Notes on the function gsw_molality_from_SA(SA)

This function, **gsw_molality_from_SA**(SA) evaluates the molality of seawater m_{SW} from the definition given by Eqn. (3.40.10) of the TEOS-10 Manual (IOC *et al*. (2010))

$$m_{SW} = \frac{S_A}{(1 - S_A) M_S} . \qquad (3.40.10)$$

Here M_S is the mole-weighted average atomic weight of the elements of sea salt. The paper which defines the Reference-Composition Salinity Scale, Millero *et al*. (2008), derives M_S to be the value

$$M_S = 31.403\,821\,8...\ \text{g mol}^{-1} = 0.031\,403\,821\,8...\ \text{kg mol}^{-1}, \qquad (1)$$

and this value can be found by calling **gsw_atomic_weight**. In Eqn. (3.40.10) Absolute Salinity S_A must be in units of kg kg^{-1} which means that M_S must be in units of kg mol^{-1} in this equation.

Molality m_{SW} is given by the GSW function **gsw_molality_from_SA**(SA) in units of mol kg^{-1}.

References

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

Millero, F. J., R. Feistel, D. G. Wright, and T. J. McDougall, 2008: The composition of Standard Seawater and the definition of the Reference-Composition Salinity Scale, *Deep-Sea Res. I*, **55**, 50-72.