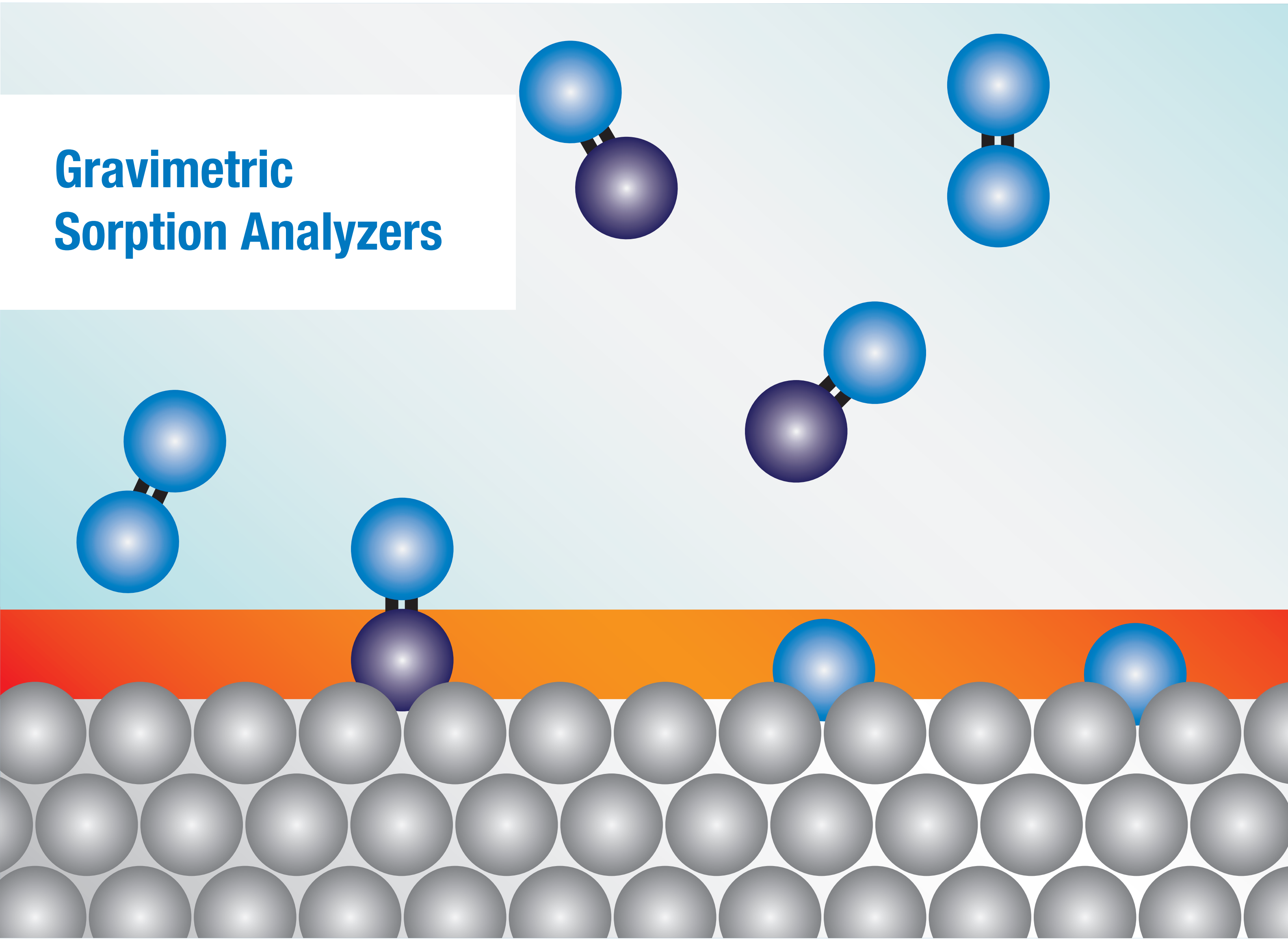
Gravimetric Sorption Analyzers



LINSEIS

Gravimetric Sorption Analyzers

STA HP

MSB

STA PT 1600 HP

Chemisorption/Physisorption (UHV to 1000 bar)

Adsorption Isotherms (BET Surface Analysis)

