MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A solution contains 28% phosphoric acid by mass. This means that ________
   A) 1 mL of this solution contains 28 g of phosphoric acid
   B) 100 g of this solution contains 28 g of phosphoric acid
   C) 1 L of this solution has a mass of 28 g
   D) the density of this solution is 2.8 g/mL
   E) 1 L of this solution contains 28 mL of phosphoric acid

   Page Ref: Sec. 13.4
   Topic:

2) Emulsifying agents typically ________
   A) are nonpolar
   B) have a hydrophobic end and a hydrophilic end
   C) are used to separate a colloid into its constituent phases
   D) are hydrophilic at both ends
   E) are hydrophilic at both ends

   Page Ref: Sec. 13.6
   Topic:

3) When argon is placed in a container of neon, the argon spontaneously disperses throughout the neon because ________
   A) of hydrogen bonding
   B) solvent-solute interactions
   C) the dispersion of argon atoms produces an increase in disorder
   D) a decrease in energy occurs when the two mix
   E) of the large attractive forces between argon and neon atoms

   Page Ref: Sec. 13.1
   Topic:

4) Which one of the following substances is more likely to dissolve in benzene (C₆H₆)?
   A) NH₃       B) NaCl      C) CH₃CH₂OH     D) CCl₄      E) HBr

   Page Ref: Sec. 13.3
   Topic:

5) Formation of solutions where the process is endothermic can be spontaneous provided that ________
   A) the solvent is a gas and the solute is a solid
   B) they are accompanied by another process that is exothermic
   C) they are accompanied by an increase in order
   D) they are accompanied by an increase in disorder
   E) the solvent is water and the solute is a gas

   Page Ref: Sec. 13.1
   Topic:

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6) Which of the following aqueous solutions will have the highest boiling point?
   A) 0.10 M NaSO₄
   B) 0.20 M glucose
   C) 0.25 M sucrose
   D) 0.10 M NaCl
   E) 0.10 M Na₂SO₄

Page Ref: Sec. 13.5

7) The concentration (M) of HCl in a solution prepared by dissolving 5.5 g of HCl in 200 g of C₂H₂O is _______. The density of the solution is 0.99 g/mL. The molar mass of HCl is _______.
   A) 1.72
   B) 0.58
   C) 6.0 x 10⁻²
   D) 0.93
   E) 21

Page Ref: Sec. 15.4

8) A supersaturated solution _______.
   A) is one with a higher concentration than the solubility
   B) exists only in theory and cannot actually be prepared
   C) is one that has been heated
   D) is one with more than one solute
   E) must be in contact with undissolved solid

Page Ref: Sec. 13.2

9) Water (H₂O) and the alcohol methanol (CH₃OH) are infinitely soluble in each other. The primary intermolecular force responsible for this is _______.
   A) dispersion forces
   B) London forces
   C) hydrogen bonding
   D) dipole-dipole forces
   E) ionic bonding

Page Ref: Sec. 13.3

10) The dissolution of gases in water is virtually always exothermic because _______.
    A) the exothermic step in the solution-formation process is unnecessary
    B) one of the two endothermic steps (separation of solute particles) in the solution-formation process is unnecessary
    C) neither of the two endothermic steps in the solution-formation process is necessary
    D) gases react exothermically with water
    E) all three steps in the solution-formation process are exothermic

Page Ref: Sec. 13.1

11) The solubility of nitrogen gas in water at 25°C and a nitrogen pressure of 1.0 atm is 6.9 x 10⁻² M. The solubility of nitrogen in water at a nitrogen pressure of 0.80 atm is _______.
    A) 3.7 x 10⁻³
    B) 1.2 x 10⁻³
    C) 0.80
    D) 5.5 x 10⁻⁴
    E) 8.6 x 10⁻⁴

Page Ref: Sec. 13.3

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12. Pairs of liquids that will mix in all proportions are called __________ liquids.
A) miscible
B) polar liquids
C) supersaturated
D) saturated
E) insoluble
Page Ref: Sec. 13.3
Topic:

13. A solution is prepared by dissolving calcium chloride in water and diluting to 500.0 mL. If this solution contains 44 ppm chloride ions, the concentration of calcium ions is _______ ppm.
A) 22
B) 11
C) 88
D) 44
E) 90
Page Ref: Sec. 13.4
Topic:

