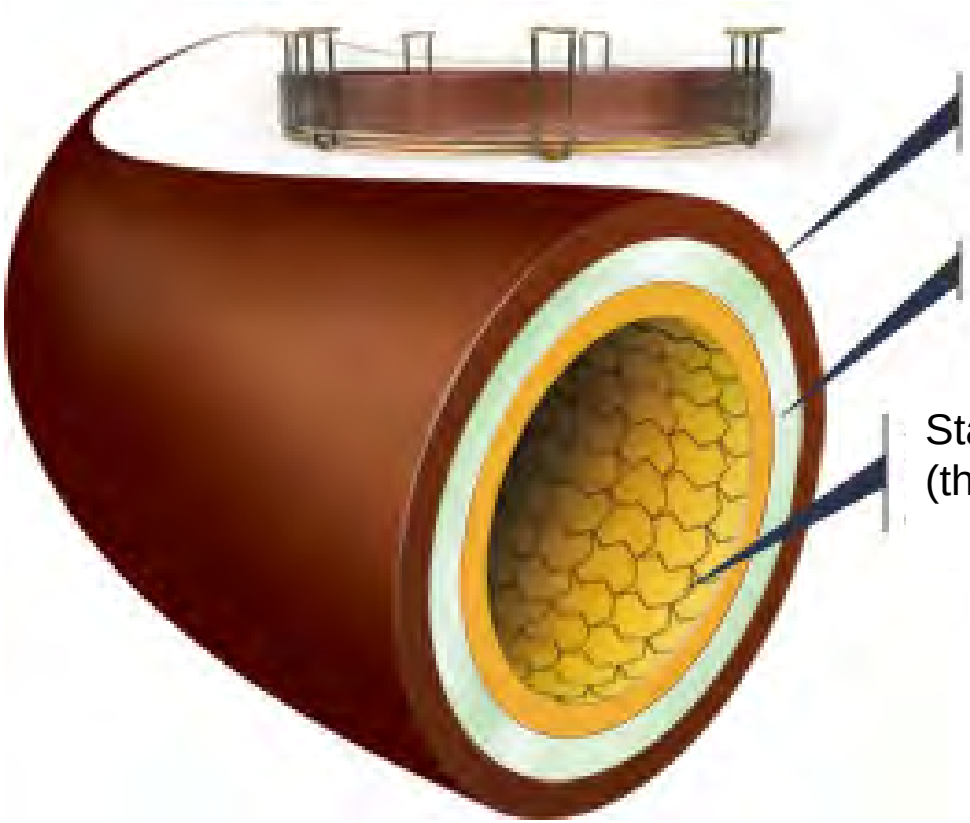
Our Offering

GC Columns

A GC column is the heart of a GC system (where the chromatographic separation occurs).

Our Offering

GC Columns – Cross Section of a Capillary Column



Polyimide coating
(provides flexibility and strength)

Fused silica tubing
(similar to fiber optic tubing)

Stationary phase – the “chemistry”
(thin layer applied to inside wall)

Our columns are coiled into a cage/basket (typically 6-8” in diameter).

