

Physical Characterization of Shale

Recent economic conditions have led researchers and companies to investigate the possibility of extracting gas and oil from shale reserves in the U.S. and around the world. Shale samples are unique because of the complexity of their porosity and the potential problems associated with cleaning the samples prior to analysis. As is always the case with any sample, the key to properly characterizing shale is thorough cleaning of the material prior to any measurement. This is typically accomplished using a soxhlet extraction procedure prior to testing.

Mercury intrusion porosimetry is commonly used to provide pore size information as well as total pore volume, porosity, and density measurements of shale. The data are used to calculate pore tortuosity, diffusion parameters, and other geological parameters.

BET surface area using the gas adsorption technique is another common test used to characterize shale samples. Surface area is used to predict the amount of free gas stored within pores, the amount of adsorbed gas or dis-

solved gas on the surface or in pores, and kinetics for rate of gas production.

Gas displacement pycnometers measure the skeletal volume of shale. When combined with other density measurements, skeletal volume can be used to determine porosity of both crushed and intact shale samples.

High pressure gas adsorption isotherms using methane, carbon dioxide, or nitrogen can be used to model kinetic data and determine volume adsorbed at simulated shale depth conditions.

Micromeritics Analytical Services (MAS) offers these sample analyses to the shale gas industry on a contract basis with fast turn-around times and outstanding customer service. Featuring products manufactured by Micromeritics, MAS also provides additional services outside of Micromeritics' current product line. A full list of materials characterization services includes: particle size distribution, particle shape, particle count, nano particle size, surface area, micropore analysis, pore volume distribution, total pore volume, density, surface ener-

gy, dynamic water vapor sorption, TGA, DSC, active surface area, percent metal dispersion, crystallite size, high-pressure adsorption isotherms, magnetic content, zeta potential, isosteric heat of adsorption, microscopy, method development, method validation, and consulting services.