AP Chemistry: Unit -1- Kinetics Practice Test

Question 1

Hydrochloric acid reacts faster with powdered zinc than with an equal mass of zinc strips because the greater the surface area of the powdered zinc

A. decreases the frequency of particle collisions
B. decreases the activation energy of the reaction
C. increases the frequency of particle collisions
D. increases the activation energy of the reaction

Question 2

In terms of disorder and energy, systems in nature have a tendency to undergo changes toward

A. less disorder and lower energy
B. less disorder and higher energy
C. greater disorder and lower energy
D. greater disorder and higher energy\

Question 3

Which sample of HCl(aq) reacts at the fastest rate with a 1.0-gram sample of iron filings?

A. 10. mL of 1 M HCl(aq) at 10.^{o}C
B. 10. mL of 1 M HCl(aq) at 25^{o}C
C. 10. mL of 3 M HCl(aq) at 10.^{o}C
D. 10. mL of 3 M HCl(aq) at 25^{o}C

Question 4

In chemical reactions, the difference between the potential energy of the products and the potential energy of the reactants is equal to the

A. activation energy
B. ionization energy
C. heat of reaction
D. heat of vaporization

Question 5

The iodide ion reacts with hypochlorite ion in the following way:
$OCl^- + I^- \longrightarrow OI^- + Cl^-$.
This rapid reaction gives the rate data shown. What is the rate law?

$[OCl^-]$	$[I^-]$	Initial Rate (M/s)
$1.5x10^{-3}$	$1.5x10^{-3}$	$1.36x10^{-4}$
$3.0x10^{-3}$	$1.5x10^{-3}$	$2.72x10^{-4}$
$1.5x10^{-3}$	$3.0x10^{-3}$	$2.72x10^{-4}$

A. rate = $[OCl^-]^2[I^-]$
B. rate = $[OCl^-][I^-]^2$
C. rate = $[OCl^-][I^-]$
D. rate = $[OCl^-][I^-]$

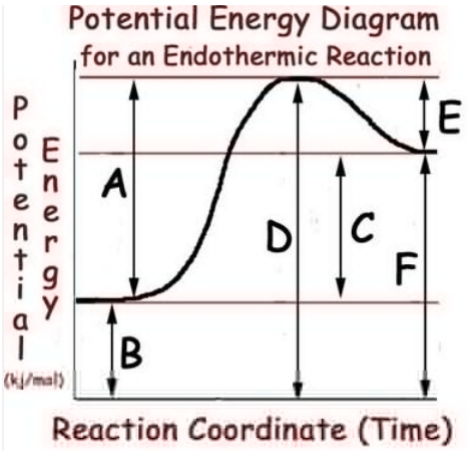
Question 6

A reaction is found to be second order with respect to carbon monoxide. If the concentration of carbon monoxide is doubled, the rate of reaction _____.

A. doubles
B. increases by a factor of 4
C. remains unchanged
D. is reduced by a factor of 2

Question 7

What letter represents the activation energy?



A. A
B. B
C. C
D. D

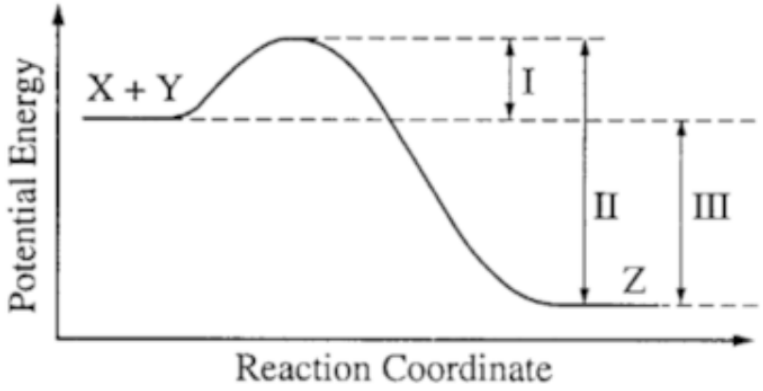
Question 8

Which of the following best describes why increasing temperature increase reaction rate?

A. Activation energy is reduced.
B. Collisions become more frequent.
C. Collisions become more energetic.
D. Collisions become more frequent and more energetic.

Question 9

The addition of a catalyst to this reaction would cause a change in which of the indicated energy differences?



A. I
B. II
C. III
D. I and II

Question 10

Which of the following could be the rate law for a third-order reaction?

