Laney College Chem 30A
Professor Scott Beaver

Homework #10
4/30/2016
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1. What is the solvent and solute in NaCl (aq) ?

solvent – water (H_2O)
solute – NaCl

an aqueous solution of sodium chloride

2. At 20 °C and a partial pressure of 760 mm Hg, the solubility of CO_2 in water is 0.169 g/100 mL. What is the solubility of CO_2 at:

a) 165 mm Hg ? $\left(0.169 \frac{g}{100mL}\right)\left(\frac{165\ mm\ Hg}{760\ mm\ Hg}\right) = 0.0367 \frac{g}{100mL}$

b) 2.5×10^4 mm Hg ? $\left(0.169 \frac{g}{100mL}\right)\left(\frac{2.5 \times 10^4\ mm\ Hg}{760\ mm\ Hg}\right) = 5.56 \frac{g}{100mL}$

3. What is the concentration (m/v)% when 30 mg of glucose is dissolved into enough water to make 200 mL of solution?

$$m/v\ \% = \frac{\#\ grams\ solute}{\#\ mL\ solution} = \frac{(0.30\ mg)\left(\frac{1\ g}{1000\ mg}\right)}{200\ mL} \times 100\%$$

$$= 0.00015\ \%\ m/v$$

4. What is the concentration (m/m)% of gold in an object containing 125 mg gold an 235 mg of other metals?

$$m/m\ \% = \frac{gold\ mass}{total\ mass} \times 100\% = \frac{125\ mg}{125\ mg + 235\ mg} \times 100\%$$

$$= 34.7\%\ m/m$$

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8. What is the concentration in molarity (M) for:

a) diluting 5 mL of 0.0012 M solution into 50 mL

$M_1V_1 = M_2V_2$

$M_2 = \frac{M_1V_1}{V_2} = 0.0012M \frac{5mL}{50mL} = 0.00012M$

b) diluting 5 mL of 0.0012 M solution into 500 mL

$0.0012M \frac{5mL}{500mL} = 0.000012M$

c) diluting 5 mL of 0.0012 M solution into 0.5 L (500 mL, 1 s.f.)

$0.0012M \left(\frac{5mL}{500mL}\right) = 0.000012M \rightarrow 0.00001M$

d) diluting 5 mL of 0.0012 M solution into 5 L

$0.0012M \left(\frac{5mL}{5000mL}\right) = 0.0000012M$

e) diluting 25 mL of 0.05 M solution into 150 mL

$0.05M \left(\frac{25mL}{150mL}\right) = 0.0083M$

9. Use osmotic pressure to explain what would happen to red blood cells placed into pure water.

water would rush into cells, rupturing cell membranes

10. Use π = MRT to find the glucose concentration in a solution with osmotic pressure of 7.65 atm at 37 °C.

$\pi = MRT$

$M = \frac{\pi}{RT} = \frac{7.45atm}{\left(0.08206\frac{L\,atm}{mol\,K}\right)(310.15K)} = 0.301M$

~~M = 0.311 M~~

11. Does π = MRT resemble the ideal gas law? (yes/no)

$M = \frac{n}{V}$