Chemistry 141 Name

Dr. Cary Willard

Quiz 11a (20 points) November 28, 2012

All work must be shown to receive credit. Give answer to correct number of significant figures. π=iMRT, ΔTf=ikfm, ΔTb=ikbm, R=0.0821 L atm/mol K=62.4 L torr/mol K

1. (15 points) A 4.23 M solution of sodium chloride in water has a density of 1.28 g/mL
	1. Calculate the mass percent sodium chloride in the solution.

$$\left(\frac{4.23 mol NaCl}{1 L soln}×\frac{58.44 g NaCl}{1 mol NaCl}×\frac{1 L soln}{1000 mL soln}×\frac{1 mL soln}{1.28 g soln}\right)×100\%=$$

* 1. Calculate the molality of sodium chloride in the solution.

$$\frac{19.31 g NaCl}{80.69 g H\_{2}O}×\frac{1 mol NaCl}{58.44 g NaCl}×\frac{1000 g H\_{2}O}{1 kg H\_{2}O}=$$

* 1. Calculate the osmotic pressure of the solution at 25oC.

$$π=iMRT=\left(2\right)\left(\frac{4.23 mol}{L}\right)\left(\frac{0.0821 L atm}{mol K}\right)\left(298 K\right)= (157000 torr)$$

Remember that NaCl dissociates to give 2 ions per mol so i = 2.

1. (5 points) An aqueous solution containing 21.8 g of an unknown molecular compound in 100.0 g of water was found to have a freezing point of -1.42oC. Calculate the molar mass of the unknown compound. (Kf for water is 1.86oC/m)

$$∆T\_{f}=iK\_{f}m \rightarrow m=\frac{∆T\_{f}}{iK\_{f}}= \frac{1.42℃}{\left(1\right)\left(1.86℃/m\right)}=0.763 m$$

$$\frac{21.8 g unknown}{100.0 g H\_{2}O}×\frac{1000 g H\_{2}O}{1 kg H\_{2}O}×\frac{1 kg H\_{2}O}{0.763 mol unknown}=286 g unknown/mol$$

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All work must be shown to receive credit. Give answer to correct number of significant figures. π=iMRT, ΔTf=ikfm, ΔTb=ikbm, R=0.0821 L atm/mol K=62.4 L torr/mol K

1. (15 points) A 3.28 M solution of sodium chloride in water has a density of 1.22 g/mL
	1. Calculate the mass percent sodium chloride in the solution.

$$\left(\frac{3.28 mol NaCl}{1 L soln}×\frac{58.44 g NaCl}{1 mol NaCl}×\frac{1 L soln}{1000 mL soln}×\frac{1 mL soln}{1.22 g soln}\right)×100\%=$$

* 1. Calculate the molality of sodium chloride in the solution.

$$\frac{15.71 g NaCl}{84.29 g H\_{2}O}×\frac{1 mol NaCl}{58.44 g NaCl}×\frac{1000 g H\_{2}O}{1 kg H\_{2}O}=$$

* 1. Calculate the osmotic pressure of the solution at 25oC.

$$π=iMRT=\left(2\right)\left(\frac{3.28 mol}{L}\right)\left(\frac{0.0821 L atm}{mol K}\right)\left(298 K\right)=(122000 torr)$$

Remember that NaCl dissociates to give 2 ions per mol so i = 2.

1. (5 points) An aqueous solution containing 48.8 g of an unknown molecular compound in 100.0 g of water was found to have a freezing point of -2.12oC. Calculate the molar mass of the unknown compound. (Kf for water is 1.86oC/m)

$$∆T\_{f}=iK\_{f}m \rightarrow m=\frac{∆T\_{f}}{iK\_{f}}= \frac{2.12℃}{\left(1\right)\left(1.86℃/m\right)}=1.14 m$$

$$\frac{48.8 g unknown}{100.0 g H\_{2}O}×\frac{1000 g H\_{2}O}{1 kg H\_{2}O}×\frac{1 kg H\_{2}O}{1.14 mol unknown}=428 g unknown/mol$$