

## PRACTICE EXAM #5

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Chem20, Elementary Chemistry

1.) At 25°C, 81 g of magnesium bromide is dissolved into 100.0 g of liquid water. (18 pts)

a.) What is the concentration of  $\text{MgBr}_2(\text{aq})$  in units of mass percent?

b.) What is this concentration in units of molality? (MW of  $\text{MgBr}_2 = 184.113 \text{ g/mol}$ )

c.) If 81 g of magnesium bromide was diluted to 105 mL with water, what would the concentration of this solution be in units of molarity?

2.) Fill in the blanks. (15 pts)

a.) A conjugate base is the product after a(n) \_\_\_\_\_ transfers a proton.

b.) If a solution contains **more** than the equilibrium amount of solute, the solution is called \_\_\_\_\_.

c.) Dispersion forces are the results of a(n) \_\_\_\_\_ dipole moment created by an unequal distribution of electrons around the nucleus.

d.) If, when dissolved in aqueous solution, a compound **completely** dissociates and creates  $\text{H}^+$  ions, it is called a(n) \_\_\_\_\_.

3.) To determine the concentration of an unknown solution of hydroiodic acid, a titration was performed with a 1.3 M aqueous sodium hydroxide solution. The titration required 27.8 mL of sodium hydroxide to fully neutralize 12.9 mL of the hydroiodic acid solution. (15 pts)

a.) Write the **balanced** chemical equation for the acid-base neutralization reaction. **CIRCLE** the Arrhenius base. **BOX** the Brønsted-Lowry acid.

b.) What is the concentration of the acid, in units of molarity?

4.) An experimental procedure calls for 672 mL of a 9.1 M solution of ammonium hydroxide. The stock solution of  $\text{NH}_4\text{OH}(\text{aq})$  available is 17.8 M. What volume of the stock solution should be diluted to 672 mL to obtain the desired 9.1 M? (15 pts)

5.) The heat of fusion ( $\Delta H_{\text{fus}}$ ) for water is 6.02 kJ/mol and the specific heat capacity for liquid water is  $4.184 \text{ J} \cdot \text{g}^{-1} \cdot ^\circ\text{C}^{-1}$ . A sample of 112.6 g of  $\text{H}_2\text{O}(\text{l})$  was kept initially at  $25.0^\circ\text{C}$ . How many grams of  $\text{H}_2\text{O}(\text{s})$  would need to be added to lower the temperature to  $8.0^\circ\text{C}$ ? (20 pts)

6.) For the following compounds, list what intermolecular forces are present. (17 pts)

- a.)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  \_\_\_\_\_
- b.)  $\text{C}_{60}$  \_\_\_\_\_
- c.)  $\text{SeH}_2$  (polar) \_\_\_\_\_
- d.)  $\text{C}_2\text{H}_6$  (non-polar) \_\_\_\_\_
- e.) Which compound will have the **highest surface tension**? \_\_\_\_\_
- f.) Which compound will have the **highest vapor pressure**? \_\_\_\_\_