Intercalation and Retention of CO$_2$ in Fluorohectorite Clay at Near-Ambient Conditions

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We show using x-ray diffraction that gaseous CO$_2$ intercalates into the interlayer space of the synthetic smectite clay fluorohectorite at conditions close to ambient. The rate of intercalation is found to be dependent on the interlayer cation, with about one order of magnitude increased rate in Li-fluorohectorite compared to Na-fluorohectorite. We further show that Li-fluorohectorite is able to retain CO$_2$ in the interlayer space at room temperature, which could have applications related to CO$_2$ capture, transport and storage. De-intercalation starts occurring at temperatures exceeding 30 °C.