Chapter 4

Question 4.1

(a) The predicted osmolarity (mOsm L^{-1}) of a single salt solution such as sodium chloride (NaCl) equals the molarity of the salt multiplied by the number of ions into which it dissociates (in this case, 2), and also multiplied by the proportion that dissociates into the separate ions at the temperature of the solution (0.93).

Therefore, the osmolality of a 160 mmol L^{-1} solution of NaCl at 25°C = 160 × 2 × 0.93 (mOsm L^{-1})
= **297.6 mOsm L^{-1}**

(b) The osmolality of a solution containing a mixture of 50 mmol L^{-1} NaCl and 10 mmol L^{-1} KCl is the sum of the osmolarity of each component.

The osmolality of 50 mmol L^{-1} NaCl at 25 °C = 50 × 2 × 0.93 mOsm L^{-1}

The osmolality of 10 mmol L^{-1} KCl at 25 °C = 10 × 2 × 0.92 mOsm L^{-1}

Therefore the osmolality of the mixture of NaCl and KCl = (50 × 2 × 0.93) + (10 × 2 × 0.92)
= 93 + 18.4 (mOsm L^{-1})
= **111.4 mOsm L^{-1}**