

Using Complementary Approaches to Characterizing Pore Structure of Natural Rock

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Microscopic characteristics of porous media ? pore shape, pore-size distribution, and pore connectivity ? control fluid flow and chemical transport, and are important in hydrogeological studies of rock formations in the context of energy, environmental, and water resources management. For example, the effect will influence the mass transfer in a fracture-matrix system, such as gas production from tight shale after hydraulic stimulation or long-term performance of geological repository. This presentation discusses various approaches to investigating pore structure of a range of rocks. These approaches include imbibition, tracer gas/liquid diffusion, porosimetry (mercury injection porosimetry, water vapor transport and capillary condensation), and imaging micro-tomography, Woods metal impregnation). Consistently across approaches, we found well-connected pores for Berea sandstone, intermediately-connected pores in welded tuff and dolomite, and a sparsely-connected pore system for Indiana sandstone, metagraywacke, and Barnett shale.

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