

Water and Aqueous Solutions Exam Review

1. Label each substance as ionic or molecular and then as miscible or immiscible in water. Explain your answers in terms of polarity.

- a. CH_4 b. KCl c. He d. MgSO_4 e. $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ f. NaHCO_3

2. Circle the substances in question #1 that would be electrolytes.

3. Identify the solvent and solute in vinegar, a dilute aqueous solution of acetic acid.

4. Identify the following as: (A) colloids (B) Suspensions (C) Emulsion

- a. _____ Jello b. _____ Paint c. _____ Muddy water
 d. _____ Glue e. _____ Milk f. _____ Soap

5. Answer the following about hydrates.

- a. A crystal that loses water vapor to the air is called _____.
 b. A crystal that absorbs water vapor from the air is called _____.
 c. What is a desiccant? (include an example) _____.

6. Answer the following questions.

- a. How many oxygen atoms are in 2 formula units of $\text{Na}_3\text{PO}_4 \cdot 7\text{H}_2\text{O}$? _____
 b. What happens when the hydrate is heated? (write eqn) _____
 c. What is the name of the above hydrate? _____
 d. What is the percent of water in the above hydrate? _____

8. List and define the major factors that affect the rate of solution.

- a. _____
 b. _____
 c. _____

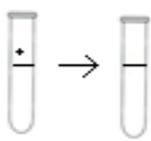
9. $\text{Sr}(\text{OH})_2$ has a solubility of 11.3 g/ 100 g H_2O at 20.0 °C.

- a. How much would be needed to make a saturated solution with 500.0 g H_2O ?
 b. How much would be needed to make an unsaturated solution with 500.0 g H_2O ?
 c. How much would be needed to make a supersaturated solution with 500.0 g H_2O ?

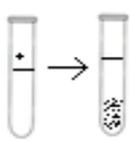
10. Label the picture shown. (unsaturated, saturated, supersaturated)



at 25 C



at 90 C



at 20C

Amount of solute	Volume of solution	Molarity
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11. Convert the values in the table on the right.



4.55 mol	238 mL	
2.44 g NaCl	0.0036 L	
2.0 mol	3331 mL	

12. A student in the lab has 1.25L of a 5.00M solution of KCl.

a. How many moles and grams of KCl are present in the solution?

b. If the student adds 1.4 L of H₂O what is the new molarity?

c. How many grams of KCl are in the solution from part b?

13. In the reaction to make silver nitrate (AgNO₃) how many liters of 1.3 M silver (Ag) are needed to react with 5.00 L of a 12.0 M nitric acid (HNO₃) solution? $3 \text{ Ag} + 4 \text{ HNO}_3 \rightarrow 3 \text{ AgNO}_3 + 2 \text{ H}_2\text{O} + \text{NO}$

14. A gas has a solubility of 12.4 g/L at 3.5 atm of pressure. What is its solubility at 1.7 atm of pressure?

15. Draw a water molecule →

Is it polar or nonpolar?

What is its shape?

16. Define and give an example of the following:

a. Suspension- _____ example: _____

b. Colloid- _____ example: _____

i. Both of these exhibit the _____ effect.

c. Brownian motion- _____

17. Emulsifying agents have one _____ and one _____ end of the molecule.

It is a colloidal dispersion of _____ in _____.

Examples:

18. How many joules are required to heat 12 ice cubes from 0°C to steam at 120°C if each cube has a mass of 45g? Draw and label the heat curve. (FYI: You will need 4 steps to complete this problem ☺)

ΔH_v : 2260 J/g
ΔH_f : 334 J/g
C_{water} : 4.184 J/g°C
C_{ice} : 2.11 J/g°C
C_{steam} : 2.08 J/g°C