14. A solution is prepared by dissolving 23.7 g of CaCl₂ in 375 g of water. The density of the resulting solution is 1.08 g/mL. The concentration of Cl⁻ in this solution is ______ M.
A) 0.562
B) 6.64 x 10⁻²
C) 0.214
D) 1.12
E) 1.20
Page Ref: Sec. 13.4
Topic:

15. Calculate the freezing point (°C) of a 0.05500 M aqueous solution of glucose. The molal freezing-point-depression constant of water is 1.86°C/m.
A) 0.1023
B) -0.05267
C) -0.2046
D) -0.3925
E) 0.0286
Page Ref: Sec. 13.5
Topic:

16. A 20°C, an aqueous solution that is 20.0% by mass in ammonium chloride has a density of 1.0674 g/mL. What is the molarity of ammonium chloride in the solution? The formula weight of NH₄Cl is 53.50 g/mole.
A) 5.90
B) 0.0445
C) 4.79
D) 0.479
E) 22.5
Page Ref: Sec. 13.4
Topic:

17. A solution contains 15 ppm of benzene. The density of the solution is 1.00 g/mL. This means that
A) 10.0 g of the solution contains 15 g of benzene
B) the solution is 15% by mass of benzene
C) 1.0 L of the solution contains 15 g of benzene
D) 1.0 g of the solution contains 15 x 10⁻⁶ g of benzene
E) there are 15 mg of sodium chloride in 1.0 g of this solution
Page Ref: Sec. 13.4
Topic:

18. A solution with a solute concentration greater than the solubility is ________
A) unsaturated
B) supercritical
C) supersaturated
D) unsaturated
E) saturated
Page Ref: Sec. 13.3
Topic:
19) Hydration is a specific example of the phenomenon known generally as _________.
A) condensation  
B) saturation  
C) dilution  
D) disordering  
E) solvation
Page Ref: Sec. 13.1  
Topic: 

20) Of the following, ________ should be immiscible with carbon tetrachloride, CCL₄.
A) C₂H₆  
B) I₂  
C) Br₂  
D) C₆H₁₄  
E) CH₃CH₂OH
Page Ref: Sec. 13.3  
Topic: 

21) Calculate the freezing point (°C) of a 0.00500 m aqueous solution of NaNO₃. The molal freezing-point-depression constant of water is 1.86°C/m.
A) 0.0286  
B) -0.2046  
C) -0.05627  
D) -0.1023  
E) 0.1023
Page Ref: Sec. 13.5  
Topic: 

22) Which produces the greatest number of ions when one mole dissolves in water?
A) NH₄NO₃  
B) Na₂SO₄  
C) NH₄Cl  
D) NaCl  
E) sucrose
Page Ref: Sec. 13.5  
Topic: 

23) As the concentration of a solute in a solution increases, the freezing point of the solution ________ and the vapor pressure of the solution ________.
A) decreases, decreases  
B) increases, increases  
C) decreases, is unaffected  
D) increases, decreases  
E) decreases, increases
Page Ref: Sec. 13.5  
Topic: 

24) Which of the following substances is more likely to dissolve in CH₃OH?
A) Kr  
B) CH₃CH₂OH  
C) CCl₄  
D) H₂  
E) N₂
Page Ref: Sec. 13.3  
Topic: 

25) The freezing point of ethanol (C₂H₅OH) is -114.6°C. The molal freezing point depression constant for ethanol is 2.08°C/m. What is the freezing point (°C) of a solution prepared by dissolving 50.0 g of glycerin (C₃H₅O₃, a nonelectrolyte) in 200 g of ethanol?
A) -115  
B) -114.6  
C) -123.3  
D) -120.0  
E) -5.42
Page Ref: Sec. 13.5  
Topic:
26) A solution is prepared by dissolving 0.60 g of nicotine (a nonelectrolyte) in water to make 12 mL of solution. The osmotic pressure of the solution is 7.55 atm at 25°C. The molecular weight of nicotine is _______ g/mol.
   A) 43  B) 50  C) 160  D) 28  E) 0.60
   Page Ref: Sec. 13.5
   Topic: 

27) A solution is prepared by dissolving 16.2 g of benzene (C₆H₆) in 282 g of carbon tetrachloride (CCl₄). The concentration of benzene in this solution is _______ molal. The molar masses of C₆H₆ and CCl₄ are 78.1 g/mol and 154 g/mol, respectively.
   A) 5.43  B) 0.182  C) 0.736  D) 0.0543  E) 7.36 × 10⁻⁴
   Page Ref: Sec. 13.4
   Topic: 

