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# New high temperature-high pressure XAS cell to study salt precipitation at- and near- supercritical conditions of water.

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Above or near the critical point (374 ℃, 22.1 MPa) the behavior of water as a solvent is entirely reversed. Organic compounds become completely miscible with supercritical water, whereas inorganic salts precipitate. This is of particular interest for several disciplines and technological applications, i.e. geochemistry, hazardous waste treatments and Synthetic Natural Gas (SNG) production. For the latter, removal and recovery of the inorganic components is crucial. We have designed a new spectroscopic cell suitable for low energy X-ray transmission measurements at pressures up to 40 MPa and temperatures up to 600℃. The titanium made cell hosts a small compartment in its center, where the liquid is pumped between two thin (˜7 μm) diamond windows (Ø˜100⊠μm). The distance between the windows is of few 10⊠μm, thin enough to allow transmission of low energy X-rays for the experiments. The constant flow setup will prevent measurement artifacts due to radiation damage to the sample. Measurements will be taken at isothermal conditions at different temperatures. XAS in transmission mode, at the M-K edge (where M = P, S, K and Ca), will be applied to structurally characterize ion-pairs in solution. The aim of this contribution is to show how this new cell allows XAS measurements at low energies to have insight about: i) formation, evolution and structure of ion-pairs in hydrothermal salt solutions; ii) identifying the specific p/T conditions at which these ion-pairs occur.

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