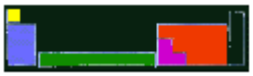
Revised August 2010

HONORS WORKSHEET 13b: ANSWERS



1.

(a) Peak lower and to the right of the cooler peak with a tail above that of the cooler curve. Same total area under the curve, same origin

(b) Area the same under each curve. Area represents the total number of particles which remains the same, regardless of the temperature

(c) Vertical line on right hand side of the graph. The line represents the minimum energy required for a reaction (the activation energy). All particles to the right hand side of the line have sufficient energy for reaction, and therefore collisions between them result in a reaction (they are successful). The higher temperature curve has a greater number of particles that have sufficient energy for reaction (to the right of the line), so the rate of reaction is greater at a higher temperature

2. Second order

3. Rate = $k[P][Q]^2$, total order = 3

4. Rate = k. Zero order

5. 36682 min^{-1} mol^{-1} L

6. First order with respect to A. Doubling A while keeping B constant causes the rate to double (Experiment #1 and #2)

   First order with respect to B. Consider experiments #2 and #3. Doubling A should result in a doubling of rate from 0.004 to 0.008 (since reaction is first order with respect to A). The rate actually doubles again to 0.016 due to the doubling of B, i.e. first order with respect to B

7. Reactants must collide; Reactants must collide with sufficient energy (activation energy); Reactants must collide with the correct collision geometry (orientation)