

Notes on the function `gsw_SA_from_rho_t_exact(rho,t,p)`

This function, `gsw_SA_from_rho_t_exact(rho,t,p)` calculates (using a modified Newton-Raphson iteration procedure) the Absolute Salinity S_A corresponding to the input values of *in situ* density, *in situ* temperature, and pressure. Note that the density input is not density anomaly, that is, it has not had 1000 kg m^{-3} subtracted from it.

This function uses the full TEOS-10 Gibbs function $g(S_A, t, p)$ of IOC *et al.* (2010), being the sum of the IAPWS-09 and IAPWS-08 Gibbs functions.

One use for this function is in the laboratory where a measured value of the *in situ* density ρ of a seawater sample may have been made at the laboratory temperature t and at atmospheric pressure p . The present function will return the Absolute Salinity S_A of this seawater sample.

References

- IAPWS, 2008: Release on the IAPWS Formulation 2008 for the Thermodynamic Properties of Seawater. The International Association for the Properties of Water and Steam. Berlin, Germany, September 2008, available from www.iapws.org. This Release is referred to in the text as **IAPWS-08**.
- IAPWS, 2009: Supplementary Release on a Computationally Efficient Thermodynamic Formulation for Liquid Water for Oceanographic Use. The International Association for the Properties of Water and Steam. Doorwerth, The Netherlands, September 2009, available from <http://www.iapws.org>. This Release is referred to in the text as **IAPWS-09**.
- IOC, SCOR and IAPSO, 2010: *The international thermodynamic equation of seawater – 2010: Calculation and use of thermodynamic properties*. Intergovernmental Oceanographic Commission, Manuals and Guides No. 56, UNESCO (English), 196 pp. Available from <http://www.TEOS-10.org>