1.9.8.2: Practice Colligative Properties

Exercise 1.9.8.2.1

A red blood cell is isotonic with a 0.9 % (m/v) NaCl solution. If you placed red blood cells into 100.0 mL of solution that has 2.0 g of NaCl dissolved in it, what will happen to the cells?

Answer

The NaCl solution is 2.0 % (m/v), so it is hypertonic compared to the cell. (The cell is hypotonic compared to the solution.) When the cell is placed into the solution, water will flow from the low concentration cell into the high concentration salt water. The cell will shrivel (crenation).

Exercise 1.9.8.2.1

Which solution will have a lower freezing point, one with 25.0 g of NaCl dissolved in 0.500 L solution, or one with 25.0 g of $MgCl_2$ dissolved in 0.500 L solution? (Hint: what is molarity of each solution? What is number of particles "i"? What is molarity of particles in the solution?)

Answer

NaCl solution is 0.856 M, i=2, it is 1.71 M in particles.

$MgCl_2$ solution is 0.263 M, i=3, it is 0.789 M in particles.

The more concentrated NaCl will experience more freezing point depression and have a lower freezing point.