Chemistry 141 Name

Dr. Cary Willard

Quiz 11A (20 points) May 12, 2008

All work must be shown to receive credit.

$$∆T\_{f}=K\_{f}m, ∆T\_{b}=K\_{b}m, π=MRT, R=\frac{0.0821 L atm}{mol K}=\frac{62.4 L torr}{mol K}, $$

1. (8 points) A 3.65 M solution of glucose (C6H12O6) has a density of 1.26 g/ml, calculate the percent glucose in the solution and the molality of the solution.

$$\%by mass=\left(\frac{mass glucose}{total mass}\right)×100\%$$

$$=\left(\frac{3.65 mol glucose}{1 L solution}×\frac{180.1 g glucose}{1 mol glucose}×\frac{1 L soln}{1000 mL soln}×\frac{1 mL soln}{1.26 g soln}\right)×100\%$$

$=$52.2% glucose

$$m glucose= \frac{moles glucose}{kg solvent}$$

$$= \left(\frac{3.65 mol glucose}{1 L solution}×\frac{1 L soln}{1000 mL soln}×\frac{1 mL soln}{1.26 g soln}×\frac{100 g soln}{47.8 g water}×\frac{1000 g water}{1 kg water}\right)$$

$$=6.06 m glucose$$

1. (4 points) A person preparing a fish tank uses preboiled (and then cooled) water to fill it. When the fish is put into the tank, it dies. Explain.

If the water is boiled, the oxygen will come out of solution because gases are much less soluble in hot liquids than in cold liquids. The fish will die because there is not enough oxygen in the water for it to survive!

1. (4 points) A beaker contains 100.0 mL of pure water. A second beaker contains 100.0 mL of seawater. The two beakers are left side by side on a lab bench for one week. At the end of the week the liquid level in both beakers has decreased. However, the level has decreased more in one of the beakers than in the other. Which one and why?

More water will evaporate out of the beaker containing pure water because the vapor pressure of a solution is lowered. The lower the vapor pressure the less liquid will evaporate.

1. (3 points) Calculate the freezing point of the solution in question 1. The Kf for water is 1.86 oC/m.

$$∆T\_{f}=K\_{f}m$$

$$=\left(1.86°\frac{C}{m}\right)\left(6.06 m\right)=11.3°C$$

Or the freezing point will be -11.3oC!

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Quiz 11B (20 points) May 12, 2008

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$$∆T\_{f}=K\_{f}m, ∆T\_{b}=K\_{b}m, π=MRT, R=\frac{0.0821 L atm}{mol K}=\frac{62.4 L torr}{mol K}, $$

1. (8 points) A 4.28 M solution of glucose (C6H12O6) has a density of 1.31 g/ml, calculate the percent glucose in the solution and the molality of the solution.

$$\%by mass=\left(\frac{mass glucose}{total mass}\right)×100\%$$

$$=\left(\frac{4.28 mol glucose}{1 L solution}×\frac{180.1 g glucose}{1 mol glucose}×\frac{1 L soln}{1000 mL soln}×\frac{1 mL soln}{1.31 g soln}\right)×100\%$$

$=$58.8% glucose

$$m glucose= \frac{moles glucose}{kg solvent}$$

$$= \left(\frac{4.28 mol glucose}{1 L solution}×\frac{1 L soln}{1000 mL soln}×\frac{1 mL soln}{1.31 g soln}×\frac{100 g soln}{41.2 g water}×\frac{1000 g water}{1 kg water}\right)$$

$$=7.93 m glucose$$

1. (4 points) A person preparing a fish tank uses preboiled (and then cooled) water to fill it. When the fish is put into the tank, it dies. Explain.

If the water is boiled, the oxygen will come out of solution because gases are much less soluble in hot liquids than in cold liquids. The fish will die because there is not enough oxygen in the water for it to survive!

1. (4 points) A beaker contains 100.0 mL of pure water. A second beaker contains 100.0 mL of seawater. The two beakers are left side by side on a lab bench for one week. At the end of the week the liquid level in both beakers has decreased. However, the level has decreased more in one of the beakers than in the other. Which one and why?

More water will evaporate out of the beaker containing pure water because the vapor pressure of a solution is lowered. The lower the vapor pressure the less liquid will evaporate.

1. (3 points) Calculate the freezing point of the solution in question 1. The Kf for water is 1.86 oC/m.

$$∆T\_{f}=K\_{f}m$$

$$=\left(1.86°\frac{C}{m}\right)\left(7.93 m\right)=14.7°C$$

Or the freezing point will be -14.7oC!