Contribution ID: **485** Type: **Oral Presentation**

Mineral composition and concrete gradation of sandy clay on CO2 hydrates formation

Wednesday, 15 May 2024 14:45 (15 minutes)

Sandy clay is the main porous medium for the occurrence of gas hydrates in nature. Hydrate-based technology for CO2 sequestration in marine and permafrost layers is a promising and potential technique. To investigate the influence of formation properties on CO2 sequestration, experiments were conducted under an initial pressure of 5.5 MPa and temperature of 1.27 ℃. The influence of different mineral compositions and concrete gradation of sandy clay for CO2 hydrate formation were analyzed. The pressure-temperature changes, CO2 hydrate average formation rate, CO2 consumption, and phase saturation were calculated during the CO2 hydrate formation process. The results show that the CO2 hydrate average formation rate decelerated with the increase of coarse sand proportion due to the reduction of specific surface area, and the CO2 hydrate average formation rate is the smallest when the ratio of fine-grained sand to coarse-grained sand particle sizes (mass ratio of each component, the same below) is 1.0: 2.0, which is 12.60 mmol/min. Montmorillonite is not conducive to CO2 hydrate formation; the CO2 hydrate average formation rate of the sand group (contains fine-grained sand and coarse-grained sand) is higher than that of the sandy clay group (contains fine-grained sand and montmorillonite clay). The experiments in the sand group are more likely to achieve high hydrate saturation and CO2 consumption, making it more suitable for CO2 sequestration in areas with mineral compositions containing fine-grained sand and coarse-grained sand. The CO2 consumption rates for the ratio of fine-grained sand to coarse-grained sand and clay mineral particle sizes of 1.0: 0.5 are 0.86 mol and 0.77 mol, respectively. With the increase in the proportion of coarse-grained sand and clay minerals, both the hydrate saturation and CO2 consumption gradually decrease. The ratio of fine-grained sand to coarse-grained sand and clay mineral particle sizes of 1.0:0.5 is suitable for CO2 sequestration using the hydrate-based technology.

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

Country

China

Porous Media & Biology Focused Abstracts

References

Conference Proceedings

I am interested in having my paper published in the proceedings.

Primary author: Dr ZHAO, Jianzhong (Key Laboratory of In-situ Property-improving Mining of Ministry of Education, Taiyuan University of Technology, Taiyuan 030024, China)

Co-authors: Dr ZHANG, Chi (Key Laboratory of In-situ Property-improving Mining of Ministry of Education, Taiyuan University of Technology, Taiyuan 030024, China); Dr GAO, Qiang (College of Engineering for Safety and Emergency Management, Taiyuan University of Science and Technology, Taiyuan 030024, Shanxi, China); Dr MA, Yue (Key Laboratory of In-situ Property-improving Mining of Ministry of Education, Taiyuan University of Technology, Taiyuan 030024, China)

Presenter: Dr ZHAO, Jianzhong (Key Laboratory of In-situ Property-improving Mining of Ministry of Education, Taiyuan University of Technology, Taiyuan 030024, China)

Session Classification: MS17

Track Classification: (MS17) Complex fluid and Fluid-Solid-Thermal coupled process in porous media: Modeling and Experiment