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Results of a European interlaboratory comparison on CO2 sorption on coals and activated carbon

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For the assessment of CO_2 storage in coal seams or enhanced coalbed methane production (ECBM), the sorption properties of natural coals are important parameters. Since more and more laboratories worldwide are concerned with measurements of gas sorption on coal it is indispensable to establish quality standards for such experiments.

The first two interlaboratory studies on CO_2 sorption on coal (Goodman et al. 2004, 2007) revealed a poor agreement of sorption isotherms among the participating laboratories, particularly in the high-pressure range.

During the MOVECBM (http://www.movecbm.eu/) project funded by the European Commission (6^{th} framework), an interlaboratory comparison of CO_2 sorption on selected coals and activated carbon was initiated. Measurements were performed on dry samples at 45° C using the manometric and the gravimetric method. up to a final pressure of 15 MPa.

Figure 1: CO2 Excess sorption isotherm on activated carbon F400

The first set of high-pressure sorption measurements was performed on a Filtrasorb 400 activated carbon sample in order to minimise heterogeneity effects and to optimize the experimental procedures for the individual (manometric or gravimetric) methods (Gensterblum et al. 2009).

Since comparability for the activated carbon was excellent, the measurements were continued using natural coals of various rank (anthracite, bituminous coal and lignite) to study the influence of heterogeneities and varying starting conditions on the CO_2 sorption properties (Gensterblum et al. 2010).

Compared to the poor reproducibility observed in previous interlaboratory studies (Goodman et al., 2004, 2007) this European study showed excellent agreement (<5 % deviation) among the participating laboratories with good repeatability .

The sorption data and technical information on the different experimental setups have been used to investigate errors and potential pitfalls in the assessment of high-pressure CO_2 sorption isotherms.

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