28) The Procter & Gamble Company product called oliestra™ is formed by combining a sugar molecule with _______.
   A) vitamin A  B) alcohols  C) fatty acids  D) cholesterol  E) protein
   Page Ref: Sec. 13.3
   Topic: 

29) In a saturated solution of a salt in water, _______.
   A) seed crystal addition may cause massive crystallization
   B) addition of more water causes massive crystallization
   C) the rate of dissolution > the rate of crystallization
   D) the rate of crystallization > the rate of dissolution
   E) the rate of crystallization = the rate of dissolution
   Page Ref: Sec. 13.2
   Topic: 

30) The concentration of KBr in a solution prepared by dissolving 2.21 g of KBr in 897 g of water is _______ molal.
   A) 2.07 × 10⁻⁵  B) 0.0186  C) 2.46  D) 0.0207  E) 0.0167
   Page Ref: Sec. 13.4
   Topic: 

The data in the table below were obtained for the reaction:

\[ \text{2 ClO}_2^-(aq) + 2 \text{OH}^-(aq) \rightarrow \text{ClO}_2^-(aq) + \text{ClO}_2^- (aq) + \text{H}_2\text{O}(l) \]

<table>
<thead>
<tr>
<th>Experiment Number</th>
<th>[ClO₂⁻] (M)</th>
<th>[OH⁻] (M)</th>
<th>Initial Rate (M/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.060</td>
<td>0.030</td>
<td>0.0248</td>
</tr>
<tr>
<td>2</td>
<td>0.020</td>
<td>0.030</td>
<td>0.00276</td>
</tr>
<tr>
<td>3</td>
<td>0.020</td>
<td>0.090</td>
<td>0.00828</td>
</tr>
</tbody>
</table>

31) What is the order of the reaction with respect to OH⁻?
   A) 0  B) 1  C) 2  D) 3  E) 4
   Page Ref: Sec. 14.3
   Topic: 

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32) The rate law of the overall reaction

\[ A + B \rightarrow C \]

is rate = \[ k[A]^2 \]. Which of the following will not increase the rate of the reaction?
A) increasing the temperature of the reaction
B) adding a catalyst for the reaction
C) increasing the concentration of reactant B
D) increasing the concentration of reactant A
E) All of these will increase the rate.

Page Ref: Sec. 14.7

Topic:

33) The combustion of ethylene proceeds by the reaction

\[ \text{C}_2\text{H}_4 (g) + 3\text{O}_2 (g) \rightarrow 2\text{CO}_2 (g) + 2\text{H}_2\text{O} (g) \]

When the rate of disappearance of \( \text{O}_2 \) is 0.28 M s\(^{-1}\), the rate of appearance of \( \text{CO}_2 \) is ________ M s\(^{-1}\).
A) 0.19  B) 0.56  C) 0.42  D) 0.093  E) 0.84

Page Ref: Sec. 14.2

Topic:

A flask is charged with 0.124 mol of A and allowed to react to form B according to the reaction \[ \text{A}(g) \rightarrow \text{B}(g) \]. The following data are obtained for \([A]\) as the reaction proceeds:

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>1</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moles of A</td>
<td>0.124</td>
<td>0.110</td>
<td>0.088</td>
<td>0.073</td>
<td>0.054</td>
</tr>
</tbody>
</table>

34) How many moles of B are present at 10 s?
A) 0.011  B) 0.226  C) 0.014  D) 1.4 \times 10^{-3}  E) 0.110

Page Ref: Sec. 14.2

Topic:

35) A second-order reaction has a half-life of 18 s when the initial concentration of reactant is 0.71 M. The rate constant for this reaction is ________ M\(^{-1}\) s\(^{-1}\).
A) 3.8 \times 10^{-2}  B) 2.0 \times 10^{-2}  C) 1.3  D) 18  E) 7.8 \times 10^{-2}

Page Ref: Sec. 14.4

Topic:

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36) At elevated temperatures, methylisocyanite (CH₃NC) isomerizes to acetonitrile (CH₃CN):

$$\text{CH₃NC} (g) \rightarrow \text{CH₃CN} (g)$$

The reaction is first order in methylisocyanite. The attached graph shows data for the reaction obtained at 198.9°C.