A. rate = k[A]
B. rate = k[A]^2[B]
C. rate = k[A][B]
D. rate = k[A]^2

Question 11

Which of the following is the effect of an increase in temperature on a chemical reaction?

A. It slows down the rate of the reaction.
B. It lowers the activation energy of the reaction.
C. It results in less successful collisions.
D. It increases the kinetic energy of the reactants.

Question 12

Using the following data, which is the correct rate law of the sample reaction?

$A + 5B + 6C \rightarrow 3D + 3E$

Experiment	[A] (M)	[B] (M)	[C] (M)	Initial Rate (M/s)
1	0.35	0.35	0.35	8.0×10^{-4}
2	0.70	0.35	0.35	3.2×10^{-3}
3	0.70	0.70	0.35	6.4×10^{-3}
4	0.70	0.35	0.70	3.2×10^{-3}

A. $R=k[A]^2\,[B]^1\,[C]^1$
B. $R=k[A]^4\,[B]^2\,[C]^1$
C. $R=k[A]^2\,[B]^1\,[C]^0$
D. $R=k[A]^1\,[B]^2\,[C]^0$

Answer: C

Question 13

What would the rate constant of the reaction be given the following set of experiments?

$A + B \rightarrow C + D$

Experiment	[A] (M)	[B] (M)	Initial Rate (M/s)
1	0.040	0.040	2.2×10^{-4}
2	0.040	0.080	4.4×10^{-4}
3	0.080	0.080	8.8×10^{-4}

A. $k = 0.179\ M^{-1}s^{-1}$
B. $k = 0.157\ M^{-1}s^{-1}$
C. $k = 0.275\ M^{-1}s^{-1}$
D. $k = 0.138\ M^{-1}s^{-1}$

Answer: D

Question 14

Which of the following are true of reaction rates?

I. The overall rate law is determined by the fastest step of a reaction
II. The presence of a catalyst will increase the number of molecules entering the transition state
III. An increase in temperature will increase the rate of a reaction
IV. Increasing the concentration of reactants will increase the rate at which products yield

A. I+II+IV

B. I +II+III

C. II+III only

D. II+III+IV

Question 15

The Arrhenius equation, $k = Ae^{-Ea/(RT)}$ gives the relationship of the rate constant of a reaction to the temperature (T) and the activation energy (Ea). If a catalyst is added that decreases the activation energy by 20 kJ/mol, and simultaneously the temperature is decreased by 20 K, which of the following will be true of the reaction?

A. The reaction rate will decrease overall
B. The reaction rate will increase overall
C. The reaction will take place at the same rate
D. Not enough information is given

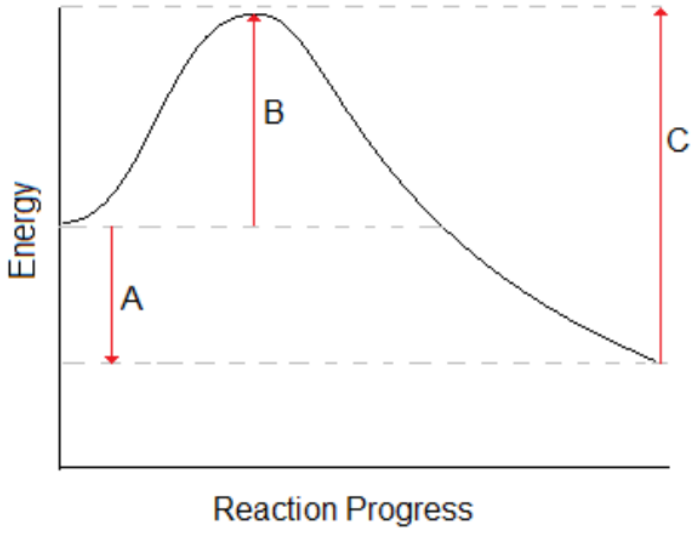
Question 16

Which of the following is true regarding the addition of a catalyst to a reaction?

A. The rate of the reverse reaction is decreased
B. The ΔG of a reaction is decreased
C. The equilibrium favors the products upon catalyst addition
D. The energy of the activated complex will decrease

Question 17

An addition of a catalyst to the following reaction would have what effect?



A. “A” would be decreased
B. “B” would be increased
C. “C” would be decreased
D. None of the above

Answer Key

1. C
2. C
3. D
4. C
5. C
6. B
7. A
8. D
9. D
10. B
11. D
12. C
13. D
14. C
15. B
16. D
17. C