

CO₂ sorption on ZIF-8

INTRODUCTION

Zeolites Imidazole Frameworks (ZIF) are a class of metal organic frameworks. They can potentially be used to remove carbon dioxide from gas streams thanks to their highly porous structure.

Thermogravimetric analysis can be used to determine the sorption capacity of porous materials against pure (like in the present example), or complex gas blends, together with the assessment of sorption kinetics at a given temperature.

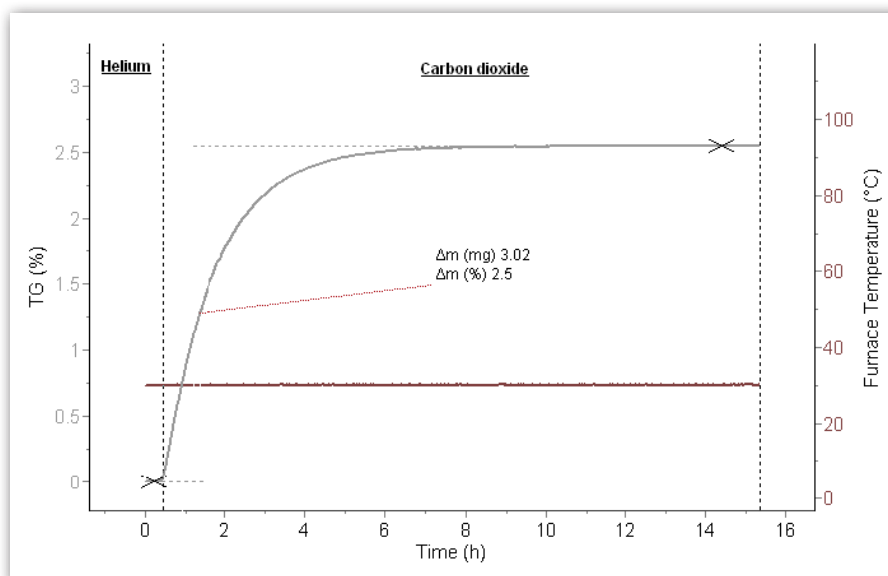


Figure 1 – CO₂ sorption by a ZIF-8 sample at 30°C

EXPERIMENT

A 118.82 mg sample was pretreated at 100 °C under primary vacuum during 2 hours. It was then cooled down to 30 °C and its temperature stabilized under a flow of helium (20ml/min). At time zero, the signal is stabilized, but helium is flowed again during 20 more minutes, then the THEMYS gas panel switches from helium to carbon dioxide at the same flowrate.

RESULTS AND CONCLUSION

The mass variation (TG) signal was stabilized after 14 hours because of the saturation of the ZIF-8 sorption capacity. The mass uptake was determined thanks to Calisto data treatment software to be equal to 3.02 mg, i.e. 2.5%.

This example shows simple gas change possibilities. More complex gas blends can be handled / programmed with the PureGas, GasBlend, or MultiGasBlend options.

INSTRUMENT

THEMYSTGA



HIGH ACCURACY & VERSATILITY

hang-down symmetrical beam balance, specifically designed for TGA applications

ULTRA-HIGH TEMPERATURE CAPABILITY

to 2400°C with a single furnace.

MODULAR ADAPTIONS ALLOWING

TGA only, DTA only, TG-DTA, and TMA up to 2400°C, DSC only and TG-DSC up to 1600°C all in one instrument.

EXTERNAL COUPLING CAPABILITY

designed for evolved gas analyzers (FTIR, MS, GCMS, MSFTIR, or FTIR-GCMS)