

# 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<sup>2</sup> of HCl. ( $1/t$  on y-axis, conc<sup>2</sup>. on x-axis)
10. Plot the rate of reaction ( $1/t$ ) vs concentration<sup>3</sup> of HCl. ( $1/t$  on y-axis, conc<sup>3</sup>. on x-axis)
11. The straightest line is the direct correlation between rate and conc<sup>x</sup>.  
Using this line state the rate law for the reaction. ie. Rate =  $k [\text{HCl}]^x$
12. Calculate k for the reaction including units.