Gas Chromatography–Mass Spectrometry

HOW DID WE GET HERE?

Mass Spectrometer

J.J. Thomson developed the first Mass Spectrometer (MS) during his research on Neon isotope separation at the University of Cambridge.

GC-MS

Although the first GCMS was reported in 1959, the first commercialized product was brought to market by Robert Finnigan at Electronic Associates in Palo Alto, CA following his work at Stanford Research Institute (SRI).

1903 — 1912 — 1948 — 1964 — 1970-2010

Chromatography

During his research on plant pigments at the University of Warsaw (Poland) , Mikhail Tsvet developed the chromatography technique. He put together the first chromatography column.

Gas Chromatography

Archer Martin from Wool Industries Research Institution in Leeds along with his colleague Richard Fringe received the Nobel Price in 1952 for their invention of partition chromatography leading to gas chromatography.

Latest Additions

GCMS technology kept improving over the years with the development of quadripole, Time of Flight (ToF) and ion traps GCMS. Orbitrap GC is the most recent addition to GC-MS techniques.

HOW DOES IT WORK?

GC-MS is the combination of two techniques: Gas Chromatography and Mass Spectrometry.

Gas Chromatography (GC):

Chromatography, from the Greek khrōma "color" and graphia "description of", is a technique used to separate chemicals initially mixed together. It uses the property that these chemicals (mobile phase) have to move through another substance (stationary phase) at different speeds. A simple way to understand chromatography is to imagine how the ink moves away on a wet paper.

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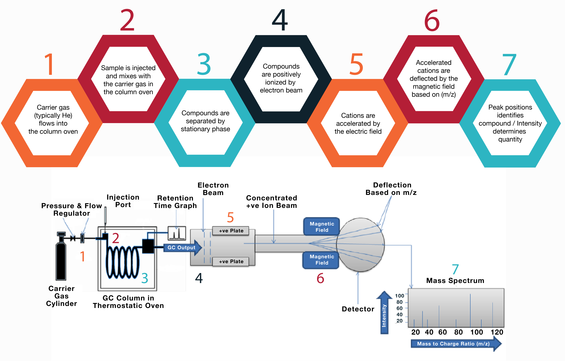
In the case of GC, the mobile phase is a gas and the stationary phase can be either a solid or a liquid. Carrier gas and the sample to be analyzed, are heated under controlled temperature and gas environment (Column Oven). Once the chemicals are separated by the GC they need to be quantified. Therefore GC is coupled with a detector such as Flame Ionization, Electron-Capture or Mass Spectrometer.

Mass Spectrometer (MS):

MS is a technique used to identify and quantify compounds. In addition, it can also provide information about the structure and the chemical properties of molecules.Within the equipment a magnetic field separate by deflection positive ions (cations) based on their mass to charge ratio (m/z). The higher the m/z, the less deflected the cations will be. When the deflected cation hits the detector, it creates an electric current. The location on the detector is characteristic of the compound. The intensity of the current generated at this specific location is proportional to the quantity of that compound hitting the detector.

Gas Chromatography Mass Spectrometer (GC-MS):



Ref: Kumar, Dipesh & Singh, Bhaskar & Bauddh, Kuldeep & Korstad, John. (2015). Title: Bio-oil and biodiesel as biofuels derived from microalgal oil and their characterization by using instrumental techniques.

APPLICATIONS

Trace level organic molecules detection for quality control of consumer products. Detection of hazardous materials like phenols (BPA), or for routine process monitoring such as fatty acid content in food.

Environmental monitoring for chemical waste treatment. Easily detects organic solvents and alcohols to control the efficiency of the cleaning procedures.

Isolation and purification for new material development. Commonly used for pharmaceutical and biotechnology companies to monitor stability of drug delivery methods.

CUSTOMER SERVICE WORKFLOW

STEP 1 — Consult with Our Technologists

STEP 2 — Provide Your Samples

STEP 3 — Receive In-Depth Report

STEP 4 — Debrief with Our Technologists

WHY CHOOSE OUTERMOST TECHNOLOGY FOR GC-MS?

Strong Method Development Experience
Maximize the value of information learned per sample run

Leading Edge Technologies
Highest quality equipment (Agilent 6500) and data reports

Complimentary Consultation
For project scoping and post-report discussion

Streamline R&D Services
Single point of contact for all services

Quality Assurance Program
Free remeasurement if not satisfied