

Implications Of Sorption On Carbon Dioxide Sequestration In Gas Shales

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Abstract

Gas shales are one of the potential sinks considered for carbon dioxide sequestration. Therefore further research on the importance of sorption on the carbon dioxide sequestration potential is highly topical. Experimentally measured maximum sorption capacity of carbon dioxide was about 15% higher than that of methane. Carbon dioxide also exhibited a higher affinity towards these shales as compared to methane. Through the IAST multi-component sorption behavior was found to be similar to that of single-component behavior. Reservoir simulation accounting for sorbed gas revealed that huff-and-puff injection is not expected to increase methane recovery after 5 years of production. With increasing adsorption uptakes, a lower amount of carbon dioxide was injected into the reservoir for a given injection period. Therefore longer injection periods as compared to production periods are necessary for gas shales to be carbon neutral. Sorbed carbon dioxide stored in the reservoir was found to be highly stable even during methane production, and can, therefore, be expected to be less susceptible to leakage compared to other carbon dioxide sequestration technologies.

Figures used in the abstract

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Figure 1 : Methane in reservoir in a) before methane production, b) after methane production, and c) after carbon dioxide injection

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Figure 2 : Carbon dioxide in reservoir in a) before methane production, b) after methane production, and c) after carbon dioxide injection

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Figure 3 : Adsorption isotherms

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Figure 4 : Methane produced and carbon dioxide sequestered a) total amount b) sorbed amount