

Problem and Aims

Sorption isotherms describing the gas storage capacity of coals and shales, are important parameters for the estimation of gas saturation and the CO₂ enhancement potential of shale gas reservoir production.

While the quality of gas sorption isotherms on coals has been assessed in various inter-laboratory studies, such comparisons have not been performed or reported so far for gas shales. This makes it difficult to compare the results obtained from different laboratories. Questions arise concerning the extent to which differences in results can be attributed to heterogeneities, sample preparation or the measurement technique.

Strict control must be exerted on experimental methodology and variables in order to obtain reproducible results. The need for inter-laboratory accuracy is well recognized by regulatory agencies and industry and is a driver for the development of standard methods. Further, the research community recognizes that several factors including the operator, the equipment, the calibration of the equipment, and the laboratory environment including temperature and humidity can influence the variability of a test result. Because no standard method or equipment for obtaining CH₄, CO₂ or C₂H₆ isotherm data for gas shales exists, laboratories use different instrumentation and procedures. To investigate the intra-laboratory reproducibility for methane ethane and carbon dioxide isotherms on gas shales, we propose to initiate an inter-laboratory comparison study for sorption measurements with these gases on up to four different shale samples. The sample selection will comprise one low- and one high-TOC sample, respectively, at a high and a low maturity level.

This study will further investigate the inter-laboratory reproducibility of methane, ethane and carbon dioxide isotherm measurements on dry and moisture-equilibrated shale samples (Namurian shale V_{Rf}=2%, TOC=5%; Eagle Ford Shale,). Six independent laboratories will provide isotherm data on the three dry and moisture-equilibrated shale samples at 65 °C and pressures up to at least 16 MPa.

Each laboratory will use the same batch of shale sample powdered, characterised and provided by RWTH and will follow the same general procedure; however, each laboratory will use its own apparatus and isotherm measurement techniques. Our intent is to address the issue of whether the differences currently found among laboratories influence the outcome, or if all published isotherms are comparable. This work will provide guidance for estimating the reproducibility that might be expected when comparing adsorption isotherms from different laboratories.

The project will be performed as an “open” round-robin with regular updates and exchange of results and experience among the participants. The common objective is the improvement of data quality and reliability and the refinement of experimental techniques.

Participants:

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