

Reaction Kinetics Practice Test

Name:

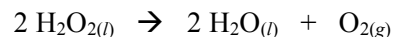
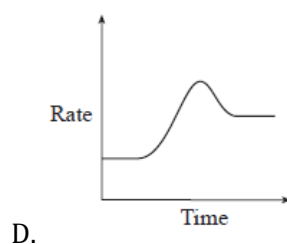
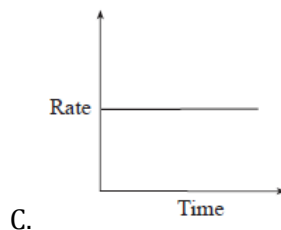
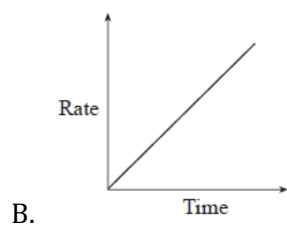
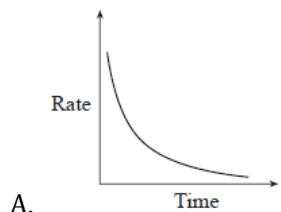
Date:

Block:

Multiple Choice._____ 1. Which of the following best describes *activation energy*?

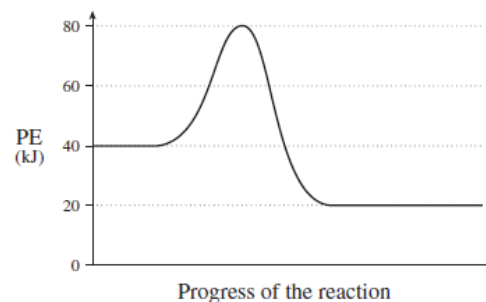
- A. PE of activated complex
 B. (PE of products) - (PE of reactants)
 C. (PE of reactants) - (PE of activated complex)
 D. (PE of activated complex) - (PE of reactants)

_____ 2. Consider the following reaction:

Which graph shows the relationship between rate of consumption of H_2O_2 and time?

3. Explain your answer to the question above:

_____ 4. Consider the following PE diagram:



What is the activation energy for the reverse reaction?

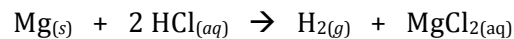
- A. -60 kJ
 B. -20 kJ
 C. +40 kJ
 D. +60 kJ

_____ 5. Which of the following best describes the E_a of a fast reaction and the stability of its activated complex?

	E_a	Activated Complex
A.	small	unstable
B.	small	stable
C.	large	unstable
D.	large	stable

6. Explain your answer to the question above:

_____7. Consider the following reaction:



The rate of this reaction increases when more magnesium is added. This change is caused by the

- A. addition of a catalyst.
- B. increase in surface area.
- C. change in nature of the reactants.
- D. increase in concentration of reactants.

_____8. Which of the following factors affect the rates of reactions?

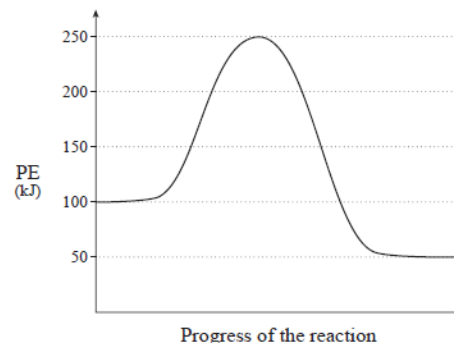
I.	nature of reactants
II.	presence of a catalyst
III.	temperature of system
IV.	concentrations of reactants

- A. I and IV only
- B. II and III only
- C. II, III and IV only
- D. I, II, III and IV

_____9. How does the addition of a catalyst increase the reaction rate of an endothermic reaction?

- A. It reduces the ΔH of the reaction.
- B. It increases the ΔH of the reaction.
- C. It reduces the required activation energy.
- D. It causes the reaction to become exothermic.

_____10. Consider the following PE diagram:



Which of the following describes the forward reaction?

	ΔH (kJ)	ACTIVATION ENERGY (kJ)
A.	+50	250
B.	-50	200
C.	-50	150
D.	+50	150

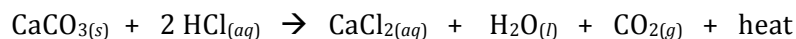
_____11. Consider the following reaction mechanism:

Step 1	$\text{O}_3 \rightarrow \text{O}_2 + \text{O}$
Step 2	$\text{O}_3 + \text{O} \rightarrow 2\text{O}_2$

Which of the following could represent the activated complex for Step 2?

