Friday Worksheet   **Name: ………………..**

Rates of reaction worksheet 1

1) Consider the graph below of the reaction
   $2AB(g) <=> 2A(g) + B_2(g)$
   A disturbance to the equilibrium takes place at T1.

$$2AB(g) \rightleftharpoons 2A(g) + B_2(g), \Delta H = + \text{ve}$$
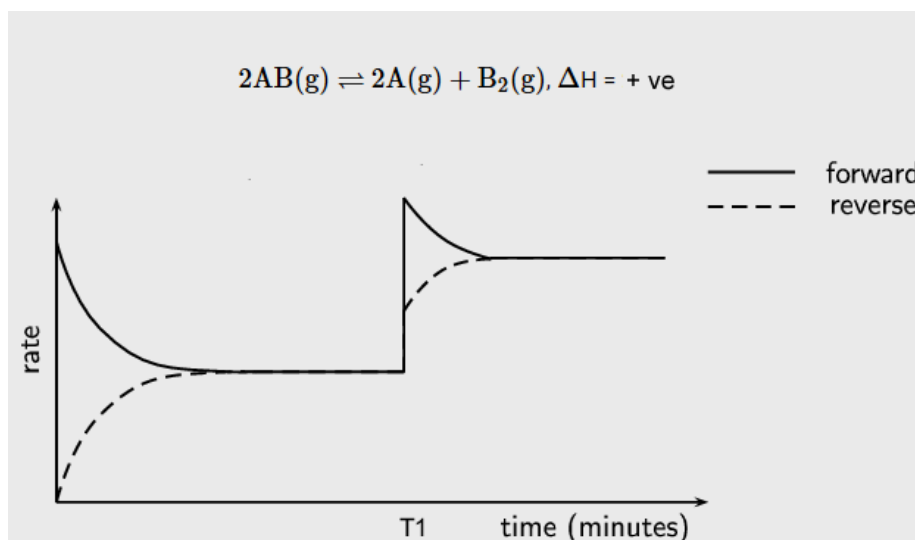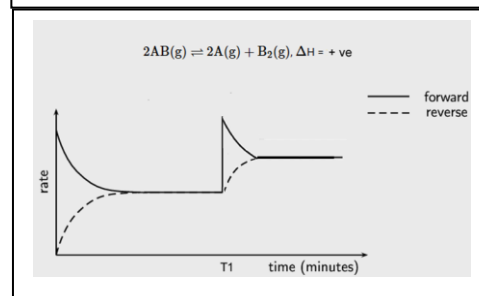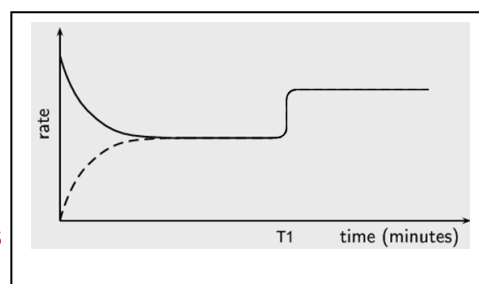
a) Are both the forward reactions increased the same at T1?
   No, the forward reaction is increased more than the reverse reaction.

b) Explain what may have happened at T1 from the possible scenarios listed below. Provide an explanation for each. Draw what the graph would look like if each of the following changes occurred.

   A catalyst is added at T1? Explain.

   A catalyst increases the backward and forward reactions equally.

   The concentration of a reactant is increased? Explain.

   Since both forward and backward rates increase immediately this is unlikely to be as a result of an increase in reactant. If additional reactant is added the forward reaction will immediately increase and the reverse reaction will catch up steadily as shown below.

Temperature is increased

Temperature increase will increase the rate of both the forward and the backward reaction. As more particles have the activation energy required for both the reverse and forward reaction. Being an endothermic reaction an increase in temperature will favour the forward reaction rate as the equilibrium position shifts to the right.

Temperature is decreased.