![Graph with data points and a trend line]

The rate constant for the reaction is ________ s⁻¹.  
A) -1.9 × 10⁴  B) 6.2  C) -5.2 × 10⁻⁵  D) -1.9 × 10⁴  E) -5.2 × 10⁻⁵

Page Ref: Sec. 14.4  
Topic:  

37) Of the following, ________ will lower the activation energy for a reaction.  
A) raising the temperature of the reaction  
B) increasing the concentrations of reactants  
C) adding a catalyst for the reaction  
D) removing products as the reaction proceeds  
E) increasing the pressure  

Page Ref: Sec. 14.7  
Topic:  

38) A particular first-order reaction has a rate constant of 1.35 × 10² s⁻¹ at 25°C. What is the magnitude of k at 95°C if $E_a = 55.5$ kJ/mol?  
A) 4.33 × 10⁸  B) 9.60 × 10³  C) 1.36 × 10²  D) 2.85 × 10⁴  E) 576  

Page Ref: Sec. 14.5  
Topic:  

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The peroxydisulfate ion ($\text{SO}_5^{2-}$) reacts with the iodide ion in aqueous solution via the reaction:

$$\text{SO}_5^{2-} (\text{aq}) + 3\text{I}^- \rightarrow 2\text{SO}_4^{2-} (\text{aq}) + 3\text{I}^- (\text{aq})$$

An aqueous solution containing 0.050 M of $\text{SO}_5^{2-}$ ion and 0.072 M of $\text{I}^-$ is prepared, and the progress of the reaction followed by measuring $[\text{I}^-]$. The data obtained is given in the table below.

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>0</th>
<th>400</th>
<th>800</th>
<th>1200</th>
<th>1600</th>
</tr>
</thead>
<tbody>
<tr>
<td>$[\text{I}^-]$ (M)</td>
<td>0.072</td>
<td>0.057</td>
<td>0.046</td>
<td>0.037</td>
<td>0.029</td>
</tr>
</tbody>
</table>

39) The concentration of $\text{SO}_5^{2-}$ remaining at 1600 s is __________ M.
   A) 0.043  
   B) 0.036  
   C) 0.029  
   D) 0.014  
   E) 0.064

Page Ref: Sec. 14.2  
Topic:

40) The concentration of $\text{SO}_5^{2-}$ remaining at 800 s is __________ M.
   A) 0.015  
   B) 0.046  
   C) 0.041  
   D) 0.076  
   E) 4.00 ×10^-3

Page Ref: Sec. 14.2  
Topic:

41) Which energy difference in the energy profile below corresponds to the activation energy for the forward reaction?

A) $x$  
B) $y$  
C) $x - y$  
D) $y - x$  
E) $x + y$

Page Ref: Sec. 14.3  
Topic:

42) The rate law of a reaction is $\text{rate} = k[D][X]$. The units of the rate constant are __________
   A) mol/L•s$^{-1}$  
   B) L$^2$ mol$^{-2}$•s$^{-1}$  
   C) L$^2$ mol$^{-2}$•s$^{-1}$  
   D) mol/L•s$^{-1}$  
   E) mol/L•s$^{-2}$

Page Ref: Sec. 14.3  
Topic:

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43) A possible mechanism for the overall reaction

\[ \text{Br}_2 (g) + 2\text{NO} (g) \rightarrow 2\text{NOBr} (g) \]

is

\[ \begin{align*}
\frac{k_1}{k_{-1}} & \quad \text{(fast)} \\
\frac{k_2}{k_{-2}} & \quad \text{(slow)}
\end{align*} \]

The rate law for formation of \( \text{NOBr} \) based on this mechanism is \( \text{rate} = \) ________.

A) \( k_1[\text{Br}_2]^{1/2} \)
B) \( (k_1/k_{-1})[\text{NO}]^2 \)
C) \( (k_2/k_{-2})[\text{NO}][\text{Br}_2] \)
D) \( k_1[\text{NO}]^{1/2} \)
E) \( (k_2/k_{-2})[\text{NO}]^2[\text{Br}_2] \)

Page Ref: Sec. 14.6

Topic:

44) Of the units below, ________ are appropriate for a first-order reaction rate constant.

