Absolute Measurements on Density of Sea-Water Under Controlled Pressure

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The density of seawater is an important parameter that governs the global ocean circulation mechanisms. For the suppression and monitoring of global warming, it is necessary to organize information on the distribution of seawater density with precision up to 1 ppm. Absolute measurement of seawater density in the deep sea is impossible, so density is numerically derived from salinity, which is obtained from electrical conductivity. However, the uncertainty in the thermodynamic equation of state for seawater, TEOS-10, which forms the basis of this calculation, is not better than 5 ppm. For an accurate and quantitative elucidation of ocean dynamics, high-precision absolute measurements of salinity and thermodynamic properties for seawater are essential. The authors have improved a hydrostatic weighing device for absolute density measurement of seawater, previously developed, enabling measurements under controlled atmospheric pressure. This paper reports the dependence of measured density on atmospheric pressure.