

On the in-situ measurements of physicochemical properties of geothermal brines in Germany

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The objective of this research project is the physicochemical evaluation of hydrogeothermal regions in Germany. The results are essential for the design and optimisation of power plants. The physicochemical properties quantified here are chemical composition, gas content, specific isobaric heat capacity, kinematic viscosity, density, thermal conductivity, pH-value and redox potential. They are experimentally determined with a specifically designed mobile testing unit.

In-situ measurements (operational conditions) are conducted to determine the dependency of the physicochemical properties on temperature, pressure and salinity. Such measurements are necessary, since the solubility under ambient conditions is significantly lower than in-situ. The in-situ measurements are used to characterise the geothermal brines and to calibrate lab test series. In these systematic test series, multiple mixtures of purified water and selected salts (including the main cations [Na, Ca, K, Mg] and anions [Cl, SO₄, HCO₃, CO₃]) in the appropriate amount (based on in-situ measurements) will simulate the previously encountered in-situ conditions. The test series will show the possibilities of artificial brine mixtures in comparison to real geothermal brines. A series of measurements will be performed to create a comprehensive data base.

As yet, geothermal brines at five sites have been investigated in-situ and in the lab, with the result that: With significant salinity, the physicochemical properties differ considerably from pure water values. And at low salinity the lab measurements reflect the in-situ values.