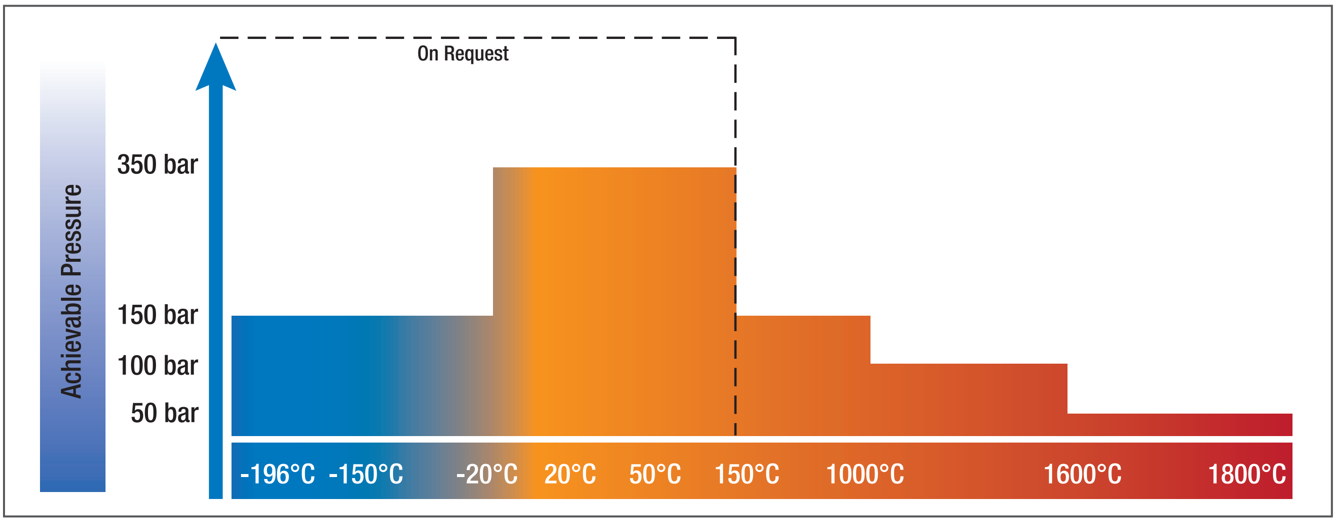
TPD, TPO, TPR measurements (-196 to 1800 °C)

Sorption Enthalpies (Simultaneous TG/DSC- sensor)

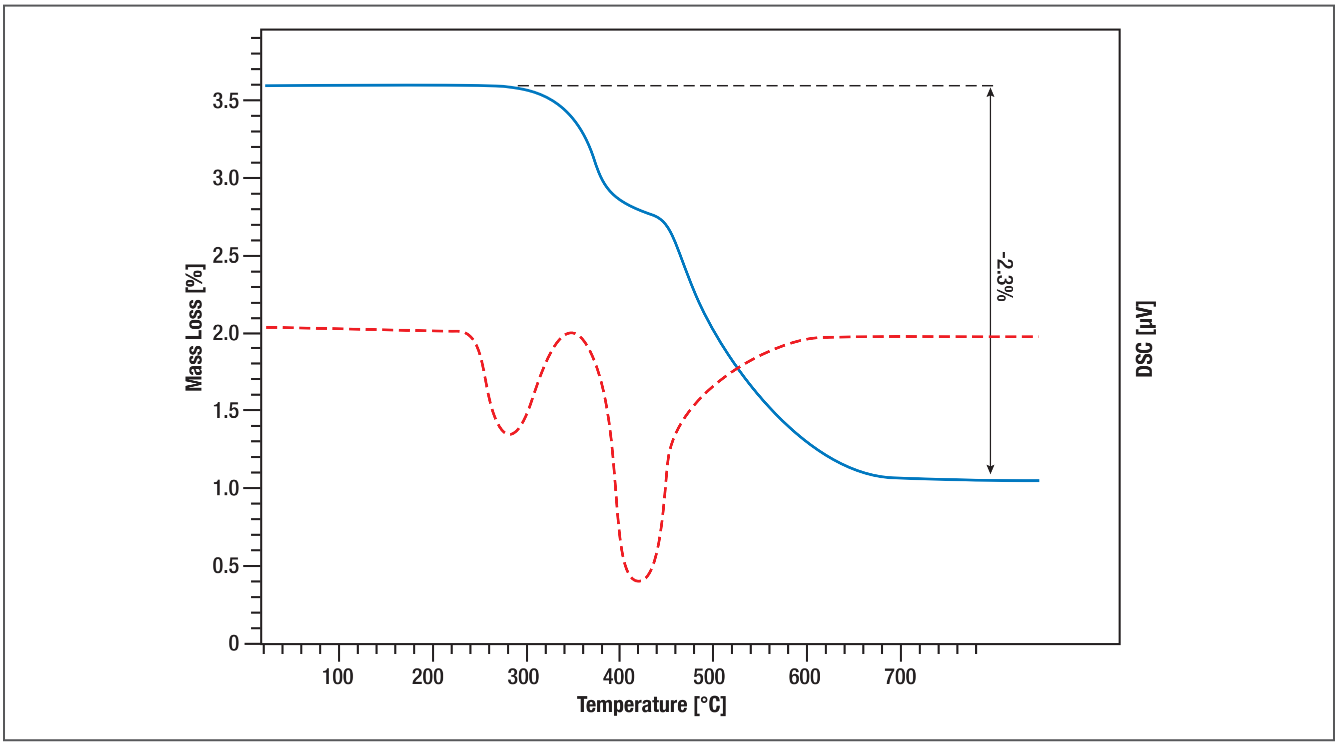
In-situ Gas Analysis (FTIR, Raman, ELIF)

