Lesson 5

Osmometry

Read the text in your group and try to fill the gaps.

Osmometry is a technique for m_ _ _ _ _ _ _g the concentration of particles in a s_ _ _ _ _ _ _n, i.e., osmolar concentration.
When a s_ _ _ _ e is dissolved in a pure s_ _ _ _ _ t, the following properties of the solvent are changed:
The f_ _ _ _ _ _g p_ _ _ t is depressed;
the b_ _ _ _ _ g p_ _ _ t is raised;
the o_ _ _ _ _ c p_ _ _ _ _ _ e is increased;
the v_ _ _ _ r p_ _ _ _ _ _ e is lowered.

The f_ _ _ _ _ _g p_ _ _ t of pure w_ _ _ r is precisely 0 ^{o}C at atmospheric pressure.
Ideally, 1 mol of a non-dissociating s_ _ _ _ e such as glucose, dissolved in 1 kg of water, depresses the f_ _ _ _ _ _g p_ _ _ t by 1.86 ^{o}C.
The f_ _ _ _ _ _g p_ _ _ t depression also depends upon the degree of dissociation of the s_ _ _ _ _ e.
For e_ _ _ _ _e, if 1 mol of sodium chloride were to completely dissociate into two i_ _ _ c species (Na^{+} and Cl^{-}) in 1 kg of water, the freezing point would _ _ depressed by 3.92 ^{o}C.

The freezing point o_ _ _ _ _ _ _r is the most commonly used m_ _ _ _ d for measurement of osmolality in the chemistry laboratory. When using this d_ _ _ _ e, a patient s_ _ _ _ e is s_ _ _ _ _ _ _ _ _ d below its freezing point; the sample in the measurement cell is still fluid. In the measurement chamber, immersed in the sample, is a t_ _ _ _ _ _ _ _ e sensing thermistor and a s_ _ _ _ _ _ g w_ _ e. When the wire agitates the supercooled sample begins to f_ _ _ _ e. The process of freezing releases h_ _t and the supercooled solution warms to its freezing temperature.

Supercooling
The tendency of a substance to remain in the l_ _ _ _ d state when cooled b_ _ _ w its freezing point.

Crystallisation temperature
Aqueous s_ _ _ _ _ _ _ _s can be induced to freeze (i.e. crystallise) most reliably when supercooled. Supercooled c_ _ _ _ _ l formation is induced by agitating the solution (freeze pulse).