## Phase Behavior of (CO<sub>2</sub> + Water + Nitrogen) Systems Under Reservoir Conditions

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Carbon capture and storage (CCS) is a promising technology for reducing the  $CO_2$  emissions from the power and industry sectors in the short and medium term. Of the potential geological storage sites available, deep saline aquifers appear to offer the greatest capacity. The design and optimization of the carbon storage in saline aquifers require knowledge of the thermophysical properties of  $CO_2$  + water + permanent gases, the latter being typical impurities present in the  $CO_2$  stream. These properties are very limited in the literature, especially for complex mixtures at reservoir conditions [1]. The  $CO_2$  storage capacity in the reservoirs depends in part on the phase behavior of these mixtures. Moreover, accurate experimental data are required to validate thermodynamic models used in reservoir simulators. In this work, we present the phase behavior for the ( $CO_2$  + water + nitrogen) system at temperatures from (298 to 473) K and pressures up to 20 MPa. The measurements have been carried out in a newly developed analytical apparatus comprising a high-pressure equilibrium cell, heater jacket, sampling valves, coupled to an online gas chromatograph (GC) for composition measurements, and syringe pumps for fluid injection. A highsensitivity pulsed discharge detector has been used with the GC to enable the low levels of nitrogen present in the aqueous phase to be measured. The predictive capabilities of appropriated equation-of-state models have been evaluated against the new experimental results.

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## References:

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