Corrosive Atmospheres Magnetic Suspension Balance

Temperature Control

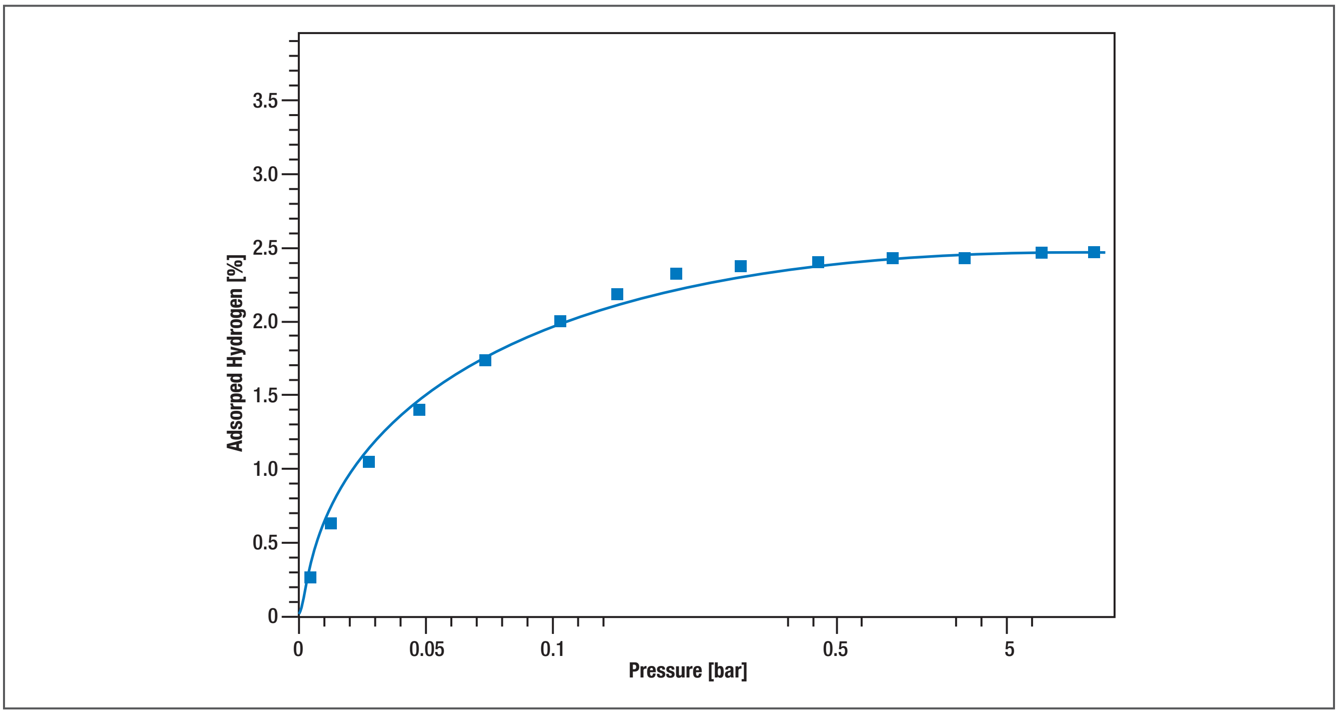


