Technical Note: 104

Analysis of Fixed and Rare Gases

Applications:

Purity of gases in Hospitals ***Composition of gases***
Electronic application ***Purity of gases***

The composition of gases in a system can indicate whether the system has developed a leak, oxidation or some other chemical reaction has occurred. Many processes require accurate control of the atmosphere. Presence of unwanted gases, even at low levels, may have a drastic effect on the process. In hospitals, the purity of gases used in clinical applications is of great importance.

There are different methods for the analysis of fixed gases **(**O_2, N_2, CO, CO_2, and CH_4,). These are: mass spectrometry (MS), infrared spectroscopy (IR), or gas chromatography (GC). The gas chromatography method is the most widely used because of its simplicity and low cost. In this method a known volume of the sample is injected into a gas chromatograph equipped with thermal conductivity detector. The fixed gasses are chromatographically separated based on molecular size. A molecular sieve packing is used in a conventional 1/8" stainless steel packed column. Samples are introduced using either a gas tight syringe or a gas injection valve (Valco Instrument) with a fixed volume loop. Upon injection the sample is swept through the GC system with carrier gas and the gases are separated in the column. The carrier gas carries each component into the detector where components are detected based on the difference in thermal conductivity between the carrier gas and the component. For the analysis of hydrogen and helium, argon is used as the carrier. Helium is used for all the other gases. Other gases such as Argon, Neon and Krypton are determined using specific GC column.

The detection limit for carbon monoxide, carbon dioxide, and methane using a thermal conductivity detector are typically 0.01% by volume. Please contact Dr. Andrew Kitto for more information.