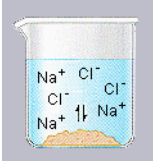


Chemistry 106 Fundamental Chemistry II	Solutions Practice 	Fall Semester
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- 1) For each of the indicated molarities of ionic solid solutions, give the individual ion molarities. Also indicate the value of i_{solute} (van't Hoff factor), for each ionic solid.

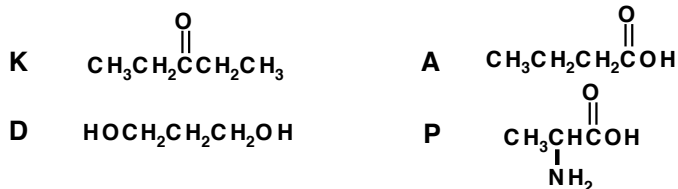
1.0 M KCl 0.50 M Na₂SO₄ 0.10 M CaCl₂ 0.25 M FeCl₃
2.5 M (NH₄)₂SO₄ 0.010 M Pb(NO₃)₂ 0.001 M Na₃PO₄

- 2) Which of the compounds below are likely to be more soluble in water and which are likely to be more soluble in n-hexane?

(a) 4-amino-butanoic acid (b) propyl pentanoate (c) 1,4-dimethylbenzene
(d) 1,3,5-pentanetriol (e) 2,2,4-trimethylpentane (f) 2-amino-ethanol

- 3) Which of the following would be least soluble in water based on the hydrophobic molecule regions?

a) propanal b) pentanal c) heptanal



- 4) Which substance above, A or P, will have the greater solubility in water? Which substance above, K or D, will have the greater solubility in water? Which substance above, K or A, will have the greater solubility in water?
- 5) What is the molality of a solution of 112 g of glucose (180.2 g/mole) in 250.0 g of water?
- 6) Consider wine to be a 12.0% (by volume) solution of ethanol (46.07 g/mole) in water. The density of ethanol is 0.789 g/mL. If the volumes additive, what is the molarity of the ethanol in wine?
- 7) A water sample contains benzene (C₆H₆ MW= 78.11 g/mol) at a concentration of 36.0 ppb. What is the molarity of the solution? Assume solution volume equals the water volume.
- 8) The Henry's Law constant for H₂ gas in water at 20 °C is $8.5 \times 10^{-4} \text{ M}\cdot\text{atm}^{-1}$. How many moles of hydrogen gas could dissolve in 50.0 mL of water at 20.0 °C when $P_{\text{H}_2} = 0.963 \text{ atm}$?
- 9) A liter of water dissolves 0.0434 grams of oxygen gas (32.00 g/mole) when the partial pressure of the oxygen gas is 1.00 atm at 20 °C.
- a) What is the molarity of the oxygen gas in solution?
b) What is the Henry's Law constant for oxygen in M/atm at 20 °C?

Compound	Normal bp (°C)	K _b (°C/m)	Normal fp (°C)	K _f (°C/m)
Water, H ₂ O	100.00	0.512	0.00	1.86

- 10) A solution contains 64.3 g of sucrose (342.3 g/mole) in 200. g of water. $d_{\text{soln}} = 1.10 \text{ g/mL}$
- What is the freezing point of the solution?
 - What is the boiling point of the solution?
 - What is the osmotic pressure of this solution at 25.0 °C?
- 11) A solution contains 64.3 g of CaCl₂ (111.0 g/mole) in 200. g of water. $d_{\text{soln}} = 1.23 \text{ g/mL}$
- What is the freezing point of the solution?
 - What is the boiling point of the solution?
 - What is the osmotic pressure of this solution at 25.0 °C?
- 12) Assume seawater is a solution of 19.0 g/L of Cl⁻, 10.5 g/L of Na⁺ and 1.35 g/L of Mg⁺². What is the minimum pressure that must be applied to purify the water by reverse osmosis at 25.0 °C?

Answers

- 1) [K⁺]=[Cl⁻]=1.0 M; $i_{\text{solute}}=2$ [Na⁺]=1.00 M, [SO₄⁻²]=0.50 M; $i_{\text{solute}}=3$
 [Ca⁺²]=0.10 M, [Cl⁻]=0.20 M; $i_{\text{solute}}=3$ [Fe⁺³]=0.25 M, [Cl⁻]=0.75 M; $i_{\text{solute}}=4$
 [NH₄⁺]=5.0 M, [SO₄⁻²]=2.5 M; $i_{\text{solute}}=3$ [Pb⁺²]=0.010 M, [NO₃⁻]=0.020 M; $i_{\text{solute}}=3$
 [Na⁺]=0.003 M, [PO₄⁻³]=0.001 M; $i_{\text{solute}}=4$
- 2) a)W b)H c)H d)W e)H f)W
- 3) c
- 4) P, D, A
- 5) 2.49 m
- 6) 2.06 M
- 7) $4.61 \times 10^{-7} \text{ M}$
- 8) $4.1 \times 10^{-5} \text{ moles H}_2$
- 9 a) 0.00136 M b) 0.00136 M/atm
- 10 a) -1.75 °C b) 100.481 °C c) 19.1 atm
- 11 a) -16.2 °C b) 104.45 °C c) 198 atm
- 12) 25.67 atm (378 lb/in²)