

## **Fast and Economic Gas Isotherm Measurements Using Small Shale Samples**

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Automated field desorption experiments and laboratory adsorption isotherms, performed with various gases and shale samples, are used to compare and validate the total gas content of the shale, to define the free and adsorbed gas proportions, to verify the USBM lost gas calculation, sample crushing size and sample preparation and handling techniques. Normal and abnormal desorption curves are examined. Full diameter and sidewall desorption data is compared.

High pressure mercury injection-pore size distribution experiments are performed on solid and crushed small shale samples to illustrate the reservoir quality and the crushed rock analysis concept. The diffusion parameter ratio (plug to crushed sample) is used to describe the shale pore network interconnectivity. Crushed and powdered adsorption isotherms are generated and used to show the crushing size importance in determining the total gas content. Over crushing the shale can seriously over estimate the adsorption isotherms by generating new surface while destroying pore volume.

Shale evaluation procedures consists of automated desorption isotherms, micro fracture evaluation, tight rock analysis, diffusion parameter measurements, geochemical (TOC and Rock Evaluation, Ro), sorption isotherms, x-ray diffraction, SEM, capillary suction time for fluid optimization, mercury injection capillary pressure and pore size distribution, acoustic velocity measurements and dynamic rock mechanics are all performed on a small plug sample in a timely and economic manner.