Desorption of Hydrogen of TiH_2



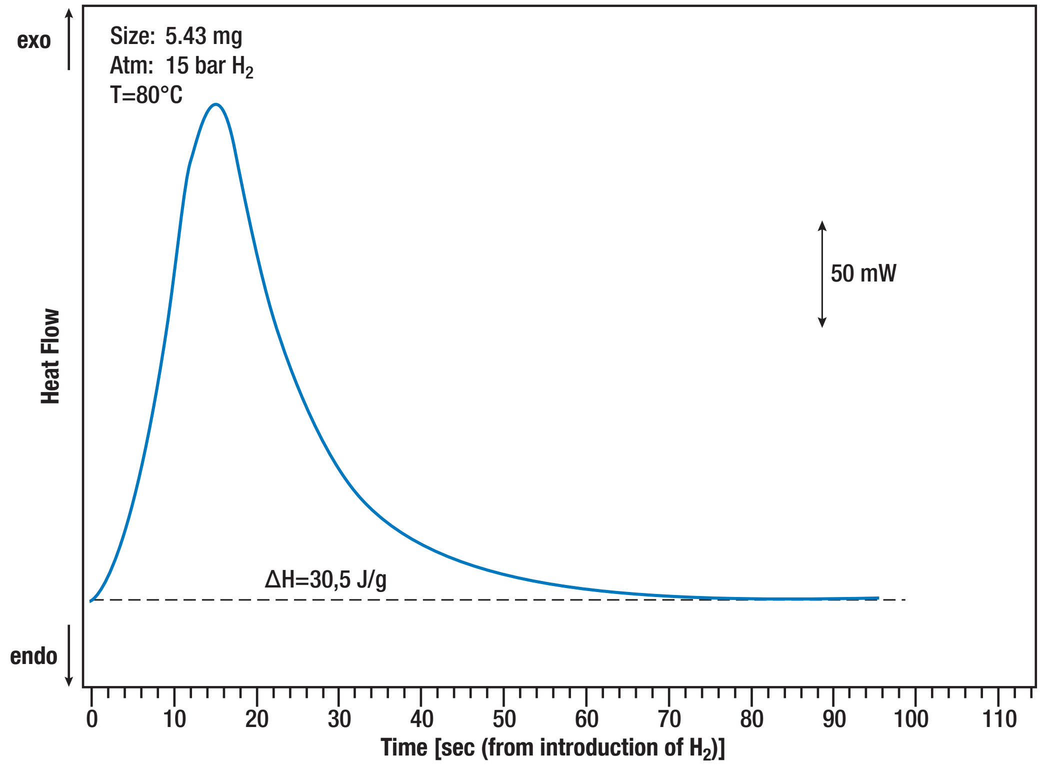
TG and DSC curves of TiH_2 in Argon at 10 K/min

