

Impact of geological structure on CO₂ geological storage safety of Ordos CO₂ geological storage demonstration site

Jing Jing (1), Zhonghua Tang (1), Yanlin Yang (2), and Liangzhe Ma (1)

(1) China University of Geosciences, Wuhan, China (452885443@qq.com), (2) Wuhan Geological Survey Center of China Geological Survey, Wuhan, Hubei Province, China, 430223

CO₂ storage safety is a key issue in CO₂ geological storage. The geological structure of the stratum is complex in the actual CO₂ storage engineering site, and the formation sloping degree and fault exist objectively. In order to explore the influence of geological structure (formation sloping degree and fault) on CO₂ geological storage safety. In this paper, taking Shi qianfeng formation in the Ordos CO₂ geological storage site as the research object. Established 3D models with TOUGHVISUAL software and simulated with TOUGH2 software. According to the condition of formation sloping degree and fault, 8 sets of simulation schemes were set up. Simulation results showed that: The larger the formation sloping degree, the smaller the formation pressure in the left upper part of the injection well, and the greater the formation pressure in the right lower part of the injection well. Formation pressure in the strata containing fault is irregular, while the pressure in the formation without faults is regular. In the process of CO₂ migration, the larger the formation sloping degree, the farther the CO₂ migration distance is, the greater the CO₂ gas saturation and the CO₂ liquid mass fraction are. Fault provides a channel for CO₂ leakage. The larger the formation sloping degree, the greater the buoyancy of CO₂, and the faster the CO₂ migration rate to the left upper part. CO₂ migration for 500 years did not leak in the horizontal (0°) formation with fault; and the larger the formation sloping degree, the earlier the CO₂ leakage time occurs in the sloping formations with fault. CO₂ total storage amount in the strata with fault, is greater than that without fault. The larger the formation sloping degree, the smaller the total CO₂ storage capacity at CO₂ injection for 20 years. The larger the formation sloping degree, the greater the CO₂ total storage amount in the left upper part of the injection well, and the smaller the CO₂ total storage amount in the right lower part of the injection well during CO₂ migration after stopping injection. In the selection of CO₂ storage site in the future, we should try our best to select the formation without fault and the smaller sloping formation for CO₂ storage.