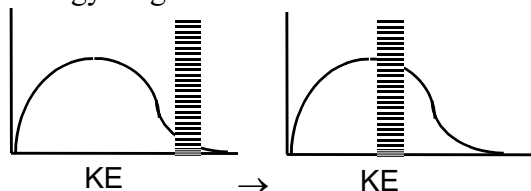


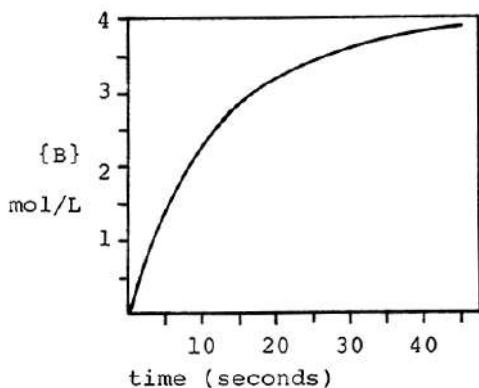
12 • Chemical Kinetics**P R A C T I C E T E S T**

1. Which of the following does NOT influence the speed of a chemical reaction?
- concentration of reactants
 - nature of reactants
 - temperature
 - presence of a catalyst
 - none of these

2. What would cause the change in the kinetic energy diagrams as shown?



- increasing the ΔH
 - decreasing the temperature
 - increasing the surface area
 - addition of a catalyst
 - increasing the concentration of reactant
3. A time vs. concentration graph is presented below for the reaction $A \rightarrow B$. What is the rate of appearance of 'B' 20 seconds after the start of the reaction?



- 0.050 mol/L·s
- 3.2 mol/L·s
- 2.2 mol/L·s
- 0.010 mol/L·s
- 9.8 mol/L·s

4. The reaction $3O_2 \rightarrow 2O_3$ is proceeding with a rate of disappearance of O_2 equal to 0.60 mol/L·s. What is the rate of appearance of O_3 , in mol/L·s?
- 0.60
 - 0.40
 - 0.10
 - 0.90
 - 1.20
5. A reaction has the rate law $\text{Rate} = k[A]^2[B]$. What is the overall order of the reaction?
- 0
 - 2
 - 1
 - 4
 - 3
6. What are the correct units for a second order rate constant?
- mol/L·s
 - 1/s
 - L/mol·s
 - L²/mol²·s
 - mol²/L²·s
7. The reaction $I^- + OCl^- \rightarrow IO^- + Cl^-$ is first order with respect to I^- and first order with respect to OCl^- . The rate constant is 6.1×10^{-2} L/mol·s. What is the rate of reaction when $[I^-] = 0.10$ M and $[OCl^-] = 0.20$ M?
- 2.4×10^{-4} M/s
 - 1.2×10^{-3} M/s
 - 6.1×10^{-3} M/s
 - 1.2×10^{-4} M/s
 - 2.4×10^{-5} M/s
8. A reaction and its rate law are given below. When $[C_4H_6] = 2.0$ M, the rate is 0.106 M/s. What is the rate when $[C_4H_6] = 4.0$ M?
- $$2 C_4H_6 \rightarrow C_8H_{12} \quad \text{Rate} = k[C_4H_6]^2$$
- 0.053 M/s
 - 0.212 M/s
 - 0.106 M/s
 - 0.424 M/s
 - 0.022 M/s

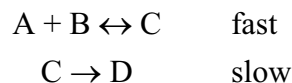
9. The rate law for the reaction
 $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g})$
 is $\text{Rate} = k[\text{NO}]^2[\text{O}_2]$. What happens to the rate when the concentration of NO is doubled?
- a) the rate doubles d) the rate is halved
 b) the rate triples e) none of these
 c) the rate quadruples

10. Below is some rate data for the hypothetical reaction, $2\text{A} + \text{B} \rightarrow \text{C}$. What is the rate law for this reaction?

