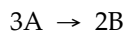


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Consider the following reaction:

1) _____

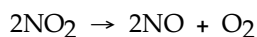


The average rate of appearance of B is given by $\Delta[B]/\Delta t$. Comparing the rate of appearance of B and the rate of disappearance of A, we get $\Delta[B]/\Delta t = \text{_____} \times (-\Delta[A]/\Delta t)$.

- A) +2/3 B) -2/3 C) -3/2 D) +1 E) +3/2

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

2) _____

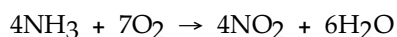


In a particular experiment at 300°C, $[\text{NO}_2]$ drops from 0.0100 to 0.00650 M in 100 s. The rate of appearance of O_2 for this period is _____ M/s.

- A) 7.0×10^{-5} B) 1.8×10^{-5} C) 3.5×10^{-5} D) 7.0×10^{-3} E) 3.5×10^{-3}

3) Which substance in the reaction below either appears or disappears the fastest?

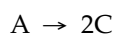
3) _____



- A) O_2
 B) NH_3
 C) H_2O
 D) NO_2
 E) The rates of appearance/disappearance are the same for all of these.

4) Consider the following reaction:

4) _____



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

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

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

Time (s)	1	10	20	30	40
Moles of A	0.124	0.110	0.088	0.073	0.054

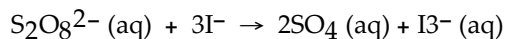
- 5) The average rate of disappearance of A between 10 s and 20 s is _____ mol/s. 5) _____
- A) 1.1×10^{-3}
B) 454
C) 2.2×10^{-3}
D) 9.90×10^{-3}
E) 4.4×10^{-3}
- 6) The average rate of disappearance of A between 20 s and 40 s is _____ mol/s. 6) _____
- A) 590 B) 7.1×10^{-3} C) 1.7×10^{-3} D) 8.5×10^{-4} E) 1.4×10^{-3}
- 7) The average rate of appearance of B between 20 s and 30 s is _____ mol/s. 7) _____
- A) $+7.3 \times 10^{-3}$
B) $+1.5 \times 10^{-3}$
C) -7.3×10^{-3}
D) $+5.0 \times 10^{-4}$
E) -1.5×10^{-3}
- 8) The average rate disappearance of A between 20 s and 30 s is _____ mol/s. 8) _____
- A) 1.6×10^{-2}
B) 0.15
C) 670
D) 1.5×10^{-3}
E) 5.0×10^{-4}

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

Time (s)	1	10	20	30	40
Moles of A	0.124	0.110	0.088	0.073	0.054

- 9) How many moles of B are present at 10 s? 9) _____
- A) 0.220 B) 0.110 C) 0.011 D) 0.014 E) 1.4×10^{-3}
- 10) How many moles of B are present at 30 s? 10) _____
- A) 1.7×10^{-3} B) 2.4×10^{-3} C) 0.15 D) 0.073 E) 0.051

The peroxydisulfate ion ($\text{S}_2\text{O}_8^{2-}$) reacts with the iodide ion in aqueous solution via the reaction:

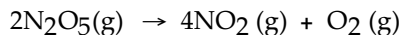


An aqueous solution containing 0.050 M of $\text{S}_2\text{O}_8^{2-}$ ion and 0.072 M of I^- is prepared, and the progress of the reaction followed by measuring $[\text{I}^-]$. The data obtained is given in the table below.

