Gas Chromatography.
Electron Capture Detector.

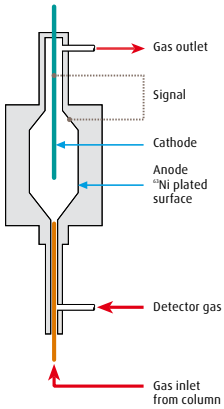
Gas chromatography

Information about gas chromatography in general can be found in the application sheet “Gas Chromatography” (GC).
Environmental measurements of deposits, water and air are becoming more and more important in all parts of the world. One group of environmental threats are polyhalogenated organic compounds such as polychlorinated biphenyls (PCB’s), pesticides and other halogenated organics. Even small concentrations are causing damages and it is of great importance to be able to analyze those compounds correctly at low concentrations (ppm and ppb). GC with Electron Capture Detector (ECD) is a very sensitive method and is well suited for analysis of such polyhalogenated organic compounds.

Analyze with the GC-ECD

In the electron capture detector a beta emitter such as radioactive tritium or 63Ni is used to ionize the carrier gas. Fast beta particles generated by the radioactive source collide with the molecules of the carrier or make-up gas. By impact ionization,, free slow-moving electrons are produced which generate a measurable and steady current. If the GC effl uent contains organic molecules with electronegative functional groups, such as halogens, phosphorous and nitro groups, electrons will be captured and the current will be reduced. In comparison to a signal without sample compounds, the reduction in electron fl ow is proportional to the quantity of electrophile sample components.

Gases



An important facet of GC-ECD is the carrier gas. The carrier gas transfers the sample from the injector, through the column and into the EC-detector. As for all GC techniques the carrier gas must be inert and may not be adsorbed by the column material. Because the ECD is sensitive to water, the carrier gas must be dry. Besides, the halocarbon content must be as small as possible, since these are the typical compounds to be analyzed with the ECD. Halocarbon-free helium or nitrogen are therefore recommended as carrier gases for GC-ECD.
To generate free slow-moving electrons the ECD requires nitrogen or methane, where methane is used in a form of a methane/argon mixture. Both nitrogen and the methane mixture are used as detector gases as well as carrier gases.
Like all chromatographic analytical processes, gas chromatography is a relative method, i.e. calibration with a standard mixture is required. In a fi rst analysis a certifi ed standard mixture is measured. By comparable measurements, the sample components can be identifi ed and their proportion, and thereby their concentration, determined.
The selection of gases, fi ttings and pipes as well as the installation is crucial to preserve the sensitivity, detection limits and reproducibility of a detector. Particular attention should be given to the choices.

HiQ® product program

The HiQ® product program offers a wide range of gas qualities and equipment that fulfi ll the demands concerning analytical techniques of AAS.

Carrier and detector gases

To obtain optimal analytical results, AGA recommends the following gas qualities for GC-ECD analysis:

Carrier gas

Halocarbon free helium 5.0 or	product code 6008
Halocarbon free nitrogen 5.5	product code 6014

Specifications

	Halocarbon free helium He 5.0	Halocarbon free nitrogen N_2 5.5
O_2	≤ 2 ppm	≤ 5 ppm
N_2	≤ 5 ppm	
Halocarbons as SF6	≤ 1 ppb	≤ 5 ppm
C_nH_m	≤ 1 ppm	≤ 5 ppm
H_2O	≤ 3 ppm	≤ 5 ppm
Product code	6008	6014

Detector gas

Halocarbon free nitrogen 5.5 product code 6014

or

10% n.a. n.a.

	Halocarbon free methane instarg 5%	Halocarbon free methane instarg 10%
Component concentration	5% CH_4	10% CH_4
Balance gas	Argon	Argon
Halocarbons as SF6	≤ 1 ppb	≤ 1 ppb
Product code	6172	6173

Calibration mixtures

For calibration mixtures please look into the HiQ® product catalog or ask your local sales representative.

Recommended central gas supply

HiQ® REDLINE central gas supply systems for inert and non-reactive gases. Group green for single gas supply panels designed for pure gases and mixtures.
Group blue for single stage supply panels with internal purging designed for high purity gases and mixtures including flammable gases.

Recommended cylinder regulators

HiQ® REDLINE single stage regulator, C200/1 for carrier and auxiliary gases. For calibration gases HiQ® REDLINE two stage regulator, C200/2 provides a stable secondary outlet pressure. C200 regulators can be plain or equipped with a shut-off valve (type A) or a needle valve (type B).
For GC-ECD we recommend a C200 regulator in brass with a shut-off valve.

HiQ® REDLINE		Outlet pressure bar	psi	Product code
Single stage	C200/1 A, brass	0.2-3	3-45	3100
Single stage	C200/1 A, brass	0.5-6	8-85	5467
Two stage	C200/2 A, brass	0.2-3	3-45	5482

More information

Please look into our HiQ® catalog 'Biotech, Chemical, Petrochemical & Pharma-ceutical', look into our web site, http://hiq.aga.com, or contact your local AGA sales representative.

5% Blending tolerance

5% Analysis uncertainty

6 Shelf life

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