FLINN SCIENTIFIC

Name_____

Post-Laboratory Review Questions

1. An unknown Group 1 metal carbonate M_2CO_3 (M = Li, Na or K) was reacted with excess 2 M HCl and the mass of CO_2 released was determined by mass difference. The initial mass of solid M_2CO_3 was 2.002 g and the mass of CO_2 released was 1.206 g.

   a. Write the balanced chemical equation for the reaction of M_2CO_3 with HCl.

   b. What is the mole ratio of CO_2 to M_2CO_3?

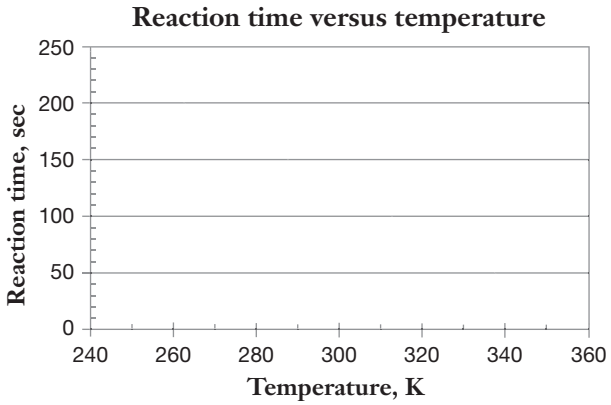
   c. Calculate the molar mass of the unknown metal carbonate and identify the Group 1 metal.

2. The rate of reaction of 0.030 g of magnesium ribbon with 1 M hydrochloric acid was studied at four different temperatures by measuring the time required for the magnesium metal to disappear. The following data was recorded:

Temperature	2 °C	23 °C	40 °C	53 °C
Average Reaction Time (sec)	204	73	56	41
Average Reaction Rate (moles/sec)				

   a. Calculate the number of moles of magnesium that reacted and the average reaction rate for each temperature.

   b. Convert each temperature to kelvins and plot the average reaction time versus temperature in the graph below. Predict how long the reaction would take at 75 °C.



   c. Using kinetic molecular theory and collision theory, explain why the absolute temperature scale (kelvins) is more appropriate than Celsius for explaining the effect of temperature on reaction rate. Does the effect of temperature on reaction rate support the collision theory of chemical reactions?