A) M s\(^{-1}\)  
B) s\(^{-1}\)  
C) M\(^{-1}\) s\(^{-1}\)  
D) L mol\(^{-1}\) s\(^{-1}\)  
E) mol/L

Page Ref: Sec. 14.2

Topic:

45) The mechanism for formation of the product \( X \) is:

\[ A + B \rightarrow C + D \quad \text{(slow)} \]
\[ B + D \rightarrow X \quad \text{(fast)} \]

The intermediate reactant in the reaction is ________.

A) A  
B) B  
C) C  
D) D  
E) X

Page Ref: Sec. 14.6

Topic:

The reaction \( A \rightarrow B \) is first order in \([A]\). Consider the following data.

\[
\begin{array}{c|c}
\text{time (s)} & \text{[A] (M)} \\
0.0 & 1.60 \\
10.0 & 0.40 \\
20.0 & 0.10 \\
\end{array}
\]

46) The rate constant for this reaction is ________ s\(^{-1}\).

A) 0.34  
B) 3.1 \times 10^{-3}  
C) 0.030  
D) 3.0  
E) 0.013

Page Ref: Sec. 14.4

Topic:

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47) The kinetics of the reaction below were studied and it was determined that the reaction rate increased by a factor of 9 when the concentration of B was tripled. The reaction is ________ order in B.

A) zero  B) first  C) second  D) third  E) one-half

Page Ref: Sec. 14.3  
Topic:  

68) A catalyst can increase the rate of a reaction __________.
A) by lowering the overall activation energy (E_a) of the reaction
B) by changing the value of the frequency factor (A)
C) by lowering the activation energy of the reverse reaction
D) by providing an alternative pathway with a lower activation energy
E) All of these are ways that a catalyst might act to increase the rate of reaction.

Page Ref: Sec. 14.7  
Topic:  

49) The reaction

\[ \text{CH}_3-\text{N}=\text{C} \rightarrow \text{CH}_3-\text{C}=\text{N} \]

is a first-order reaction. At 230.3°C, \( k = 6.29 \times 10^{-4} \text{s}^{-1} \). If [CH3-N=C] is 1.00 x 10^{-3} initially, [CH3-N=C] is ________ after 1.00 x 10^3 s.

A) 4.27 x 10^{-3}  B) 1.00 x 10^{-6}  C) 2.34 x 10^{-4}  D) 5.33 x 10^{-4}  E) 1.88 x 10^{-3}

Page Ref: Sec. 14.4  
Topic:  

50) The first step of a mechanism involving the reactant I2 is shown below, where the equilibrium is established.

\[ \text{I}_2 (aq) \rightleftharpoons 2 \text{I}^{-}(aq) \]  \( (1, -1) \)

The expression relating [I] to [I2] is [I] = ________.

A) \( k_1[\text{I}] \)
B) \( (k_1k_2^{-1})^{1/2}[\text{I}]^{1/2} \)
C) \( k_1[\text{I}]^{1/2} \)
D) \( (k_1k_2^{-1})[\text{I}]^{1/2} \)
E) \( (k_1k_2^{-1})[\text{I}]^{2} \)

Page Ref: Sec. 14.6  
Topic:  

51) The half-life of a first-order reaction is 13 min. If the initial concentration of reactant is 0.085 M, it takes ________ min for it to decrease to 0.055 M.

A) 8.2  B) 0.048  C) 11  D) 8.4  E) 3.6

Page Ref: Sec. 14.4  
Topic:
The data in the table below were obtained for the reaction:

$$A + B \rightarrow P$$

<table>
<thead>
<tr>
<th>Experiment Number</th>
<th>[A] (M)</th>
<th>[B] (M)</th>
<th>Initial Rate (M/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.273</td>
<td>0.763</td>
<td>2.83</td>
</tr>
<tr>
<td>2</td>
<td>0.273</td>
<td>1.526</td>
<td>2.83</td>
</tr>
<tr>
<td>3</td>
<td>0.819</td>
<td>0.763</td>
<td>25.47</td>
</tr>
</tbody>
</table>

52) The order of the reaction in A is ________
   A) 1           B) 2           C) ?
   D) 4           E) 0

Page Ref: Sec. 14.3
Topic:

53) Which one of the following is not a valid expression for the rate of the reaction below?

$$4NH_3 + 7O_2 \rightarrow 4NO_2 + 6H_2O$$

A) \( \frac{1}{6} \frac{d[\text{H}_2\text{O}]}{dt} \)
B) \( \frac{1}{4} \frac{d[\text{NH}_3]}{dt} \)
C) \( \frac{1}{7} \frac{d[\text{O}_2]}{dt} \)
D) \( \frac{1}{4} \frac{d[\text{NO}_2]}{dt} \)
E) All of the above are valid expressions of the reaction rate.

