Micro-bubble Injection Enhanced dissolution during CO_2 Sequestration in saline

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CO_2 micro-bubble injection is available for storing CO_2 in aquifers with non-anticline (monotonic) structure in a low-cost concept. In this study, the dynamic displacement and dissolution during CO_2 flushing was investigated by using medical X-ray CT scanner. CO_2 was injected into brine saturated sandstone with 0.05 mL/min under reservoir condition (10MPa/40°C).Two sets experiments with micro-bubble and normal bubble CO_2 were conducted to quantify compare the enhanced dissolution efficiency. Larger interfacial area between CO_2 and brine during the injection enhanced the mass transfer and delayed CO_2 breakthrough. The breakthrough time for micro bubble was nearly 120 min corresponding to 180 min for normal bubble under the same injection rate. By image analysis, the high sweep efficiency during micro-bubbles injection was obtained. Micro-bubble CO_2 preferred to trap into tiny pores since the small size bubble and micro-bubbles injection accelerated gas trapping because of the fully dissolution. CO_2 micro-bubble sequestration is also a novel technology to store CO_2 from the small- to middle-scale emission sources by enhanced dissolution and effective use of pore space suggested by our experimental results.

Keywords: micro bubble, CO2 saturation, high sweep efficiency, dissolution