Hydrogen Adsorption on Titanium at 700°C



Adsorption Isotherm of Hydrogen on Titanium

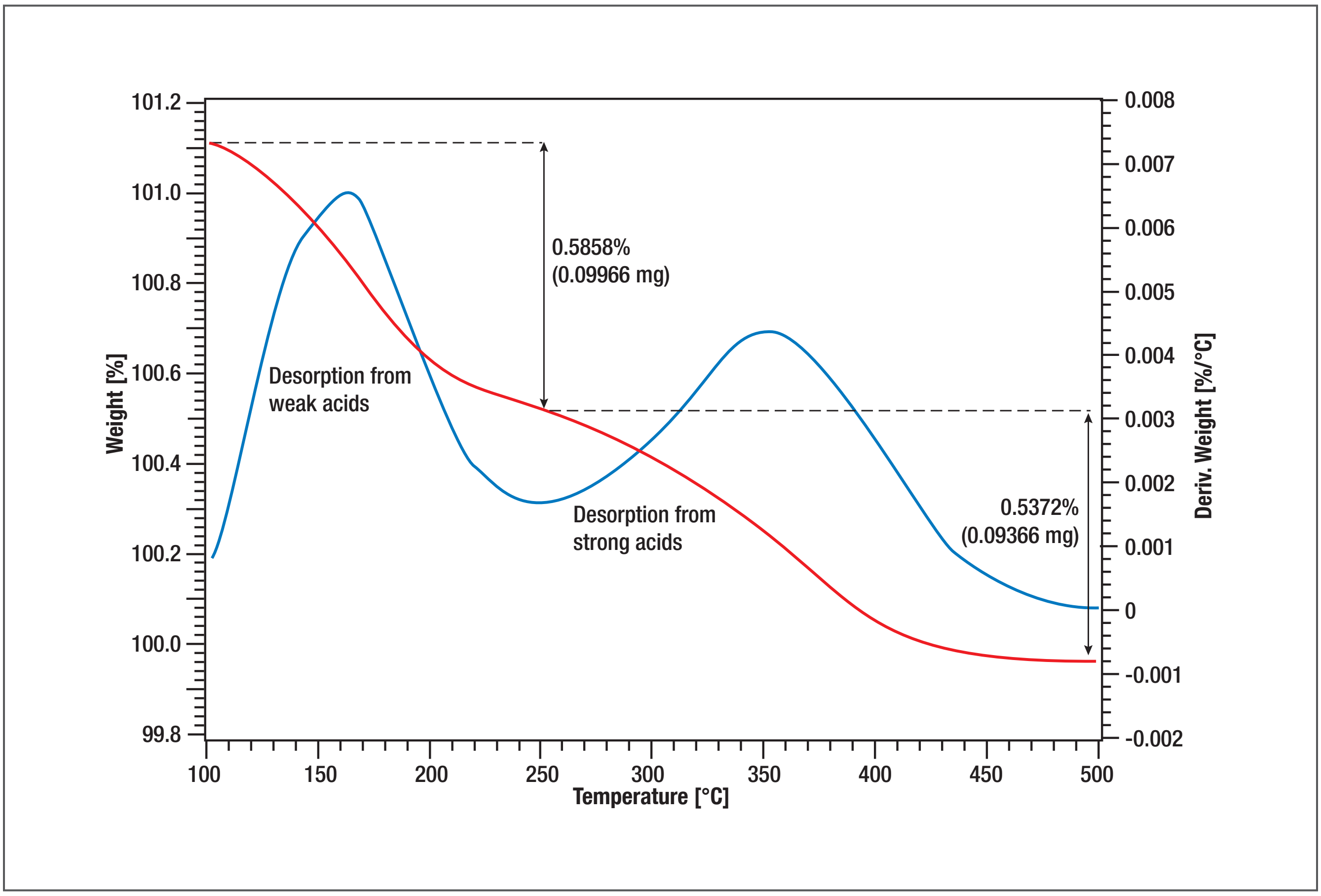
Fast and Easy determination of Sorption Heats



The measurement of sorption, oxidation or reduction heats of catalysts performed with volumetric methods are normally very time-consuming and need many hours. The LINSEIS Gravimetric Sorption Analyzer STA HP, which measures both weight change and DSC-signal, provides a much faster alternative. Within 15 minutes or less the sorption heats can be measured.

