# DETERMINATION OF RATE LAW EXPRESSIONS

Purpose: To determine the rate law with respect to concentration of hydrochloric acid when reacted with magnesium.

Materials: stop watch or clock — 6 molar HCl
flasks — graduated cylinder
4 three centimetre pieces of magnesium ribbon

Pre-lab: Do the calculations to produce the proper HCl solutions.

Procedure:

1. Prepare 50mL of 0.5M, 1M, 1.5M and 2M HCl
2. Place 50mL of 2M HCl into a 250 mL erlenmeyer flask. (volume of flask is not critical)
3. Noting the time, drop a 3 cm piece of Mg into the 2M HCl
4. Swirl and/or shake the flask to obtain uniform results.
5. Record the time when all the ribbon has reacted.
6. Repeat steps 2 to 5 for each concentration of HCl
7. Calculate the rate of each reaction as 1/t. There is no specific property being measured but time is the denominator.
8. Plot the rate of reaction (1/t) vs concentration of HCl. (1/t on y-axis, conc. on x-axis)
9. Plot the rate of reaction (1/t) vs concentration$^2$ of HCl. (1/t on y-axis, conc$^2$. on x-axis)
10. Plot the rate of reaction (1/t) vs concentration$^3$ of HCl. (1/t on y-axis, conc$^3$. on x-axis)
11. The straightest line is the direct correlation between rate and conc$^x$. Using this line state the rate law for the reaction. ie. Rate = k [HCl]$^x$
12. Calculate k for the reaction including units.