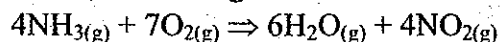


Kinetics Review

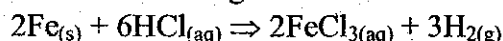
For multiple choice practice, access quizmebc.ca QuizWiz and the ministry of education (B.C.) past provincial exams for Chemistry 12 online. Kinetics multiple choice questions are usually #1-6 or #1-7 on the exams.

1. Consider the following reaction:



- If 43.2g of H_2O is produced in 3.00 minutes, what is the rate of the reaction in grams of O_2 consumed per second?
- If the reaction rate is 0.045mol of NH_3 per second, how many moles of NO_2 is produced in 15 seconds?

2. Consider the following reaction:



- Give three specific ways to increase the reaction rate. Explain why using collision theory.
- Describe two specific ways you could monitor the rate of the reaction, not including the method in #3 below.

3. The reaction from #2 occurred in an open system and the following data was obtained:

Time (seconds)	Mass of System (g)
0.00	167.12
15.0	165.45
30.0	164.51
45.0	163.74
60.0	163.32

- What is the rate in the first 30.0 seconds?
- What is the average rate of the entire reaction?
- Why is the answer to b smaller than a? Explain in terms of collisions.
- What is the average rate of the entire reaction in grams of Fe per second?

4. Using collision theory, explain the two reasons why decreasing temperature will cause a decrease in reaction rate.

5. Explain how PE and KE change as:

- two reactant particles approach each other to collide
- the collision occurs
- the particles move away after the collision

6. a) Draw an endothermic potential energy curve. Label the axes of the graph, the reactant energy, product energy, forward E_a , reverse E_a , activated complex, and ΔH .

- Is the ΔH positive or negative for the reverse reaction?

7a) When the temperature of a reaction is increased, how does E_a change? ΔH ?

b) When a catalyst is added, how does E_a change? ΔH ?

8. a) Draw a PE curve that has $PE_{\text{products}} = 50\text{kJ}$, a forward E_a of 30kJ , and a $\Delta H_{\text{rev}} = -10\text{kJ}$.

b) What is the reverse E_a ?

c) What is the PE of the activated complex?

9. Why do gases react faster than liquids?

10. Consider the following reaction mechanism:

Step 1: $\text{H}_2\text{O}_2 + \text{I}^- \Rightarrow \text{H}_2\text{O} + \text{IO}^-$ slow & endo

Step 2: $\text{H}_2\text{O}_2 + \text{IO}^- \Rightarrow \text{H}_2\text{O} + \text{O}_2 + \text{I}^-$ fast & exo

Overall, the reaction is exothermic.

a) Write the overall reaction.

b) List all reaction intermediates.

c) Is there a catalyst? If so, what is it?

d) What is the rate determining step?

e) Draw a PE curve for the mechanism.

11. Consider the following reaction mechanism:

Step 1: $\text{O}_3 \Rightarrow \text{O}_2 + \text{O}$ slow

Step 2: fast

Step 3: $\text{O} + \text{NO}_2 \Rightarrow \text{NO} + \text{O}_2$ fast

Overall: $2\text{O}_3 \Rightarrow 3\text{O}_2$

a) What is Step 2?

b) Would increasing the concentration of O increase the rate of the reaction? Why or why not?

c) What about increasing $[\text{O}_3]$?