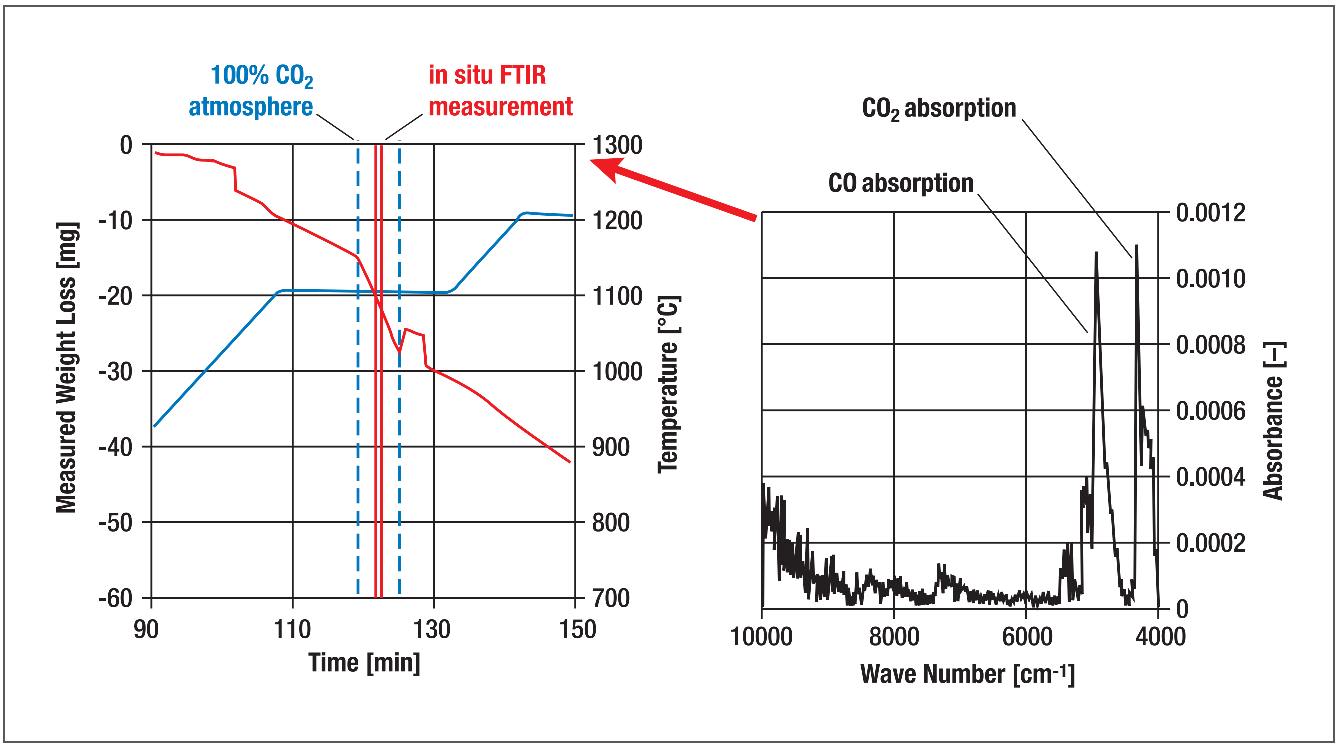
Chemisorption and catalytic oxidation or reduction are exothermic reactions. The heat involved can be easily monitored with the integrated DSC- sensor of the LINSEIS STA HP. The Figure below shows the DSC-signal of the adsorption of Hydrogen on a Pt/Al catalyst at a pressure of 15 bar and a temperature of 80°C. The evolved heat is 30,5 J/g.

TPD, TPO and TPR measurements

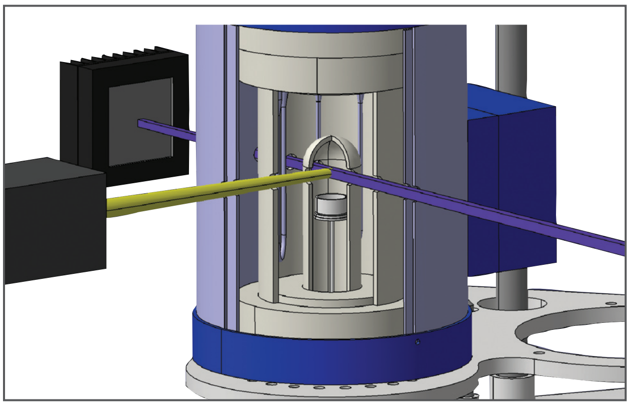


The distribution and relative strength of acid sites in zeolithes are important indicators of its catalytic properties. The acidity of zeolithes can be accurately measured with the temperature programmed desorption (TPD) of a base from the zeolithe surface. The Linseis gravimetric Sorption Analyzers are useful tools for characterizing TPD, TPO or TPR profiles.

The figure below shows the chemidesorption of ammonia from a zeolithe catalyst surface. Weakly bound ammonia molecules are desorped between 100 and 250 °C. Between 260 and 500 °C strongly bound ammonia is desorped. The amounts of desorped ammonia can be quantitatively measured, i.e. it is possible to quantitatively identify the number of strong and weak acid sites present in the sample.



In-situ FTIR measurement during CO_2 gasification of an anthracite in a TGA system (sample temperature: 1100°C, pure CO_2 atmosphere [gas flow rate: 20 ml/min at 273 K, 0.013 bar] during FTIR measurement, FTIR measurement: 30 s, CO absorption at 4300 cm^{-1}, CO_2 absorption at 4900 cm^{-1}).



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