Molality and Mole Fraction

Molality

For a solution prepared using \( n_j \) moles of solute and \( w_s \) kg of solvent, the molality \( m_j \) is given by:

\[
m_j = \frac{n_j}{w_s} \quad \text{(a)}
\]

Molality \( m_j \) expressed in ‘mol kg\(^{-1}\)’ is independent of temperature and pressure being defined by the masses of solvent and solute. The solvent may comprise a mixture of liquids, the composition of the solvent being described using mole fractions, weight-per-cent or volume-per-cent.

Mole Fraction

For a closed system comprising \( n_1, n_2, n_3 \ldots n_i \) moles of each \( k \) chemical substance, the mole fraction of chemical substance \( j \),

\[
x_j = \frac{n_j}{\sum_{k=1}^{k=i} n_k} \quad \text{where} \quad \sum_{k=1}^{k=i} x_k = 1 \quad \text{(b)}
\]

Mole fraction \( x_j \) is independent of temperature and pressure (in the absence of chemical reaction between the chemical substances in the system).