Contribution ID: **140** Type: **Oral Presentation**

Pore Scale Visualization of CH4-CO2 Mixed Hydrates Phase Transitions During Stepwise Depressurization

Monday, 31 May 2021 10:10 (15 minutes)

In this study, we investigate the dissociation pattern of CH4/CO2 mixed hydrate in porous media using high-pressure micromodel. We formed CH4/CO2 mixed hydrate from gaseous CH4 and liquid/gaseous CO2 to mimic the scenario where a CH4 hydrate reservoir has been injected with CO2. Direct visualization was carried out using a high-pressure, water-wet, silicon-wafer based micromodel with a pore network of actual sandstone rock. Mixed hydrate was formed at reservoir conditions (P = 44-75 bar and T = 1.7-3.6℃) from either a two-phase system (liquid water and CH4/CO2 gas mixture) or a three-phase system (liquid water, CH4 gas, and liquid CO2).

A stepwise pressure reduction method was applied to record multiple dissociation pressure points for a given mixed hydrate system, and the molar concentration of CH4/CO2 corresponding to each dissociation point was calculated. The effect of hydrate and fluid saturation on fluid flow during dissociation was also analyzed.

The results showed that liberated gas during stepwise pressure reduction was trapped by surrounding hydrate, and reformation of CO2 hydrate occurred rapidly when liquid water was present. The reformed CO2 hydrate shielded the CH4 hydrate that was still not dissociated and complete dissociation was accomplished when the pressure was brought below the stability pressure of pure CO2 hydrate.

Time Block Preference

Time Block C (18:00-21:00 CET)

References

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Primary author: Mr PANDEY, Jyoti Shanker (Technical University of Denmark)

Co-authors: Mr STRAND, Ørjan (University of Bergen); Prof. VON SOLMS, Nicolas (Technical University of Denmark); Prof. ERSLAND, Geir (University of Bergen); Dr ALMENNINGEN, Stian (University of Bergen)

Presenter: Mr PANDEY, Jyoti Shanker (Technical University of Denmark)

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