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Experimental study on salt rocks: gas permeability and stress coupling effects.

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This experimental study on salt rocks is conducted with Storengy company, which is in charge, in France, of natural gas storage facilities. Salt rock caverns have been long used to perform this kind of technics and two scenarios are currently considered for their future life. It can be an abandon strategy or a potential solution for hydrogen storage. For both scenarios the salt permeability and poromechanical behaviours are two key properties to be investigated. Therefore a series of gas permeability tests under different hydrostatic stress and fluid pressure have been conducted to investigate the behaviour of salt rocks as regards gas flow and coupling effects. The transient pulse decay method was carried out to measure the permeability as well as the effect of internal gas pressure. This gas pressure can be also used to evaluate the occurrence of coupling effects, which are often supposed negligible for salt. These effects strongly depends on the level of confining pressure. The salt porosity and its variation with stress were also measured during the tests (i.e. under loading) to underline the links with permeability measurements. The results show that the permeability decreases upon the increasing hydrostatic stress, and with time at a constant hydrostatic stress (within the range of 10E-17 to 10E-23 m2). Gas permeability as a function of an effective stress is also investigated. Under low confinement, the coupling effect between the fluid pressure and the skeleton of the salt rock is significant. The maximum porosity value is 1%, and it decreases to almost 0 as the confinement reaches 14MPa.