

Chemistry 30

**Unit 2: Chemical Kinetics**

Assignment 2: 2-1 to 2-3

**MAX: 16**

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1. Describe the collision theory, being sure to list the factors required for successful collisions.

1. *In order for a chemical reaction to occur, reacting particles must first collide.*
2. *Particles must collide with sufficient energy), and*
3. *With the proper orientation*

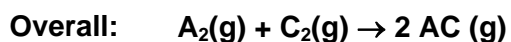
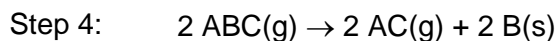
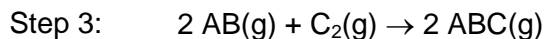
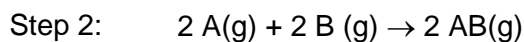
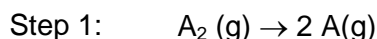
***All 3 items are required for full marks - 3***

2. Think of a set of tasks that you do on a regular basis (such as getting out of bed and getting ready for school).

- List the starting point of this event series (the initial “reactants”)
- List the final end point of the series (the final “product”)
- List the steps required, in the proper order, and the amount of time required for each step (approximate times are fine)
- Which step is the rate determining step?
- How might you speed up the rate determining step?

*Answers will vary; accept most answers – students do not need to provide a lot of detail (3 marks). Answer must indicate the rate determining step (1 mark) as the slowest step in the process and indicate how this might be sped up (1 mark). Complete value for this question: 5*

3. Given the following reaction mechanism, determine the equation for the overall reaction.



Also list the reaction intermediates for this reaction:

**Reaction intermediates are A, AB, and ABC**

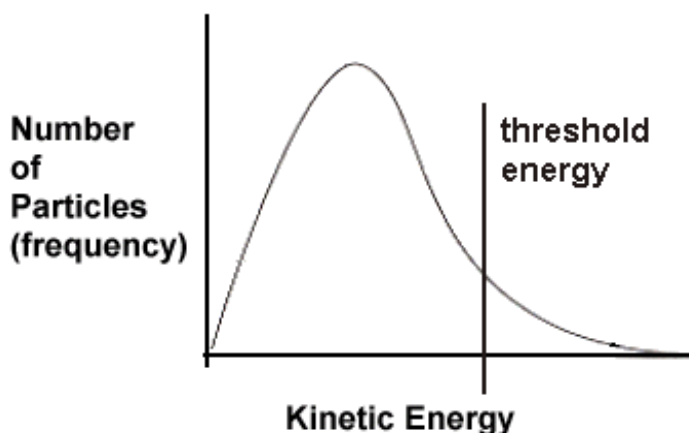
*NOTE: B also gets cancelled out and does not appear in the overall equation. B is a **catalyst** – a substance that is added to the reaction and increases the rate of the reaction, but eventually emerges from the reaction unchanged. Deduct 1 mark if it is listed as a reaction intermediate.*

*Reaction intermediates first appear as products, but are reactants in the next step of the series.*

*Catalysts first appear as reactants, and show up as products in a later step.*

*Marks for this question – 2 for the balanced overall equation; 3 for listing the 3 reaction intermediates for a total of 5 marks.*

4. Draw a basic kinetic energy diagram. Include a line to represent threshold energy for a reaction, and label the line. Also label the axes but you do not need to include numerical values on these axes.



*Marks for the graph – 3. Award as follows*

*1 mark – labels for x- and y-axis*

*1 mark – general shape*

*1 mark – a vertical line, anywhere on the curve, indicating threshold energy*