Name:_____
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Reaction Kinetics Assignment

Due: _____

Lesson I. Read pages 1-5 in Hebden: Chemistry 12 then answer I-1 to I-4.

I-1. What is Reaction Kinetics?

I-2. What is the formula used for calculating reaction rate? Identify the parts of the formula.

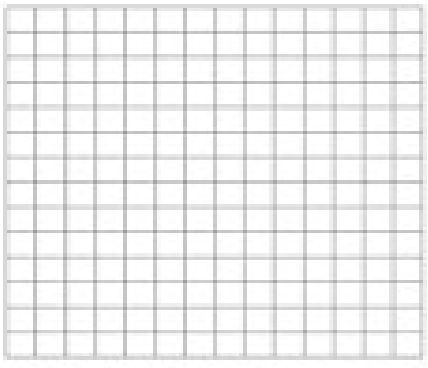
I-3. List four different properties that can be used to determine reaction rate.

I-4. The hydrolysis of chloro butane produces butanol and hydrochloric acid:

$$C_4H_9Cl + H_2O \rightarrow C_4H_9OH + HCl$$

The concentration of cholo butane at different times during the reaction is given:

Time (s)	$[C_4H_9Cl]$ = M
0	0.1000
50	0.0905
100	0.0820
150	0.0741
200	0.0671
300	0.0549
400	0.0439
700	0.0210
800	0.0170



a. Why is the concentration decreasing?
b. Plot the data on the graph paper proper?
c. What is the slope of the line?
d. What are the units for the slope?

Lesson II. Read pages 5-10 in Hebden: Chemistry 12, copy out the notes skeleton then answer II-1 to II-6.

II-1. Identify the factors that affect reaction rate:

II-2. What is the difference between homogenous and heterogenous reactions? Provide examples of both.

II-3. Rank the reaction rates among phases in homogeneous reactions:

II-4. What do catalysts and inhibitors do for a chemical reaction?

II-5. The reaction of solid Iron in the presence of aqueous sulphuric acid produces aqueous Iron (II) sulphate and hydrogen gas. If the reaction occurs in a closed container whose volume can be changed, list four ways of increasing the reaction rate.

II-6. Provide three examples of everyday situations that require the control of reaction rates:

Lesson III. Read pg 12 in Hebden: Chemistry 12, copy out the notes skeleton then answer III-1 to III-4.

III-1. Explain the Collision Theory.

III-2. Explain the effect that increasing concentration has on reaction rates.

III-3. Explain the effect that increasing temperature has on reaction rates.

III-4. How does collision theory explain the effect that increasing surface area has on reaction rate?

Lesson IV. Read pages 13-19 in Hebden: Chemistry 12. Watch my flipped classroom lesson, copy out the notes skeleton then answer IV-1 to IV-5.

IV-1. Draw two potential energy diagrams:

a. Endothermic reaction

b. Exothermic reaction

IV-2. Write out the formula for determining ΔH.

IV-3.

a. What is the ΔH value for an endothermic reaction?

b. What is the ΔH value for an exothermic reaction?

IV-4. An increase in what temperature will result in the doubling of a SLOW reaction rate?

IV-5. Explain, in terms of kinetic energy, why increasing the temperature will increase the reaction rate.

Lesson V. Read pages 20-25 in Hebden: Chemistry 12. Watch my flipped classroom lesson, copy out the notes skeleton and then answer V-1 to V-3.

V-1. What is activation energy?

V-2. Describe the activated complex in terms of its potential energy (PE), stability and structure.