- A. O
- B. O_2
- C. O_3
- D. O_4

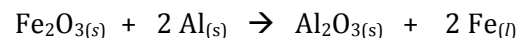
_____12. Given the reaction:



Which of the following will cause the reaction rate to increase?

- A. increasing pressure
- B. decreasing pressure
- C. increasing temperature
- D. decreasing temperature

_____13. Consider the following reaction:



If 0.50 mol of Fe is produced in 10.0 sec, what is the rate of consumption of Fe_2O_3 in mol/s ?

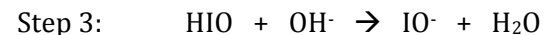
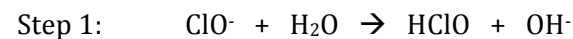
- A. 5.0×10^{-2} mol/s
- B. 2.5×10^{-2} mol/s
- C. 1.0×10^{-1} mol/s
- D. 5.0 mol/s

14. Show your calculation the question above:

_____15. Which of the following could describe a catalyst?

- A. A substance that increases the reaction time.
- B. A substance that provides an alternate mechanism with a higher activation energy.
- C. A substance that is formed in one step and used up in a subsequent step in a reaction mechanism.
- D. A substance that is used up in one step and reformed in a subsequent step in a reaction mechanism.

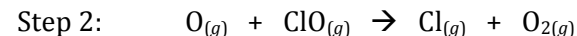
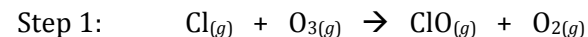
_____16. Consider the following 3 step reaction mechanism:



The products of the net reaction are:

- A. $\text{IO}^- + \text{H}_2\text{O}$
- B. $\text{HIO} + \text{OH}^-$
- C. $\text{IO}^- + \text{Cl}^-$
- D. $\text{ClO}^- + \text{I}^-$

_____17. Consider the following reaction mechanism:



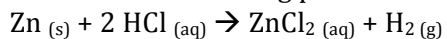
The reaction intermediate is

- A. Cl
- B. O_2
- C. O_3
- D. ClO

18. Explain your answer to the question above:

Problems:

1. At 25°C, zinc is consumed at a rate of 2.82 g per minute according to the following reaction:

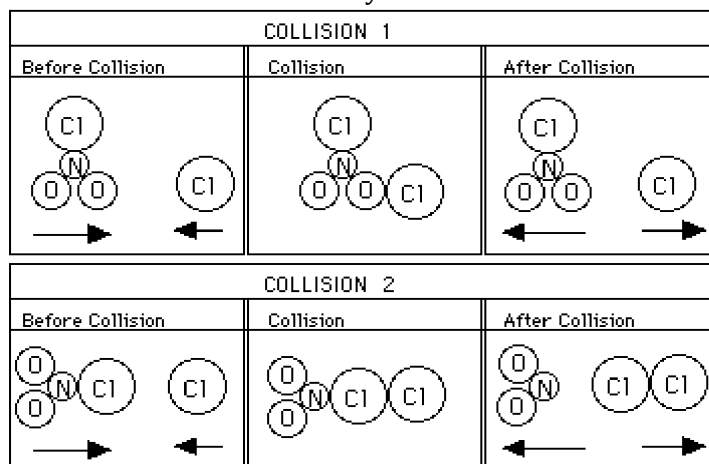


a) Calculate the rate of this reaction in terms of mass of hydrogen gas produced per minute.

b) List two ways to **measure** the rate of reaction:

c) List two ways to **increase** the rate of reaction:

2. The diagrams below represent two collisions between a NO₂Cl molecule and a Cl atom. Using collision theory, state which collision was effective and why it was effective:



3. Consider this three step reaction mechanism.

- The potential energy (PE) of the reactants is 20 kJ
- The PE of the products is 50 kJ
- The PE of the activated complex in the rate determining step is 70 kJ:



a) Write the overall net reaction.

b) Which substance(s) would be considered reaction intermediates?

c) Which substance is the catalyst for this reaction (if there is one)?

d) Draw a PE diagram for this multi-step reaction. Provide the following on the graph with labeled arrows:

Labeled axes

Sites of all activated complexes

Sites of all intermediates

E_a for the overall reaction

ΔH for the overall reaction