

Density Measurements of Supercooled Standard Seawater at High Pressure

R. Romeo^{C, S}, S. Lago and P.A. Giuliano Albo
Istituto Nazionale di Ricerca Metrologica (INRiM), Turin, Italy
r.romeo@inrim.it

In this work, a consolidated experimental apparatus for measuring the density of liquids at extreme conditions, such as in metastable states, based on the isochoric method, was exploited to study supercooled seawater. Thus, density of IAPSO Standard Seawater was measured in a wide range of temperature and pressure: from 263.15 K to 313.15 K and up to 100 MPa. The experimental apparatus consisting of a stainless-steel cell to be filled with seawater was devised to be used as a pycnometer. The mass of the sample was measured by weighing the cell by means of an analytical balance and using the substitution method. The volume of the cell was obtained by the gravimetric method and correcting the value by the thermal expansion and compressibility coefficients experimentally determined. Therefore, density was calculated according to its definition from the mass and volume measurements. All terms contributing to the uncertainty in determining the volume and the mass were considered, obtaining a relative expanded uncertainty of supercooled seawater density better than 0.1 % ($k=2$).