Chemistry 115 Name

Dr. Cary Willard

Quiz 9a (20 points) April 26, 2011

All work must be shown to receive credit. S = kHP

1. (4 points) Explain why ammonia, NH3, is soluble in water but benzene, C6H6, is not.

Ammonia and water are both polar substances, benzene is not. Because like dissolves like, the polar ammonia will dissolve in polar water, but nonpolar benzene will not.

1. (4 points) A solution is composed of 43.2 grams of ethanol and 73.2 grams of benzene. Identify the solvent and the solute.

Benzene is the solvent and ethanol is the solute.

1. (4 points) What is meant by the term “hydrated ion”?

A hydrated ion is an ion that has been surrounded by water molecules as it dissolves.

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

Because the solubility of gases decreases as the temperature increases, the boiled water will not contain enough dissolved oxygen to sustain the fish.

1. (4 points) The solubility of carbon dioxide in water at 3.5 atm is 0.12 M. Calculate the solubility of carbon dioxide in water at a pressure of 7.2 atm.

$$\frac{S\_{1}}{P\_{1}}=\frac{S\_{2}}{P\_{2}} \rightarrow S\_{2}=S\_{1}\left(\frac{P\_{2}}{P\_{1}}\right)=0.12 M\left(\frac{7.2 atm}{3.5 atm}\right)=0.25 M$$

Chemistry 115 Name

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Quiz 9b (20 points) April 26, 2011

All work must be shown to receive credit. S = kHP

1. (4 points) Explain why ammonia, NH3, is soluble in water but benzene, C6H6, is not.

Ammonia and water are both polar substances, benzene is not. Because like dissolves like, the polar ammonia will dissolve in polar water, but nonpolar benzene will not.

1. (4 points) A solution is composed of 84.4 grams of ethanol and 73.2 grams of benzene. Identify the solvent and the solute.

Benzene is the solute and ethanol is the solvent.

1. (4 points) What is meant by the term “hydrated ion”?

A hydrated ion is an ion that has been surrounded by water molecules as it dissolves.

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

Because the solubility of gases decreases as the temperature increases, the boiled water will not contain enough dissolved oxygen to sustain the fish.

1. (4 points) The solubility of carbon dioxide in water at 3.5 atm is 0.12 M. Calculate the solubility of carbon dioxide in water at a pressure of 9.4 atm.

$$\frac{S\_{1}}{P\_{1}}=\frac{S\_{2}}{P\_{2}} \rightarrow S\_{2}=S\_{1}\left(\frac{P\_{2}}{P\_{1}}\right)=0.12 M\left(\frac{9.4 atm}{3.5 atm}\right)=0.32 M$$

Chemistry 115 Name

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Quiz 9c (20 points) April 28, 2011

All work must be shown to receive credit. S = kHP, M=n/V

1. (4 points) Explain why ammonia, NH3, is soluble in water, but decane, C10H22, but is not. Why would the addition of soap (CH3CH2CH2CH2CH2CH2CH2CH2CO2Na) allow the decane to dissolve in water?

Ammonia and water are both polar substances, decane is not. Because like dissolves like, the polar ammonia will dissolve in polar water, but nonpolar decane will not. When soap with a polar and non-polar end is added, the polar end will dissolve in water and the non-polar end will dissolve the decane pulling it into the aqueous solution.

1. (4 points) What is meant by the term “miscible”?

Miscible liquids are completely soluble in each other.

1. (4 points) When you leave a bottle of carbonated soda out on the counter with the lid off the carbonation disappears. Explain based on the concepts in the solution chapter.

Gases are more soluble at high pressure than at low pressure. When the pressure of carbon dioxide is removed by removing the lid, the CO2 will come out of solution and the carbonation will vanish.

1. (4 points) The solubility of carbon dioxide in water at 6.3 atm is 0.35 M. Calculate the solubility of carbon dioxide in water at a pressure of 8.2 atm.

$$\frac{S\_{1}}{P\_{1}}=\frac{S\_{2}}{P\_{2}} \rightarrow S\_{2}=S\_{1}\left(\frac{P\_{2}}{P\_{1}}\right)=0.35 M\left(\frac{8.2 atm}{6.3 atm}\right)=0.46 M$$

1. (4 points) A solution is made by dissolving 53.2 grams of aluminum chloride, AlCl3 in water to make 350.0 mL of solution. What is the molarity of the solution?

$$M=\frac{n}{V}=\frac{53.2 g AlCl\_{3}×\frac{1 mol AlCl\_{3}}{133 g AlCl\_{3}}}{350.0 mL soln×\frac{1 L soln}{1000 mL soln}}=\frac{0.400 mol AlCl\_{3}}{0.3500 L soln}=1.14 M AlCl\_{3}$$

Chemistry 115 Name

Dr. Cary Willard

Quiz 9d (20 points) April 28, 2011

All work must be shown to receive credit. S = kHP, M=n/V

1. (4 points) Explain why ammonia, NH3, is soluble in water, but decane, C10H22, but is not. Why would the addition of soap (CH3CH2CH2CH2CH2CH2CH2CH2CO2Na) allow the decane to dissolve in water?

Ammonia and water are both polar substances, decane is not. Because like dissolves like, the polar ammonia will dissolve in polar water, but nonpolar decane will not. When soap with a polar and non-polar end is added, the polar end will dissolve in water and the non-polar end will dissolve the decane pulling it into the aqueous solution.

1. (4 points) What is meant by the term “immiscible”?

Immicible liquids are not soluble in each other and will form 2 distinct layers when they are mixed.

1. (4 points) When you leave a bottle of carbonated soda out on the counter with the lid off the carbonation disappears. Explain based on the concepts in the solution chapter.

Gases are more soluble at high pressure than at low pressure. When the pressure of carbon dioxide is removed by removing the lid, the CO2 will come out of solution and the carbonation will vanish.

1. (4 points) The solubility of carbon dioxide in water at 4.6 atm is 0.28 M. Calculate the solubility of carbon dioxide in water at a pressure of 8.2 atm.

$$\frac{S\_{1}}{P\_{1}}=\frac{S\_{2}}{P\_{2}} \rightarrow S\_{2}=S\_{1}\left(\frac{P\_{2}}{P\_{1}}\right)=0.28 M\left(\frac{8.2 atm}{4.6 atm}\right)=0.50 M$$

1. (4 points) A solution is made by dissolving 41.7 grams of aluminum chloride, AlCl3 in water to make 350.0 mL of solution. What is the molarity of the solution?

$$M=\frac{n}{V}=\frac{41.7 g AlCl\_{3}×\frac{1 mol AlCl\_{3}}{133 g AlCl\_{3}}}{350.0 mL soln×\frac{1 L soln}{1000 mL soln}}=\frac{0.313 mol AlCl\_{3}}{0.3500 L soln}=0.896 M AlCl\_{3}$$