AutoChem 2910 and Mass Spectrometer
Gas Calibration

The AutoChem 2910 TCD level calibration is a powerful tool for converting raw TCD signals to gas concentrations. This built-in calibration provides the AutoChem 2910 with known gas concentrations and records the TCD signal associated with each one. The concentration and signal data are then used to generate a polynomial for converting TCD signals to gas concentrations.

This capability can also be used to generate a gas calibration for a mass spectrometer. A concentration calibration for hydrogen was generated to demonstrate this technique. During the AutoChem 2910 TCD level calibration, a Balzers ThermoStar (QMS 200) was used to monitor the hydrogen concentration in the gas stream. Typical calibration data are shown in Figure 1. The AutoChem 2910 was configured with argon as the carrier gas and 10% hydrogen in argon as the loop gas. The built-in TCD level calibration automatically generated 11 gas concentrations using an internal blender.

The AutoChem 2910 and the Balzers ThermoStar recorded similar signal profiles for the level calibration. By exporting the Balzers ThermoStar data to an ASCII file, these data can then be used to generate a calibration curve. Several commercial software packages (Galactic Grams/32®, Microsoft Excel, Microcal
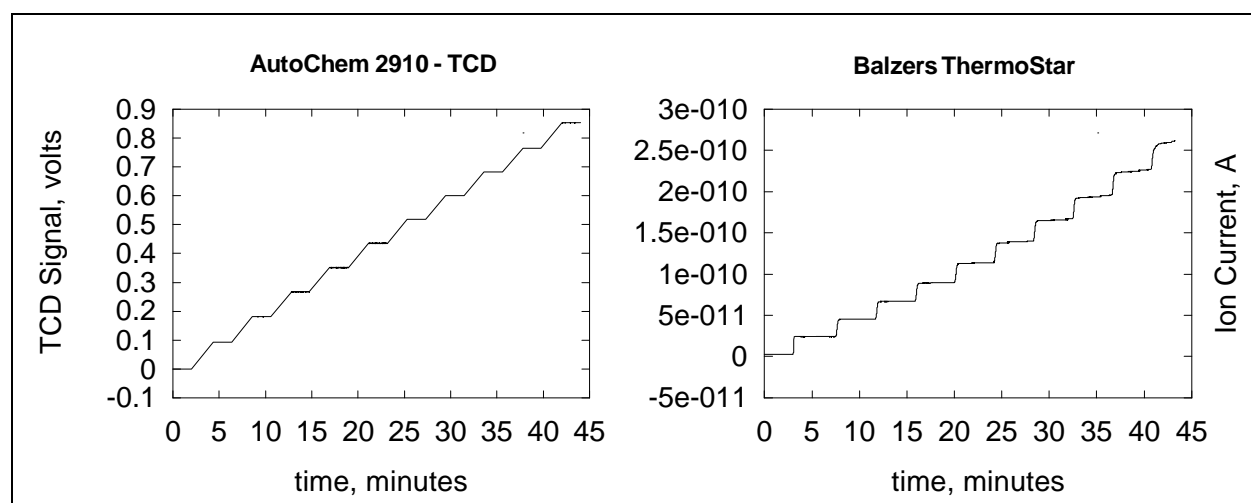

Figure 1. *Hydrogen calibration using Micromeritics' AutoChem 2910 and the Balzers ThermoStar mass spectrometer.*

Origin, and Matlab from Mathworks) are suitable for generating the final calibration curve, Figure 2. The calculated polynomial for the hydrogen gas concentration can be used to convert ThermoStar Ion Current (mass = 2) to hydrogen concentrations. Most commercial mass spectrometers can be used with the Auto-Chem 2910 to generate calibration curves for the mass spectrometer.

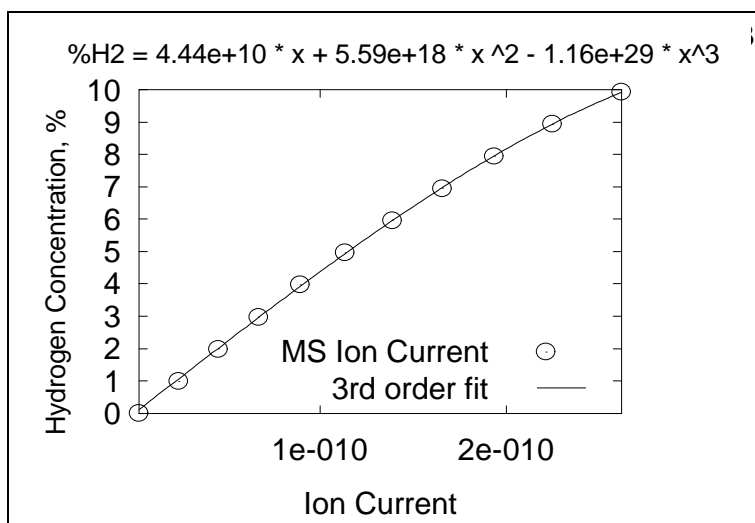$$\%H2 = 4.44e{+}10 * x + 5.59e{+}18 * x\text{ }^2 - 1.16e{+}29 * x\hat{}3$$

Figure 2. ASCII data from the mass spectrometer were imported into the Grams/32 software (included with the AutoChem 2910 analysis program) and used to generate the final calibration curve.