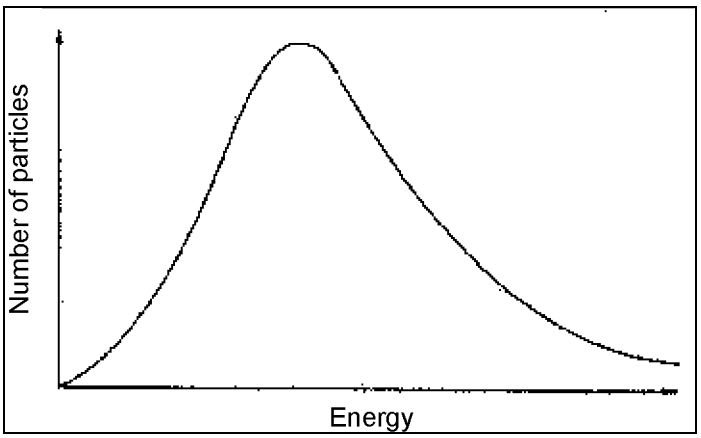
Revised August 2009

AP WORKSHEET 15s: Kinetics Summary

1. The diagram below shows the distribution of energies of molecules in a gas a certain temperature.



(a) Draw another curve on the diagram showing the distribution of energies at a **higher** temperature than the one shown. (2)

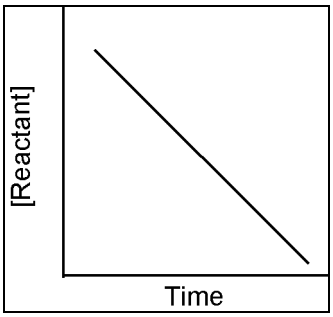
(b) If the total area under each of the two curves represents the total number of molecules present, what can be said about the area of each curve relative to one another? (2)

(c) Add a line showing the activation energy on the diagram and use it to help explain carefully how the diagram affords an explanation for the effect of increased temperature on a rate of reaction. (3)

2. F and G react together. When the concentration of F is tripled and the concentration of G remains constant, there is a nine-fold increase in the rate of reaction. What is the order of reaction w.r.t F? (1)

3. P and Q react to form E. In one experiment, the concentration of P is tripled while Q is kept constant. This causes the rate to triple. In a second experiment the concentration of Q is doubled while the concentration of P is kept constant. The rate is found to have quadrupled. Write a rate equation for this reaction. What is the overall order of reaction? (3)

4. A reaction involves T as one of the reactants. Following the change in concentration of T over time yields the graph below. What does the graph tell us about the rate of reaction AND the order with respect to T? (2)



5. C decomposes to form D. The following results were obtained by experiment.

Initial [C] in mol L^{-1}	1.00×10^{-3}	2.00×10^{-3}	6.00×10^{-3}
Rate in mol $L^{-1} s^{-1}$	1.45×10^{-5}	1.45×10^{-5}	1.45×10^{-5}

What is the rate expression (equation)? What is the overall order of the reaction? (4)

6. The reaction where A reacts with B to give P, is found to be first order with respect to both A and to B. When the initial concentrations of [A] = 3.30×10^{-6} mol L^{-1} and [B] = 2.85×10^{-3} mol L^{-1}, the initial rate of reaction is 3.45×10^{-4} mol L^{-1} min^{-1}. Calculate the rate constant for the reaction (**include units**). (2)

7. In the reaction A + B ➔ Products the following results were obtained for the initial rates of reaction for different initial concentrations.

Experiment #	[A] in M	[B] in M	Rate in M s^{-1}
1	10	10	0.002
2	20	10	0.004
3	40	20	0.016

Deduce the rate equation (**explaining carefully how you reached your answer**) and calculate the rate constant (**include units**). (4)

8. What three criteria must be met if a reaction between two reactants is to take place? (3)