Study Guide –Chapter 9

CHM1033. Summer 2020

Test # 3: Jul. 1st (Chapters: 6, 7 and 9)

1. Oil does not dissolve in water because

A) oil is polar

B) water is nonpolar

C) water is saturated

D) oil is hydrated

E) oil is nonpolar

2. Identify the solute and the solvent in each solution composed of the following:

a) 10 g of NaCl and 100 g of H_2O

b) 50.0 mL of ethanol (C_2H_5OH) and 10.0 mL of H_2O

c) 0.20 L of O_2 and 0.80 L of N_2

3. Water is a polar solvent; hexane is a nonpolar solvent. In which solvent is each of the following more likely to be soluble?

a) vegetable oil (nonpolar)

b) benzene (nonpolar)

c) LiCl (ionic)

d) Na_2SO_4 (ionic)

e) I_2 (nonpolar)

f) sucrose (polar)

g) gasoline (nonpolar)

4. Using the table below, determine whether each of the following solutions will be saturated or unsaturated at 50°C

Substance	**Solubility at 50°C** $\left(\frac{g\ solute}{100\ g\ H_2O}\right)$
KCl	42.6
$NaNO_3$	114.0
$C_{12}H_{22}O_{11}$ (sugar)	260.4

a) Adding 28.7g KCl to 55.0g H_2O

b) Adding 96.3g $NaNO_3$ to 50.0g H_2O

c) Adding 50.0 g sugar to 15.0g H_2O

5. Predict (using the Table) whether each of the following ionic compounds is soluble in water.

a) PbS
b) $CaCO_3$
c) Ag_2S
d) $CaSO_4$
e) LiCl
f) AgCl
g) $BaCO_3$
h) $Fe(NO_3)_3$

TABLE 7.8 Solubility Rules for Ionic Solids in Water

Soluble If Salt Contains		Insoluble If Salt Contains
NH_4^+, Li^+, Na^+, K^+, NO_3^-, $C_2H_3O_2^-$ (acetate)	but are soluble with	CO_3^{2-}, S^{2-}, PO_4^{3-}, OH^-
Cl^-, Br^-, I^-	but are not soluble with	Ag^+, Pb^{2+}, Hg_2^{2+}
SO_4^{2-}	but are not soluble with	Ba^{2+}, Pb^{2+}, Ca^{2+}, Sr^{2+}

6. Calculate the amount of solute needed to prepare the following solutions.

a) 35.0 mL of a 8.0% (m/v) KCl solution

b) 1500 mL of a 4.0% (m/v) NH_4Cl solution

7. a) A bottle of champagne is 19% alcohol by volume. If there are 800 mL of champagne in the bottle, how many milliliters of alcohol are present?

b) How many milliliters of a 0.600 M $Ca(NO_3)_2$ solution are needed to obtain 7.00×10^{-2} moles of $Ca(NO_3)_2$

8. Calculate the mass percent (m/m) for the solute in each of the following solutions:

a) 65g of NaOH in 395g of NaOH solution

b) 2.0 g of KOH and 22.0 g of H_2O

9. State whether each of the following refers to a saturated or an unsaturated solution:

a) A spoonful of salt added to water at 2 °C does not dissolve.

b) A layer of sugar forms on the bottom of a glass of tea as ice is added.

c) A kidney stone of calcium phosphate forms in the kidneys when urine becomes concentrated.

10. Will a red blood cell undergo crenation, hemolysis, or no change in each of the following solutions?

a) 1 % (m/v) glucose

b) 2 % (m/v) NaCl

c) 5 % (m/v) NaCl

c) 0.1 % (m/v) NaCl

ANSWERS

1. E)

2. **a)** solvent: H_2O; solute: NaCl **b)** solvent: ethanol; solute: H_2O **c)** solvent: N_2; solute: O_2

3. **a)** hexane **b)** hexane **c)** water **d)** water **e)** hexane **f)** water **g)** hexane

4. **a)** saturated solution **b)** saturated solution **c)** saturated solution

5. **a)** insoluble **b)** insoluble **c)** insoluble **d)** insoluble **e)** soluble **f)** insoluble **g)** insoluble **h)** soluble

6. **a)** 2.8 g **b)** 60 g

7. **a)** 152 mL b) 117 mL

8. **a)** 16% b) 8.3 %

9. **a)** saturated **b)** saturated **c)** saturated

10. **a)** hemolysis **b)** crenation **c)** crenation d) hemolysis