

Analysis Example by Vacuum Model FT/IR (2) Analysis of Low Concentration Gas using Long Pathlength Cell

A high S/N measurement is often required for the FT-IR analysis of low concentrations of gas or vapor compounds. In addition, the measurement of certain gas samples can be affected by the atmospheric water vapor and carbon dioxide present in the instrument, even with nitrogen purging. It is especially difficult to analyze NO gas because the absorption band is in the water vapor region, and NO₂, CO₂ and CO gas, whose absorption bands are near the CO₂ absorption. Using a full-vacuum instrument system, the water vapor and carbon dioxide in the light path can be completely eliminated and the measurement of these gas components can be accomplished even with low concentrations.

Figure 1 illustrates the spectrum of a 2 ppm CO sample by using a 20 m gas cell, demonstrating that the 2 ppm CO gas is measured with a S/N level around 200:1. The noise level with the same measurement conditions is 4×10^{-5} ABS as displayed in Figure 2, and with this noise level, the measurement of this gas can be easily accomplished with concentrations as low as 20-50 ppb.

Condition

Resolution: 4 cm⁻¹
Scans: 500
Detector: MCT
Cell: 20 m pathlength gas cell

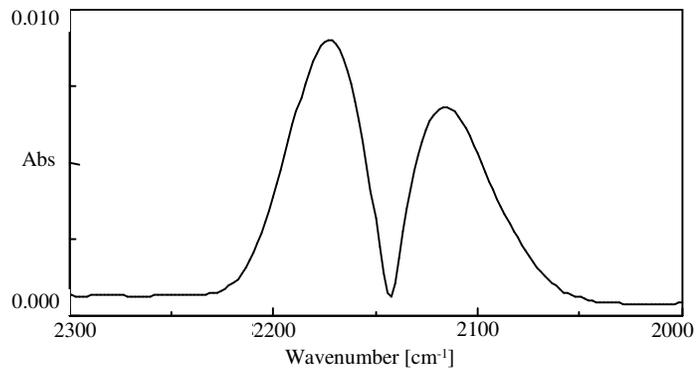


Fig. 1 2 ppm CO gas

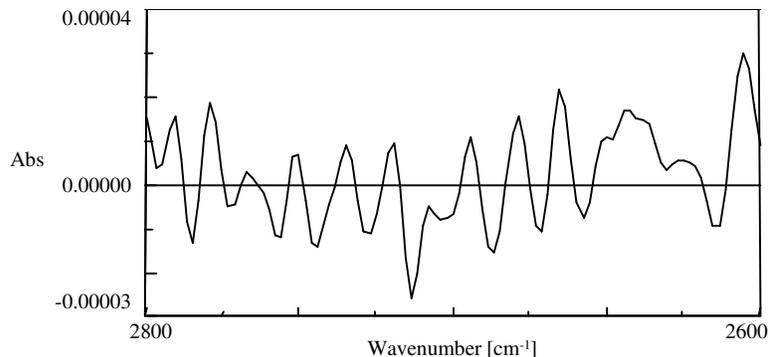


Fig. 2 Spectrum S/N using the MCT detector