Answer on the question #43063, Chemistry, Physical Chemistry

Question:

if the osmotic pressure of 0.1M aq.solution urea at certain temperature is p, that of 0.2M aq.solution
of NaCl at the same temperature

Solution:

The osmotic pressure Π of an ideal solution with low concentration can be approximated using the Morse equation:

$$\pi = \mathrm{icRT}$$

As the urea isn't an electrolyte, it doesn't dissociate in solution, and the isotonic coefficient for this compound is 1. The sodium chloride is a strong electrolyte, so it's isotonic coefficient is equal to the number of ions, 2.

For urea solution:

$$\pi = 0.1\ \mathrm{RT} = \mathrm{p}$$

For NaCl solution:

$$\pi = 2 * 0.2 * \mathrm{RT}$$

As the RT product is 10p, the osmotic pressure for NaCl is:

$$\pi = 0.4 * 10 * \mathrm{p} = 4\mathrm{p}$$

Answer: 4p