Page Ref: Sec. 14.2
Topic:

54) A first-order reaction has a rate constant of 0.33 min\(^{-1}\). It takes ________ min for the reactant concentration to decrease from 0.13 M to 0.088 M.

A) 0.85           B) 1.2           C) 0.51
D) 0.13           E) 1.4

Page Ref: Sec. 14.4
Topic:
The data in the table below were obtained for the reaction:

\[ 2\text{ClO}_2(\text{aq}) + 2\text{OH}^- (\text{aq}) \rightarrow \text{ClO}_3^- (\text{aq}) + \text{ClO}_2^- (\text{aq}) + \text{H}_2\text{O}(l) \]

<table>
<thead>
<tr>
<th>Experiment Number</th>
<th>[ClO(_2)] (M)</th>
<th>[OH(^-)] (M)</th>
<th>Initial Rate (M/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.060</td>
<td>0.030</td>
<td>0.0248</td>
</tr>
<tr>
<td>2</td>
<td>0.020</td>
<td>0.030</td>
<td>0.00276</td>
</tr>
<tr>
<td>3</td>
<td>0.020</td>
<td>0.030</td>
<td>0.003088</td>
</tr>
</tbody>
</table>

55) What is the order of the reaction with respect to ClO\(_2\)?

A) 0  B) 1  C) 2  D) 3  E) 4

Page Ref.: Sec. 14.3

56) Nitrogen dioxide decomposes to nitric oxide and oxygen via the reaction:

\[ 2\text{NO}_2 \rightarrow 2\text{NO} + \text{O}_2 \]

In a particular experiment at 300°C, [NO\(_2\)] drops from 0.0100 to 0.0050 M in 100 s. The rate of appearance of O\(_2\) for this period is ________ M/s.

A) 7.0 \times 10^{-3}  B) 3.5 \times 10^{-5}  C) 7.0 \times 10^{-5}  D) 3.5 \times 10^{-3}  E) 1.6 \times 10^{-5}

Page Ref.: Sec. 14.2

57) The active site of nitrogenase is a cofactor that contains two transition metals. These transition metals are

A) Fe and Mo  B) Cr and Mg  C) Fe and Zn  D) Os and Ir  E) Mo and V

Page Ref.: Sec. 14.7

58) Consider the following reaction:

\[ A \rightarrow 2C \]

The average rate of appearance of C is given by [C] / \( \Delta t \). Comparing the rate of appearance of C and the rate of disappearance of A, we get \([C] / \Delta t = \frac{1}{2} \times \text{[A]} / \Delta t\).

A) +1  B) -1  C) +2  D) -1/2  E) +1/2

Page Ref.: Sec. 14.2

Topaz:
The peroxydisulfate ion ($S_2O_8^{2-}$) reacts with the iodide ion in aqueous solution via the reaction:

$$S_2O_8^{2-} (aq) + 3I^- \rightarrow 2SO_4^{2-} (aq) + I_3^- (aq)$$

An aqueous solution containing 0.050 M of $S_2O_8^{2-}$ ion and 0.072 M of $I^-$ is prepared, and the progress of the reaction followed by measuring [I$^-$]. The data obtained is given in the table below:

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>0</th>
<th>400</th>
<th>800</th>
<th>1200</th>
<th>1600</th>
</tr>
</thead>
<tbody>
<tr>
<td>[I$^-$] (M)</td>
<td>0.072</td>
<td>0.057</td>
<td>0.046</td>
<td>0.037</td>
<td>0.029</td>
</tr>
</tbody>
</table>

56) The average rate of disappearance of I$^-$ between 1200 s and 1600 s is ______ M/s.
A) $5.0 \times 10^{-5}$
B) $1.8 \times 10^{-5}$
C) $1.2 \times 10^{-5}$
D) $2.0 \times 10^{-5}$
E) $1.6 \times 10^{-4}$

Page Ref: Sec. 14.2
Topic:

60) The primary source of the specificity of enzymes is ________.
A) their locations within the cell
B) their delocalized electron cloud
C) their polarity, which matches that of their specific substrate
D) their bonded transition metal, which is specific to the target substrate
E) their shape, which relates to the lock-and-key model

Page Ref: Sec. 14.7
Topic:

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