

Name \_\_\_\_\_

## Mixed Stoichiometry

- 1) A sample of solid  $\text{KClO}_3$  was heated in a test tube and decomposed according to the following reaction:



The oxygen produced was collected by water displacement at  $22.0^\circ\text{C}$  at a total pressure of  $754\text{mmHg}$ . The volume of the gas collected was  $0.650\text{L}$ . The water vapor pressure at  $22.0^\circ\text{C}$  is  $21.0\text{mmHg}$ .

- Calculate the partial pressure of  $\text{O}_2$  in the gas collected. **733mmHg**
- Calculate the moles of oxygen produced. **0.0259 moles O2**
- Calculate the mass of  $\text{KClO}_3$  that was decomposed. **2.12g KClO3**

- 2) A sample of methane gas ( $\text{CH}_4$ ) having a volume of  $2.80\text{L}$  at  $25.0^\circ\text{C}$  and  $1.65\text{atm}$  was mixed with excess oxygen. The mixture was then ignited to form  $\text{CO}_2$  and water. Calculate the volume of  $\text{CO}_2$  formed at a pressure of  $2.50\text{atm}$  and a temperature of  $125^\circ\text{C}$ .

**2.47L**

- 3) Every year thousands of tons of limestone ( $\text{CaCO}_3$ ) are decomposed by heating into  $\text{CO}_2$  and  $\text{CaO}$  (quicklime) according to the following reaction:



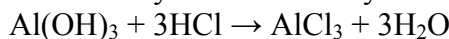
How many liters of  $\text{CO}_2$  at  $1.03\text{atm}$  and a temperature of  $950^\circ\text{C}$  will be produced if  $1.00\text{kg}$  of  $\text{CaCO}_3$  is decomposed?

**974L**

- 4) If  $6.32\text{g}$  of barium sulfate is produced from the reaction of sulfuric acid with barium chloride, then what was the molarity of the sulfuric acid solution if only  $50.0\text{mL}$  was used?

**0.541M**

- 5) If  $98.2\text{mL}$  of a  $1.50\text{M}$  hydrochloric acid solution is reacted with excess aluminum hydroxide, then how many grams of aluminum chloride would be your theoretical yield?

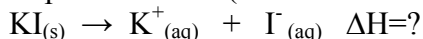


**6.55g**

- 6) If  $25.2\text{mL}$  of a  $2.50\text{M}$  sodium bromide solution reacts with excess chlorine gas, then how many liters of bromine gas would you expect to collect at  $1.03\text{atm}$  and  $295\text{K}$ ?

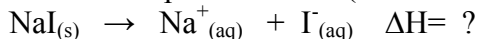
**0.741L**

- 7) When a  $45.3\text{g}$  sample of  $\text{KI}$  dissolves in  $85\text{g}$  of water, the temperature drops from  $23.5^\circ\text{C}$  to  $7.9^\circ\text{C}$ . Calculate the heat of reaction for the process in  $\text{kJ}$ . (hint: calculate  $\text{kJ/mol}$ )



**20. kJ**

- 8) When a  $52.99\text{g}$  sample of sodium iodide dissolves in  $50.0\text{g}$  of water, the temperature rises from  $22.8^\circ\text{C}$  to  $32.8^\circ\text{C}$ . Calculate the heat of reaction for the process in  $\text{kJ}$ . (hint: calculate  $\text{kJ/mol}$ )



**-5.92 kJ**

### **Hard!**

- 9)  $43.8\text{g}$  of liquid pentane was combusted in a  $15.38\text{L}$  container containing pure oxygen gas under  $8.93\text{atm}$  of pressure at  $299\text{K}$ . What is the final pressure of the container after the reaction occurs if the final temperature was  $426\text{K}$ ?

**16.9atm**

- 10)  $1.83\text{g}$  of sodium chloride is dissolved in  $36.5\text{mL}$  of water and is mixed with  $23.4\text{mL}$  of a  $0.64\text{M}$  silver nitrate solution. How many grams of solid could be recovered at the conclusion of the reaction? What is the concentration of each ion in the resulting solution?

**2.15g AgCl, 0.523M Na<sup>+</sup>, 0.250M NO<sub>3</sub><sup>-</sup>, 0.272M Cl<sup>-</sup>**