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Impact of microbial activity on hydrogen transport in porous reservoirs across scales

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Geological porous reservoirs are seen as an attractive solution for large scale underground hydrogen storage (UHS). Microbes are expected to be abundant in these reservoirs and could have a significant impact on the UHS process as the stored hydrogen can be used in their metabolism. Next to adverse effects such as hydrogen loss, H2S formation and clogging, microbial activity could alter the wettability of the hydrogen/brine/rock system and, consequently, the hydrogen transport behavior during UHS.
To effectively exploit these reservoirs for UHS, a good understanding of the impact of microbial activity on the hydrogen transport behavior inside porous rock is crucial. In this work, we characterize hydrogen transport properties in a microbial active environment from the pore- to the core-scale using several experimental techniques: Wettability is characterized using the captive-bubble cell approach and microfluidics, while relative permeability and capillary pressure are measured during core-flood tests at the core-scale. The activity of the living brine used in the experiments, which contains the sulphate reducing bacteria "*Oleidesulfovibrio alaskensis*"is continuously monitored through the pH. Our preliminary results show that high microbial activity increases the contact angle with around 5°, making the hydrogen/brine/rock system less water-wet.

Participation

In-Person

References

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