

Quantitative Gas Analysis of Small Batch Samples by Quadrupole Mass Spectrometer

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Abstract

A method to quantify gas components in small, low pressure samples has been developed using a quadrupole mass spectrometer. The method employs calibration of direct introduction of a small volume (1.47cc) of each pure gas of interested at pressure ranging from 0.05 to 1.0 torr to obtain its sensitivity factor. Relatively short analysis time for each determination, in the order of a few seconds, is required. The gas analysis system consists of a custom-designed manifold and a quadrupole mass spectrometer. The analysis of samples can be performed using the same small volume or some larger know volumes. The stability of the sensitivity factors was evaluated with pure H₂, CH₄, and Ar gases for over a period of about two months. The reproducibility and accuracy of the method were checked subsequently with a known gas mixture containing H₂, CH₄, and Ar over a 19-day period using sensitivity factors obtained previously. The strengths and weaknesses of the method will be presented and discussed.