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PERMEABILITY TESTS ON HOLLOW SALT SPHERES

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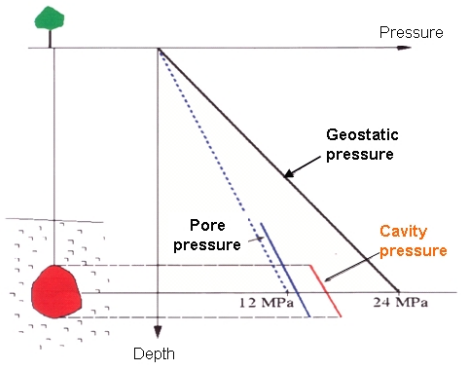
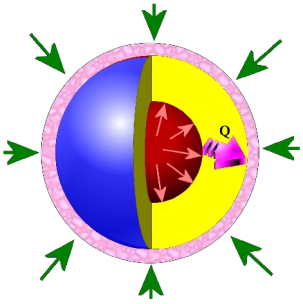


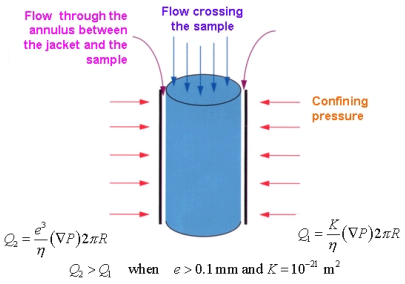
AN ENVIRONMENTAL PROTECTION PROBLEM

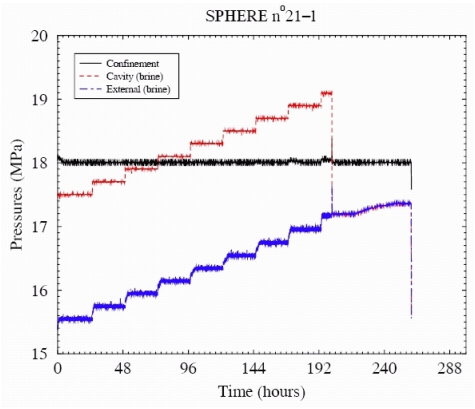
When a brine-filled deep cavern is closed and abandoned, brine pressure slowly increases due to brine thermal expansion and creep closure. It is feared that brine pressure build up to geostatic pressure, leading to hydro-fracturing and brine migration to water-bearing strata. In fact brine pressure build-up could be released by brine flow to the cavern wall.

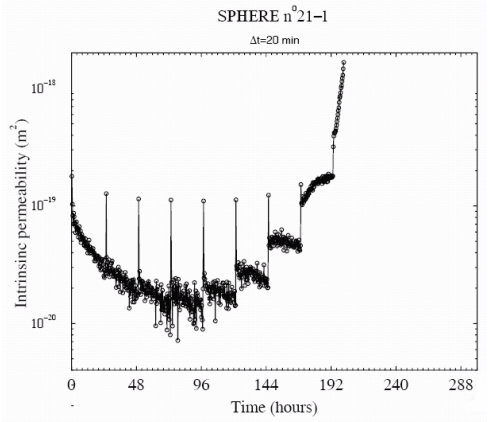


WHY HOLLOW SPHERES ?

Salt permeability is exceedingly small. Spherical symmetry minimizes boundary effects. In the case of a hollow sphere, three different pressures are applied to the sample : “cavity pressure” in the central hole, “confining pressure” applied to the spherical tight jacket and “external pore pressure”, or pressure of brine in the outer space between the jacket and the rock sample.







MAIN FINDINGS

Permeability consistently decreases at the beginning of the test. Samples are damaged during sampling; “healing” is due to the effects of high compressive stresses.

When cavity pressure increases to reach confining pressure, permeability gradually increases. At hour 200, a discrete fracture crosses the sample.
It was proved that permeability increase will allow pressure build-up to release.

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