

## Osmolarity (osmol) questions

Recall that osmolarity (osmol) depends on the number of particles in a solution. Ionic compounds dissociate into their individual ions when dissolved into water. So for ionic compounds, the number of particles increases when they are dissolved in water. So the osmolarity of a solution of ionic compounds will be greater than the molarity.

Problems:

1. Calculate the osmolarity (osmol) of the following solutions.

- a) 5.2 M  $\text{Na}_2\text{CO}_3$                       b) 0.15 M  $\text{Al}(\text{NO}_3)_3$                       c) 0.14 M LiBr  
d) 0.2 M glucose (glucose is  $\text{C}_6\text{H}_{12}\text{O}_6$ , a covalent compound)                      e) 0.009 M  $\text{K}_3\text{PO}_4$

2. The osmolarity of plasma (blood) is 0.28 osmol. Identify each of the solutions in problem 1 as isotonic, hypotonic, or hypertonic.

3. What will happen to a red blood cell when it is placed in each of the solutions in problem 1?

4. How many grams of KCl do you need to dissolve in 1 L of water to make a solution that is isotonic to plasma? The molar mass of KCl is 74.55 g/mole.

Answers:

1. a) 15.6 osmol                      b) 0.6 osmol                      c) 0.28 osmol                      d) 0.2 osmol (covalent compounds stay together when dissolved)                      e) 0.036 osmol

2. a) hypertonic                      b) hypertonic                      c) isotonic                      d) hypotonic                      e) hypotonic

3. a) crenation                      b) crenation                      c) nothing                      d) hemolysis                      e) hemolysis

4. Osmolarity must be 0.28 osmol, so molarity must be 0.14 M (KCl splits into 2 ions). If one Liter of solution, then we must have 0.14 moles of KCl. 0.14 moles is 10.44 g of KCl.