Machine learning approach for predicting the effect of CO_2 solubility on dissolution rate of calcite MOHAMMAD NOMELI, University of Maryland — A machine learning-assisted model is developed to predict the dissolution rate of calcite in saline solutions that are imbibed with dissolved CO_2 over a broad range of both subcritical and supercritical conditions. This study focuses on determining the rate of calcite dissolution within a temperature range of 50-100 C and pressures up to 600 bar, relevant for CO_2 sequestration in saline aquifers. A general reaction kinetic model is used that is based on the extension of the standard Arrhenius equation with an added, solubility dependent, pH term to account for the saturated concentration of dissolved CO_2. The kinetic model helps to obtain a predictive rate equation using machine learning methods to determine the dissolution of calcite as a function of temperature, pressure and salinity. The new rate equation helps us obtain good agreement with experimental data, and it is applied to study the geochemically induced alterations of fracture geometry due to calcite dissolution.

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