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Energy - Oil and Gas Research; Data from China University of Petroleum (East China) Provide New Insights into Oil and Gas Research (Multiscale Modeling of Gas Transport In Shale Matrix: an Integrated Study of Molecular Dynamics and Rigid-pore-network Model)

559 words
30 October 2020
Energy Weekly News
ENRGWK
57
English

2020 NOV 6 (VerticalNews) -- By a News Reporter-Staff News Editor at Energy Weekly News -- Current study results on Energy - Oil and Gas Research have been published. According to news reporting originating in Beijing, People's Republic of China, by VerticalNews journalists, research stated, "The physics of gas transport through shale systems remains ambiguous. Although several theoretical and experimental studies have been reported, most concentrate only on the permeability of shale kerogen."

Financial supporters for this research include National Natural Science Foundation of China, National Program for Fundamental Research and Development of China (973 Program), National Postdoctoral Program for Innovative Talents, Natural Science Foundation of Shandong Province, Applied Fundamental Research Project of Qingdao, Fundamental Research Funds for the Central Universities, Nanogeosciences Laboratory at the **Bureau of Economic Geology**, Jackson School of Geosciences, the University of Texas at Austin, Mudrock Systems Research Laboratory at the **Bureau of Economic Geology**, Jackson School of Geosciences, the University of Texas at Austin.

The news reporters obtained a quote from the research from the China University of Petroleum (East China), "Shales, however, are composed of various proportions of organic matter and inorganic minerals (e.g., calcite and clay). Inorganic pores are larger than organic pores, thus affecting apparent permeability. To accurately predict the apparent permeability of shale, we couple molecular dynamics (MD) and a pore-network model (PNM) to develop a multiscale framework for gas flow through shales. First, we use nonequilibrium MD (NEMD) to study the pressure-driven flow behavior of methane (CH4) through organic, calcite, and clay [montmorillonite (MMT)] nanopores under reservoir conditions, from which, using the slip-corrected Poiseuille equation, we propose a mass-transport model accounting for the contributions of both the adsorbed-phase fluid and bulk fluid. Then, we incorporate these formulations into a shale PNM in which the influences of shale composition and bimodal pore-size distribution (PSD) are taken into account. We also develop an analytical model for the apparent permeability of shale matrix using the bundle-of-capillaries approach. In comparison with previous methods, our proposed models highlight the effect of relatively greater pore sizes in inorganic matrices."

According to the news reporters, the research concluded: "This work provides an efficient tool for better understanding gas transport through shale systems at both molecular and pore scales."

This research has been peer-reviewed.

For more information on this research see: Multiscale Modeling of Gas Transport In Shale Matrix: an Integrated Study of Molecular Dynamics and Rigid-pore-network Model. SPE Journal, 2020;25(3):1416-1442. SPE Journal can be contacted at: Soc Petroleum Eng, 222 Palisades Creek Dr, Richardson, TX 75080, USA.

Our news correspondents report that additional information may be obtained by contacting Sen Wang, China University of Petroleum (East China), Beijing, People's Republic of China. Additional authors for this research include Qihong Feng, Ming Zha, Ronghao Cui and Farzam Javadpour.

Keywords for this news article include: Beijing, People's Republic of China, Asia, Oil and Gas Research, Energy, Molecular Dynamics, Physics, China University of Petroleum (East China).

Document ENRGWK0020201030egau00022