Study of advanced CO_2 dissolution technology for improvement of CO_2 storage efficiency

*Ryo Ueda[1], Masanori Nakano[1], Ziqiu Xue[2]

1. Japan Petroleum Exploration Co., Ltd., 2. Research Institute of Innovative Technology for the Earth

Reducing cost of CO_2 injection and storage is important challenge for applying to commercialization. Establishing the advanced CO_2 dissolution technology which controls the reservoir pressure during CO_2 injection is very important to inject and store CO_2 in reservoir efficiently and we focused the technology of CO_2 injection as the microbubble (MB). In this study, we proceeded the unraveling the efficiency of increase of CO_2 storage and the mechanism by MB-CO_2 from experiment and flow simulation.
MB is formed by CO_2 passed through the porous filter. In past study, it was seen that CO_2 saturation which is ratio of CO_2 volume divided by pore volume increase by MB-CO_2 injection more than normal injection and now it is the key point to applying this technology to field scale to study for the behavior and the efficiency of MB in the well and the reservoir and the mechanism of them.
As one of the studies, we targeted the “Effective area of MB-CO_2” and estimated the relation between the effective area of MB-CO_2 and CO_2 storage by conducting core flooding test with the long berea sand core (length : 30cm). Core flooding test was conducted at the reservoir condition (40℃, 10MPa) at which it is supercritical CO_2 and CO_2 saturation was increased 7.4% and CO_2 Storage is also increased 30.4% in core by MB-CO_2 injection as relative increase against normal injection. It was considered that these results show the effect of advance of CO_2 dissolution to water by MB-CO_2 injection technology. In addition, the behavior, which breakthrough time of CO_2 in MB-CO_2 injection was later than that in normal injection, was observed.

Acknowledgements
We appreciate Geological Carbon dioxide Storage Technology Research Association to support this study and Tokyo-gas co., Ltd. and RITE to proceed the basic study for MB-CO_2 injection technology.

reference
Akai, T., Xue, Z., Yamashita, Y., Yoshizawa, M. Abu Dhabi International Petroleum Exhibition and Conference, Abu Dhabi, 2015 SPE-177672-MS

Keywords: Geological CO2 Storage, advanced dissolution, microbubble, core flooding