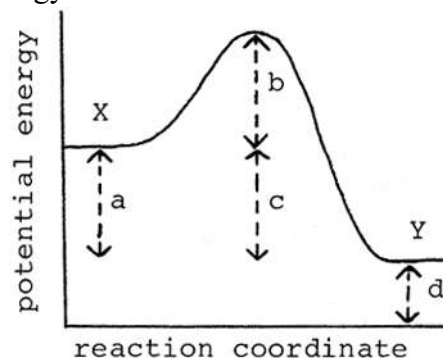
Experiment	[A] ₀	[B] ₀	Rate (M/s)
1	2.0 M	1.0 M	0.100
2	2.0 M	2.0 M	0.400
3	4.0 M	1.0 M	0.100

- a) $\text{Rate} = k[\text{A}][\text{B}]$ d) $\text{Rate} = k[\text{A}]^2[\text{B}]^2$
 b) $\text{Rate} = k[\text{A}]^2[\text{B}]$ e) $\text{Rate} = k[\text{B}]^2$
 c) $\text{Rate} = k[\text{A}][\text{B}]^2$
11. The acid catalyzed decomposition of hydrogen peroxide is a first order reaction with the rate constant given below. For an experiment in which the starting concentration of hydrogen peroxide is 0.110 M, what is the concentration of H₂O₂ 450 minutes after the reaction begins?
 $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ $k = 1.33 \times 10^{-4} \text{ min}^{-1}$
- a) 0.0961 M d) 0.00658 M
 b) 0.104 M e) 0.0156 M
 c) 0.117 M
12. What is the rate constant for a first order reaction for which the half-life is 85.0 sec?
- a) 0.00814 sec⁻¹ d) 0.0118 sec⁻¹
 b) 4.44 sec⁻¹ e) 58.9 sec⁻¹
 c) 0.170 sec⁻¹

13. What fraction of a reactant remains after 3 half-lives of a first order reaction?
- a) 1/2 d) 1/8
 b) 1/3 e) 1/12
 c) 1/6
14. Assume a reaction occurs by the mechanism given below. What is the rate law for the reaction?

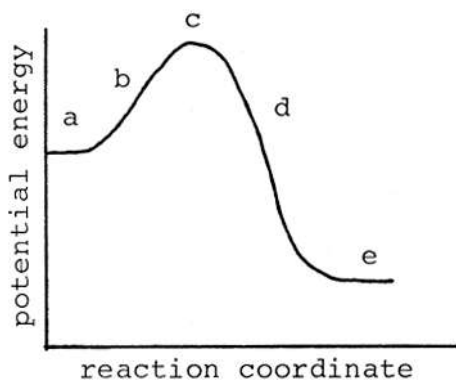


- a) $\text{Rate} = k[\text{A}][\text{B}][\text{C}]$
 b) $\text{Rate} = k[\text{A}]^2$
 c) $\text{Rate} = k[\text{A}][\text{B}]$
 d) $\text{Rate} = k[\text{A}][\text{B}]/[\text{D}]$
 e) $\text{Rate} = k[\text{A}]$
15. According to collision theory, which of the following factors does NOT influence the rate of reaction?
- a) collision frequency
 b) collision energy
 c) collision orientation
 d) collision rebound direction
 e) none of these
16. What distance corresponds to the activation energy for the reaction of X to Y?



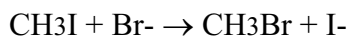
- a) a d) d
 b) b e) e
 c) c

17. At what point on the potential energy diagram given below does the transition state (activated complex) occur?



- a) a d) d
b) b e) e
c) c

18. The rate constants, at two different temperatures, for the reaction



are given below.

$$t = 30^\circ\text{C} \quad k = 1.38 \times 10^{-4} \text{ M}^{-1}\text{s}^{-1}$$

$$t = 49^\circ\text{C} \quad k = 1.21 \times 10^{-3} \text{ M}^{-1}\text{s}^{-1}$$

What is the activation energy for this reaction? $R = 8.314 \text{ J/mol}\cdot\text{K}$.

- a) 92.7 kJ/mol d) 343 kJ/mol
b) 200 kJ/mol e) none of these
c) 40.3 kJ/mol

19. Which of the following is NOT true about a catalyst?

- a) it speeds up the forward reaction
b) it acts as an inhibitor
c) it speeds up the reverse reaction
d) it may be homogeneous
e) it may be heterogeneous

20. A free radical is a chemical species that possesses

- a) a positive charge
b) a negative charge
c) an unpaired electron
d) an oxygen atom
e) unconventional political views

Answers:

1. e
2. d
3. a
4. b
5. e
6. c
7. b
8. d
9. c
10. e
11. b
12. a
13. d
14. c
15. d
16. b
17. c
18. j
19. b (an inhibitor slows a rxn down)
20. c