Temperature decrease will decrease the rate of both the forward and the backward reaction. As less particles have the activation energy required for both the reverse and forward reaction. Being an endothermic reaction a decrease in temperature will favour the backward reaction rate more as the equilibrium position shifts to the left.
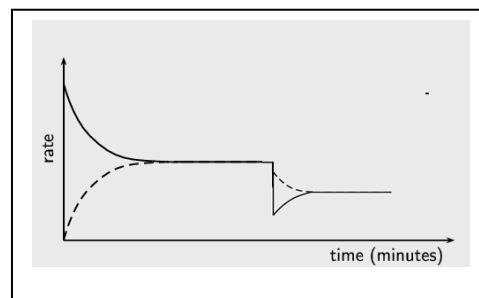

2) Reactants A and B are placed in a sealed container with a suitable catalyst where they react according to the equation
A(g) + B(g) => C(g)
After the reaction reaches equilibrium, a small amount of a compound is added to the container at time t1.
The compound 'poisons' the catalyst and stops it working.

a) Which one of the graphs best represents the rate of the forward reaction versus time?
At equilibrium the rates of the forward and backward reactions are equal. When a catalyst is removed both the forward and the backward reactions are still equal but now occur at a slower rate. Equilibrium is maintained.

b) Which graph is consistent with a temperature increase after the catalyst is poisoned?

Graph II.
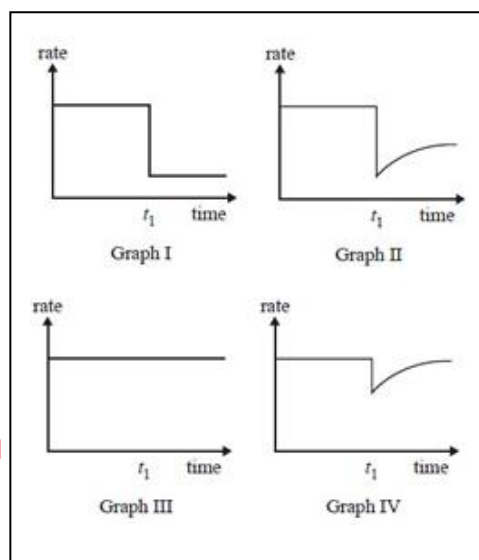
3) Two experiments, shown below, were set up as shown below to investigate factors that influence the rate of a reaction.
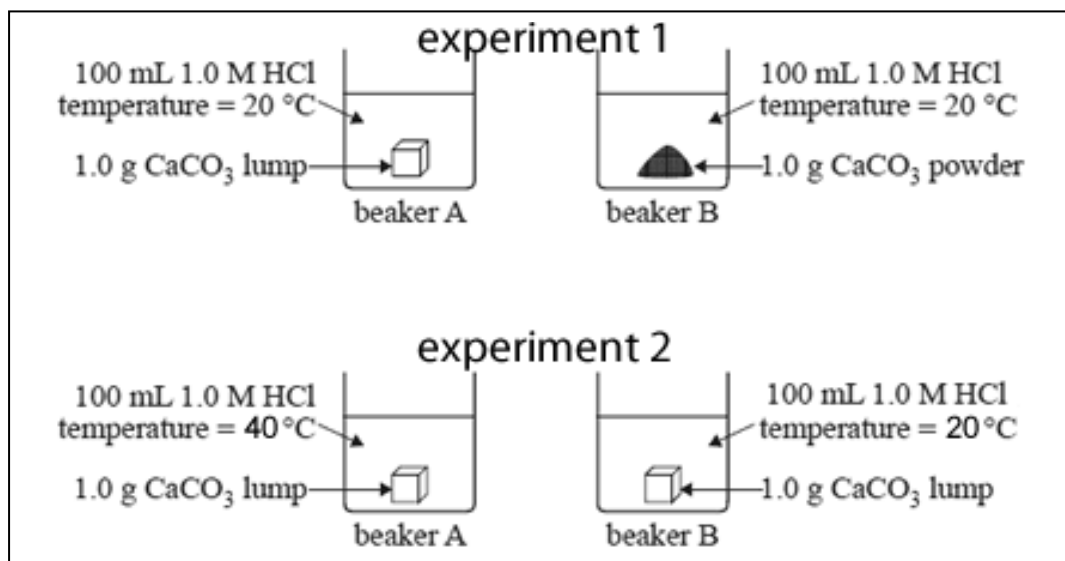
a) What are the dependent and independent variables in:

Experiment 1 dependent variable = amount of CO_2 produced, independent variable = surface area

Experiment 2 dependent variable = amount of CO_2 produced, independent variable = temperature

b) Explain using the collision theory how the rate of the reaction in experiment 2 differs from beaker A and B.

Beaker A the rate is faster than in Beaker B, due to the a greater average kinetic energy of the particles causing more fruitful collisions than in beaker B.