

Simulation of Dissolution Sequestration and Trapping Mechanisms of CO₂

Научный руководитель – Глебова Любовь Владимировна

Чжан Лиюань

Graduate (master)

Московский государственный университет имени М.В.Ломоносова, Геологический факультет, Кафедра теоретических основ разработки месторождений нефти и газа, Москва, Россия

E-mail: zhangliyuan.789@me.com

Carbon dioxide (CO₂) is one of the primary gases responsible for the greenhouse effect, and reducing anthropogenic CO₂ in the atmosphere is crucial for mitigating climate change. Sequestering CO₂ in suitable underground geological formations may be a viable method to decrease atmospheric CO₂ concentrations. This study comprehensively simulates the dissolution sequestration and trapping mechanisms of CO₂, aiming to evaluate the effectiveness and feasibility of long-term carbon storage solutions. Utilizing the CMG-GEM compositional simulator for case studies on geological formations, the research investigates the dynamics of CO₂ dissolution in aqueous environments and its subsequent mineralization, thereby gaining insights into the physical and chemical interactions that facilitate CO₂ capture. Results indicate that the primary factors affecting dissolution sequestration are pressure, temperature, and the surface area in contact with the aqueous body.

References

- 1) Nwideo LN, Theophilus S, Barifcani A, Sarmadivaleh M, Iglauer S. EOR Processes, Opportunities and Technological Advancements. Chem Enhanc Oil Recover - a Pract Overv 2016;3–52. <https://doi.org/10.5772/64828>.
- 2) Orr FM, Heller JP, Taber JJ. Carbon dioxide flooding for enhanced oil recovery: Promise and problems. J Am Oil Chem Soc 1982;59:810A-817A. <https://doi.org/10.1007/BF02634446>.
- 3) Alvarado V, Manrique E. Enhanced oil recovery: An update review. Energies
- 4) Senapati S, Berkowitz ML. Molecular Dynamics Simulation Studies of Polyether and Perfluoropolyether Surfactant Based Reverse Micelles in Supercritical Carbon Dioxide. J Phys Chem B 2003;107:12906–16. <https://doi.org/10.1021/jp035128s>.
- 5) Knight BL. Reservoir Stability of Polymer Solutions. AIChE Symp Ser 1973:40–2.