

9.20: Evolution of Pore Fluid Salinity during Compression Tests

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ABSTRACT

Pore fluid salinity is important for understanding the chemo-mechanical processes that are occurring at the clay particle level. When a sample is one-dimensionally compressed we observe the pore fluid salinity decreases with increasing stress level. The literature (based on fluid extraction measurements) suggests that part of the change is due to stress-induced smectite dehydration. The objective of this study is to characterize the variation in pore fluid salinity of RGoM-EI with compression level and investigate a potential mechanism controlling the process. We measure the salinity of the compressed specimen rather than the expelled fluid. Based on the observations, we propose that part of the reduction in salinity is due to double layer exclusion. The double layer retains a constant amount of ions and as the pore fluid volume decreases the measured salinity decreases. The laboratory measurements compare favorably with model predictions suggesting that compression expels the free pore fluid primarily at a constant salinity.

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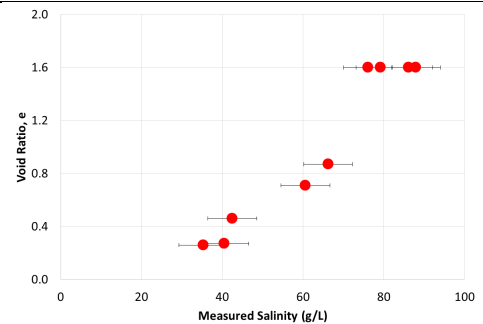


Fig 1: Measured salinity of GoM-EI test specimens compressed to various stress levels up to 40 MPa.

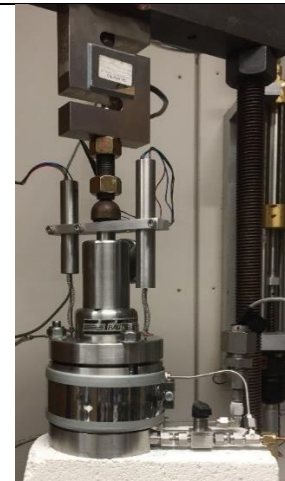


Fig 2: Constant rate of strain testing apparatus.

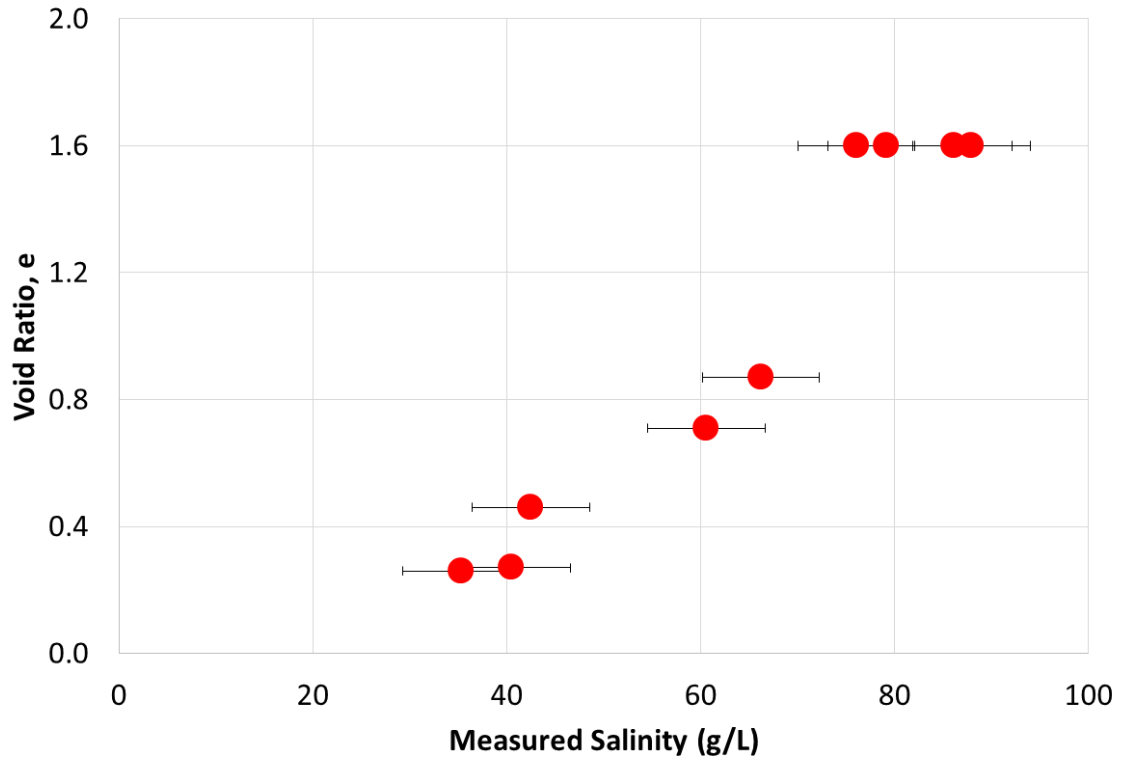


Fig. 1: Measured salinity of RGoM-EI test specimen compressed up to 40 MPa. The trend is clear that with decreasing void ratio (increased compression) the salinity also decreases.

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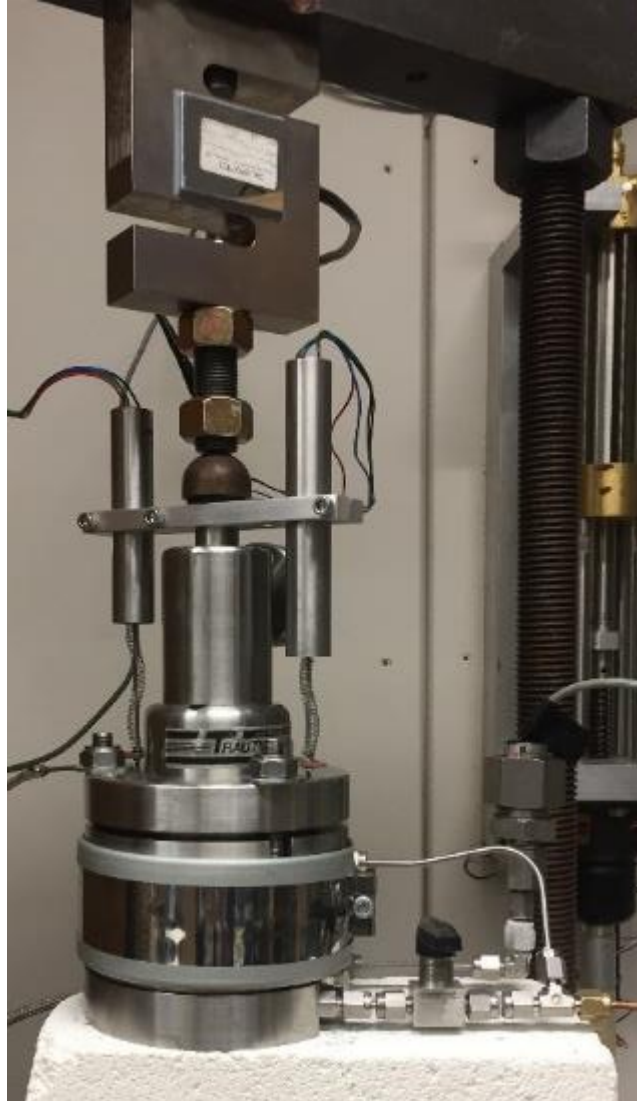


Fig. 2: This figure is the constant rate of strain apparatus. The test specimen are compressed inside this cell to any stress level up to 40 MPa.

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