Our Offering

GC Columns – Product Lines

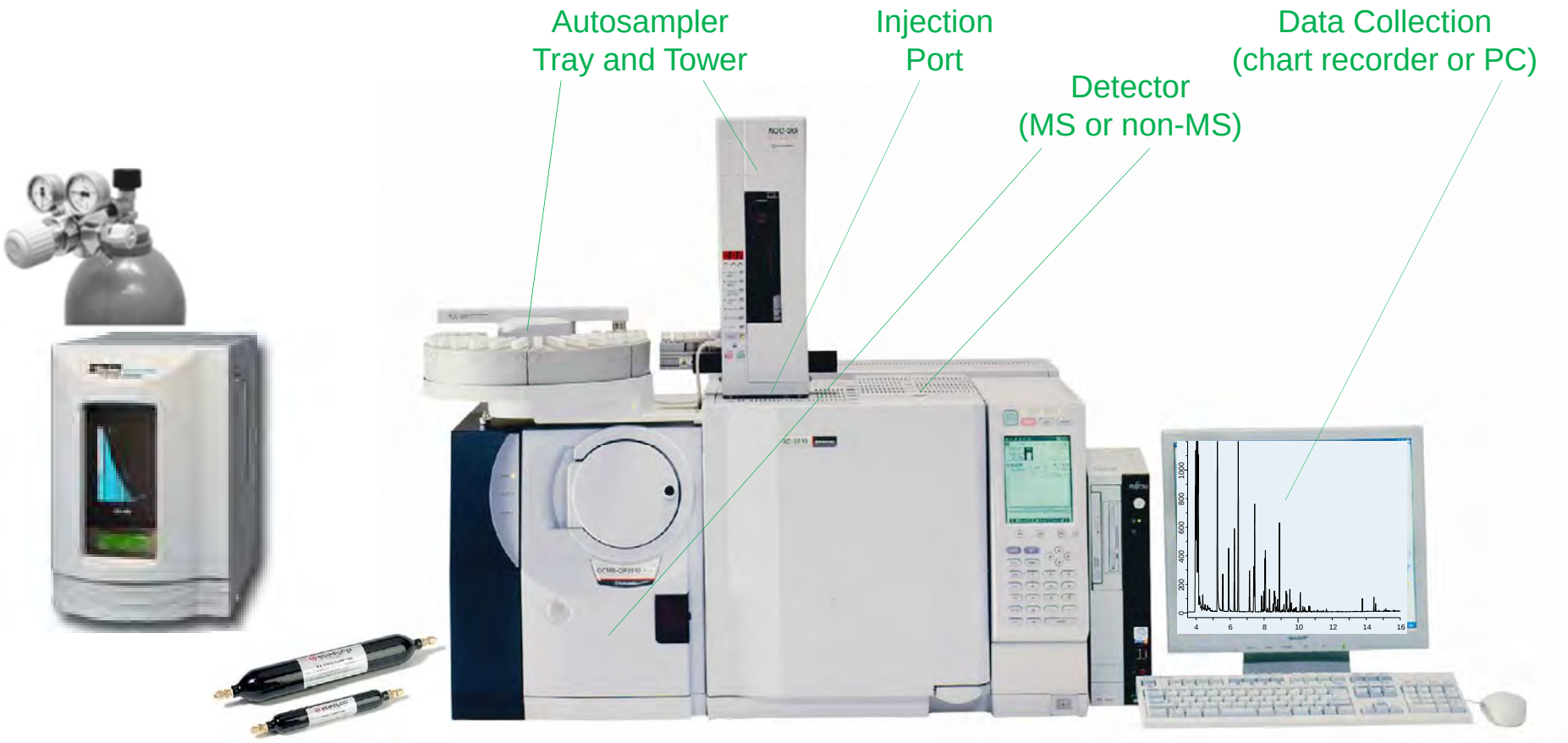
- Over 80 different column chemistries
- Each with a different combination of retention mechanisms (selectivity)
- Can serve many industries and applications

- Our ionic liquid GC columns represent a new column platform
- Benefits
  - Unique selectivity
  - Better phase stability

Visit *sigma-aldrich.com/gc-columns* for more information.

Our Offering

GC Accessories



GC accessories: 1) help get samples into the GC column
2) help with detection or data collection.

Our Offering

GC Accessories – Product Lines

- Injection port items
  - Septa, inlet liners, glass wool, o-rings, inlet seals
- Autosampler items
  - Syringes, vials
- Column installation items
  - Ferrules, nuts, cutters, connectors, flowmeters
- Detector and instrument items
  - PID lamps, cleaning brushes, split vent traps
- Data collection items
  - Ink cartridges, recorder pens, chart paper

Visit *sigma-aldrich.com/gc-accessories* for more information.

Our Offering

Gas Purification/Management

Gas Supply
(cylinder or generator)

Gas Delivery
& Purification

Gas purification/management items help ensure a clean mobile phase (carrier gas).

Our Offering

Gas Purification/Management – Product Lines

- Gas generation
  - Gas generators, air compressors

- Gas delivery
  - Tubing, cutters, reamers, benders, fittings, shutoff valves, leak detectors
- Gas purification
  - Polishing purifiers, contaminant traps (remove hydrocarbons, moisture, oxygen, carbon dioxide), gas purifiers (clean helium), filters (remove particles, oil)
- Gas management
  - Pressure regulators, flow regulators

Visit *sigma-aldrich.com/gaspurifiers* for more information.

Our Offering

Related Product Lines

- Purge and Trap
  - Purge traps, glassware
- Solid Phase Microextraction
  - Fiber assemblies, holders, field samplers
- Analytical Standards
  - Neat, single-component, multi-component
- GC Solvents
  - Pesticide, headspace, high res mass spec, general
- GC Derivatization Reagents
  - Silylation, acylation, alkylation/esterification

Visit *sigma-aldrich.com/gc* for more information.

Resources

- GC Columns
  - Mike Buchanan
  - GC Column Selection Guide (T407133 KCX)
  - *sigma-aldrich.com/gc-columns*

- GC Accessories, Syringes, Vials, and Gas Purification/Management
  - Jaime Martain
  - Maximize Performance brochure (T407103 JWE)
  - *sigma-aldrich.com/gc-accessories*
  - *sigma-aldrich.com/gaspurifiers*

Summary / Our Message

- Full selection of nearly every consumable a GC user needs (do not offer bottled gas)
- Columns and accessories ideal for GC and GC-MS
- Offer all types of columns, but focus on special purpose columns
- Our new ionic liquid columns are truly innovative, solve some important problems, and are being used for some valuable separations

If you have a GC, we can help!

Supelco site
Bellefonte, Pennsylvania (USA)


Fluka site
Buchs (Switzerland)

Thank You!