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Carbon dioxide intercalation in Na-fluorohectorite clay at near-ambient conditions[1] JON OTTO FOSSUM[2], Department of Physics, Norwegian University of Science and Technology, HENRIK HEMMEN, ERLEND G. ROLSETH, DAVI FONSECA, ELISABETH LINDBO HANSEN, Department of Physics, Norwegian University of Science and Technology - NTNU, TOMAS PLIVELIC, MAX IV Laboratory, Lund University, Sweden — A molecular dynamics study by Cygan et al.[1] shows the possibility of intercalation and retention of CO_2 in smectite clays at 37 ^{o}C and 200 bar, which suggests that clay minerals may prove suitable for carbon capture and carbon dioxide sequestration. In this work we show from x-ray diffraction measurements that gaseous CO_2 intercalates into the interlayer space of the synthetic smectite clay Na-fluorohectorite. The mean interlayer distance of the clay when CO_2 is intercalated is 12.5 Å at 20 $^\circ$C and 15 bar. The magnitude of the expansion of the interlayer upon intercalation is indistinguishable from that of the dehydrated-monohydrated intercalation of H_2O, but this possibility is ruled out by careful repeating the measurements exposing the clay to nitrogen gas. The dynamics of the CO_2 intercalation process displays a higher intercalation rate at increased pressure, and the rate is several orders of magnitude slower than that of water or vapor at ambient pressure and temperature.

[1] Cygan, R. T.; Romanov, V. N.; Myshakin, E. M. *Natural materials for carbon capture*; Techincal report SAND2010-7217; Sandia National Laboratories: Albuquerque, New Mexico, November, 2010.

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[X] Prefer Oral Session
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