Contribution ID: **759** Type: **Poster (+) Presentation**

The Effect of Surface Chemistry on Phase Behavior in Nanoporous Confinement: An Experimental Study of iso-Butane Isotherms

Thursday, 3 June 2021 20:00 (1 hour)

Understanding fluid phase behavior is of primary importance in different industries, including oil and gas exploration and production. It is known that nanoporous confinement plays a vital role in determining the phase behavior of fluids hosted in the rock pore space. While some quantitative understanding is available describing pure fluids' behavior in nanopores, surface chemistry's effects on fluids' behavior in confinement are not fully understood. In this work, the effects of adsorbent surface chemistry on nanoporous confinement were investigated using silica-based MCM-41 adsorbents with different degrees of surface modification. The isotherms of iso-Butane were generated using a novel gravimetric apparatus with four different MCM-41 adsorbents. Three of the adsorbents possessed varying degrees of surface modification with C1, C8, and C18 alkyl groups. The results of the adsorption tests in these three modified nanoporous materials are compared to isotherms measured with pure, unmodified, MCM-41 adsorbent with matching pore sizes. The isotherms were generated at temperatures 2, 8, 16, and 24 ℃. The iso-Butane isotherms are also compared with the previously published n-Butane counterparts obtained with similar adsorbents. The results show that each adsorbent-adsorbate pair exhibit qualitatively different adsorption behavior due to varying interaction potentials between the adsorbent and the adsorbate. Moreover, this study demonstrates that the adsorption process is influenced by the molecular structures of the adsorbent and the adsorbate, particularly when capillary condensation is involved.

Time Block Preference

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References

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Session Classification: Poster +

Track Classification: (MS13) Fluids in Nanoporous Media