V-3. Draw and label a potential energy diagram for the following. Be sure to label and identify the reactants, the activated complex, the products, and the values for the ΔH, the Ea(f) and the Ea (r) .

a. 2 NOBr (g)→ 2 NO (g) + Br_2 (g); ΔH = -50 KJ and Ea (f) = 30 kJ

b. H_2 (g) + I (g) → 2 HI (g); Ea (f) = 45 KJ and Ea (r) = 20 kJ

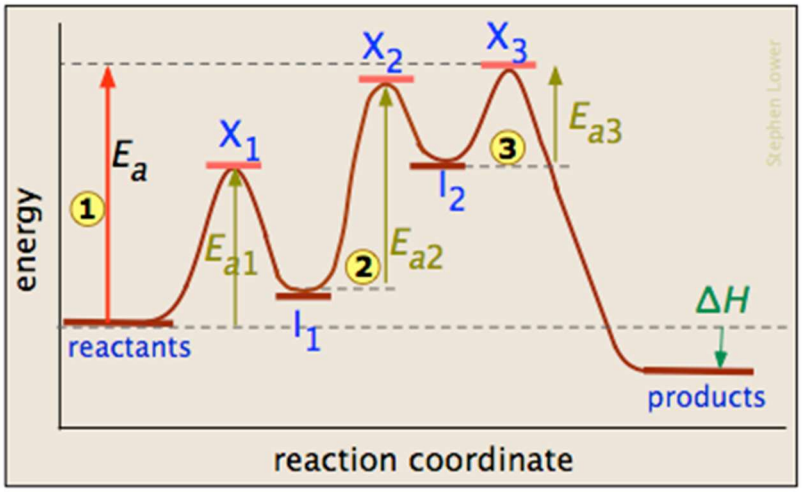
Lesson VI. Read pages 26-30 in Hebden: Chemistry 12. Watch my flipped classroom lesson, copy out the notes skeleton then answer VI-1 to VI-4

VI-1. What is the definition of a reaction mechanism?

VI-2. Describe a reaction intermediate in terms of its stability and structure.

VI-3. What is the rate-determining step?

VI-4. Using the following diagram to answer the questions below:

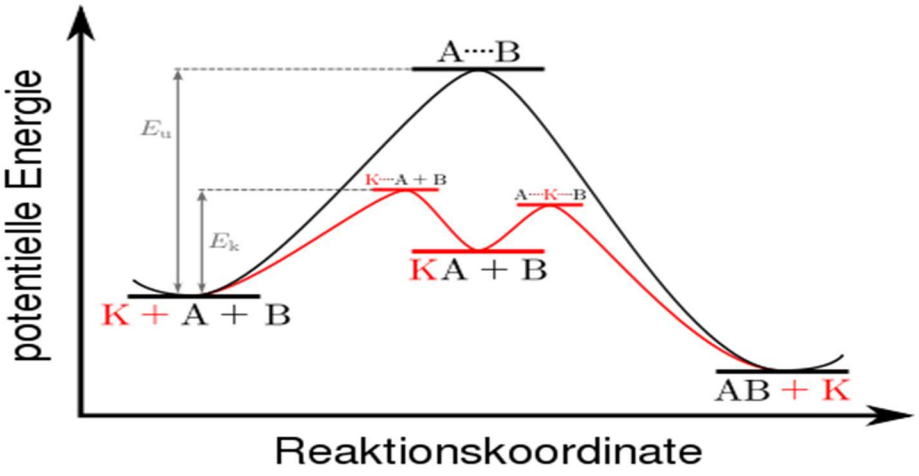


a. How many steps are in this reaction mechanism?
b. Which step is the rate determining step?
c. Is the overall reaction endothermic or exothermic
d. Would the symbol on the ΔH be positive or negative?

Lesson VII. Read pages 30-36 in Hebden: Chemistry 12. Watch my flipped classroom lesson. Answer VII-1 to VII-3

VII-1.What is the definition of a catalyst? Provide two specific catalysts and where they are used?

VII-2. Use the diagram below to answer the following:



What does the above diagram show about the catalytic reaction compared to the uncatalyzed reaction?

VII-3. Identify the overall reaction, the reaction intermediate(s) and the catalyst(s) from given the following reaction mechanism:

Step 1: $HCOOH\ (aq) + H^+\ (aq) \rightarrow HCOOH_2^+\ (aq)$

Step 2: $HCOOH_2^+\ (aq) \rightarrow HCO^+\ (aq) + H_2O\ (l)$

Step 3: $HCO^+\ (aq) \rightarrow H^+\ (aq) + CO\ (g)$

Overall:

Reaction intermediate(s):

Catalyst(s)