Chemistry 141 Name

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Quiz 11a (20 points) May 10, 2012

All work must be show to receive credit. Remember, significant figures are important!

1. (16 points) An aqueous solution of sodium phosphate is made using 115 g of Na3PO4 dissolved in water to make a total volume of 1.35 L. The density of the solution is 1.16 g/mL
	1. Calculate the molarity of the solution

$$M=\frac{mol Na\_{3}PO\_{4}}{L soln}=\frac{0.702 mol Na\_{3}PO\_{4}}{1.35 L soln}=0.518 M Na\_{3}PO\_{4}$$

$$115 g Na\_{3}PO\_{4}×\frac{1 mol Na\_{3}PO\_{4}}{163.9 g Na\_{3}PO\_{4}}=0.702 mol Na\_{3}PO\_{4} $$

* 1. Calculate the molality of the solution.

$$m=\frac{mol Na\_{3}PO\_{4}}{kg H\_{2}O}=\frac{0.702 mol Na\_{3}PO\_{4} }{1.45 kg H\_{2}O}=0.484 m Na\_{3}PO\_{4}$$

$$1.35 L soln×\frac{1160 g soln}{1000 L soln}=1570 g soln $$

$$1570 g soln-115 g Na\_{3}PO\_{4}=1450 g H\_{2}O or 1.45 kg H\_{2}O $$

* 1. Calculate the mass percent of sodium phosphate in the solution

$$\%=\left(\frac{g Na\_{3}PO\_{4}}{g total}\right)×100\left(\%\right)=\left(\frac{115 g Na\_{3}PO\_{4}}{1570 g soln}\right)×100(\%)=7.32 \% Na\_{3}PO\_{4}$$

* 1. Calculate the freezing point of the solution.

$$∆T\_{f}=iK\_{f}m=\left(4\right)\left({1.86℃}/{m}\right)\left(0.484m\right)=3.60℃$$

So freezing temperature is −3.60oC

1. (4 points) Predict whether each of the following molecules is more soluble in water, hexane or both. Explain your choices.
	1. 

Soluble in both hexane and water because has non-polar groups and H-bonding potential.

* 1. 

Soluble in hexane only because only diffusion forces possible.

* 1. Br2

Soluble in hexane only because only diffusion forces possible.

* 1. NaClO3

Soluble in water only because ionic compound.

Equations and constants

PV = nRT

P1=*i*X1\*Ptotal

π= *i*MRT

M1V1 = M2V2

Ptotal = P1 + P2 + P3 + …

M = mol/L

m = mol/kg solvent

Xi = moli/ moltotal

ΔTb = *i*(kb)(m)

ΔTf = *i*(kf)(m)

Psoln = (Psolv)(Xsolv)

Kf water=1.86 oC/m

Kb water= 0.512 oC/mj