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Theoretical fitting of experimental adsorption data from cored clay shale

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Shale reservoirs have become a major source of natural gas with the United States leading in production. This has led to new and innovative techniques which have led to improvement in exploration and production techniques. The process of quantifying adsorption is through experimental methods with results fitted to an isotherm to determine the total adsorbed gas. This study was conducted with the aim of fitting four isotherm models, namely: Langmuir, Freundlich, and Redlich Paterson to correlate experimental adsorption data using cored clay rich shale to determine the best fit isotherm. In order to determine the best, experimental methane adsorption data of two cored clay rich shale (Bandera, Scioto) were fit to isotherm models by non-linear regression using Mat lab R2016A software. Fitting results indicate that the Redlich Paterson model fit Bandera methane adsorption data better than the Langmuir, Freundlich or Sips model for the Bandera sample. For the Scioto, the Langmuir fit better than the other isotherms. These suggest that both Langmuir isotherm model and the Redlich Paterson isotherm model can generate a satisfactory fit to the experimental data, while Freundlich isotherm model cannot, the order of the isotherm best fits for the two clay rich shale samples are Redlich-Paterson >Langmuir> Freundlich. A number of studies have been conducted on organic shale and kerogen and fit to two or more isotherms to determine the best fit, but to our knowledge, this is the first study that has been carried out on cored clay rich shale to determine the best fit of adsorption isotherm.

Biography

Hayatu Bashir is a PhD student at the University of Salford. He has a Master's degree in Gas Engineering from the same university. His research area is in methane gas storage in shale reservoir specifically clay rich shale.

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