

Name (PRINT) \_\_\_\_\_

1. True or False

a) A base is a hydrogen ion ( $\text{H}^+$ ) donor. [2 pts]

**FALSE**

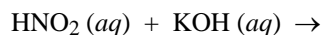
b) A weak acid completely ionizes when dissolved in water. [2 pts]

**FALSE**

c) HBr is a strong acid. [2 pts]

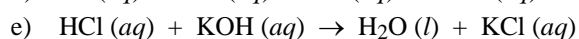
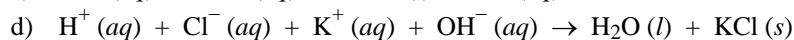
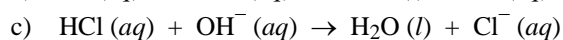
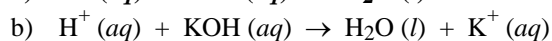
**TRUE**

2. Write the balanced molecular equation for the following acid-base reaction. [3 pts]

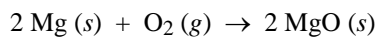


molecular equation:  $\text{HNO}_2(aq) + \text{KOH}(aq) \rightarrow \text{H}_2\text{O}(l) + \text{KNO}_2(aq)$

3. The balanced **net ionic equation** for the complete neutralization of HCl by KOH in aqueous solution is: [3 pts]



4. Assign oxidation numbers to Mg and O in the compound, MgO, and identify the *reactant* that is oxidized and the *reactant* that is reduced in the following reaction. [4 pts]



Oxidation number of O in MgO -2

Oxidation number of Mg in MgO +2

Reactant oxidized Mg

Reactant reduced O<sub>2</sub>

5. Hydrobromic acid [HBr(aq)] is a solution of hydrogen bromide gas in water. Calculate the **molarity** of a hydrobromic acid solution if 455 mL contains 145.6 g of hydrogen bromide. [4 pts]

$$145.6 \text{ g HBr} \times \frac{1 \text{ mol HBr}}{80.91 \text{ g HBr}} = 1.800 \text{ mol HBr}$$

$$M = \frac{\text{mol solute}}{\text{L soln}} = \frac{1.800 \text{ mol}}{455 \times 10^{-3} \text{ L}} = \mathbf{3.956 \text{ M}}$$

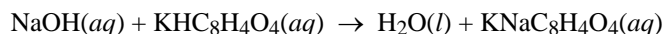
6. In the CHM 151 laboratory, you are asked to prepare 250.0 mL of a 0.100 M HCl solution from a 3.0 M HCl solution. How many **milliliters** of the 3.0 M HCl solution are needed to prepare the dilute solution? [3 pts]

$$M_c V_c = M_d V_d$$

$$(3.0 \text{ M})(V_c) = (0.100 \text{ M})(250.0 \text{ mL})$$

$$V_c = \mathbf{8.33 \text{ mL}}$$

7. In the CHM 151 laboratory, you are given an unknown solution that contains potassium hydrogen phthalate (KHC<sub>8</sub>H<sub>4</sub>O<sub>4</sub>, molar mass = 204.22 g/mol).



You titrate the solution with 0.105 M NaOH. It takes 15.03 mL of the 0.105 M NaOH solution to reach the endpoint of the titration. What is the **mass** of potassium hydrogen phthalate, KHC<sub>8</sub>H<sub>4</sub>O<sub>4</sub>, in the solution? [5 pts]

$$\frac{0.105 \text{ mol NaOH}}{1 \text{ L soln}} \times 0.01503 \text{ L} = 0.00158 \text{ mol NaOH}$$

$$0.00158 \text{ mol NaOH} \times \frac{1 \text{ mol KHP}}{1 \text{ mol NaOH}} \times \frac{204.22 \text{ g KHP}}{1 \text{ mol KHP}} = \mathbf{0.322 \text{ g KHP}}$$

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$$M = \frac{\text{mol solute}}{\text{L of soln}}$$

Molar masses: H (1.008 g/mol), C (12.01 g/mol), O (16.00 g/mol), K (39.10 g/mol), Br (79.90 g/mol)