Time (s)	0	400	800	1200	1600
$[\text{I}^-]$ (M)	0.072	0.057	0.046	0.037	0.029

- 11) The average rate of disappearance of I^- between 400 s and 800 s is _____ M/s. 11) _____
A) 2.6×10^{-4} B) 1.4×10^{-5} C) 5.8×10^{-5} D) 3.6×10^4 E) 2.8×10^{-5}
- 12) The average rate of disappearance of I in the initial 400 s is _____ M/s. 12) _____
A) 3.2×10^{-4} B) 1.4×10^{-4} C) 2.7×10^4 D) 3.8×10^{-5} E) 6.00
- 13) The average rate of disappearance of I between 1200 s and 1600 s is _____ M/s. 13) _____
A) 2.0×10^{-5} B) 1.6×10^{-4} C) 1.2×10^{-5} D) 1.8×10^{-5} E) 5.0×10^4
- 14) The concentration of $\text{S}_2\text{O}_8^{2-}$ remaining at 400 s is _____ M. 14) _____
A) +0.045 B) +0.057 C) +0.015 D) +0.035 E) -0.007
- 15) The concentration of $\text{S}_2\text{O}_8^{2-}$ remaining at 800 s is _____ M. 15) _____
A) 0.046
B) 0.015
C) 4.00×10^{-3}
D) 0.041
E) 0.076
- 16) The concentration of $\text{S}_2\text{O}_8^{2-}$ remaining at 1600 s is _____ M. 16) _____
A) 0.014 B) 0.043 C) 0.029 D) 0.064 E) 0.036

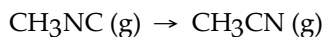
17) At elevated temperatures, dinitrogen pentoxide decomposes to nitrogen dioxide and oxygen: 17) _____



When the rate of formation of NO_2 is 5.5×10^{-4} M/s, the rate of decomposition of N_2O_5 is _____ M/s.

- A) 10.1×10^{-4}
- B) 2.8×10^{-4}
- C) 1.4×10^{-4}
- D) 2.2×10^{-3}
- E) 5.5×10^{-4}

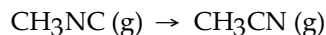
18) At elevated temperatures, methylisonitrile (CH_3NC) isomerizes to acetonitrile (CH_3CN): 18) _____



At the start of an experiment, there are 0.200 mol of reactant and 0 mol of product in the reaction vessel. After 25 min, 0.108 mol of reactant (CH_3NC) remain. There are _____ mol of product (CH_3CN) in the reaction vessel.

- A) 0.540
- B) 0.092
- C) 0.022
- D) 0.200
- E) 0.308

19) At elevated temperatures, methylisonitrile (CH_3NC) isomerizes to acetonitrile (CH_3CN): 19) _____



At the start of the experiment, there are 0.200 mol of reactant (CH_3NC) and 0 mol of product (CH_3CN) in the reaction vessel. After 25 min of reaction, 0.108 mol of reactant (CH_3NC) remain. The average rate of decomposition of methyl isonitrile, CH_3NC , in this 25 min period is _____ mol/min.

- A) 0.092
- B) 2.3
- C) 0.54
- D) 4.3×10^{-3}
- E) 3.7×10^{-3}

20) A reaction was found to be second order in carbon monoxide concentration. The rate of the reaction _____ if the $[\text{CO}]$ is doubled, with everything else kept the same. 20) _____

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

- 21) If the rate law for the reaction 21) _____
- $$2A + 3B \rightarrow \text{products}$$
- is first order in A and second order in B, then the rate law is rate = _____.
- A) $k[A]^2[B]^3$ B) $k[A]^2[B]^2$ C) $k[A]^2[B]$ D) $k[A][B]^2$ E) $k[A][B]$
- 22) The overall order of a reaction is 2. The units of the rate constant for the reaction are _____. 22) _____
- A) M/s B) 1/s C) s/M² D) M⁻¹s⁻¹ E) 1/M
- 23) 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. 23) _____
- $$A + B \rightarrow P$$
- A) zero B) first C) second D) third E) one-half
- 24) The kinetics of the reaction below were studied and it was determined that the reaction rate did not change when the concentration of B was tripled. The reaction is _____ order in B. 24) _____
- $$A + B \rightarrow P$$
- A) zero B) first C) second D) third E) one-half
- 25) A reaction was found to be third order in A. Increasing the concentration of A by a factor of 3 will cause the reaction rate to _____. 25) _____
- A) triple
B) remain constant
C) decrease by a factor of the cube root of 3
D) increase by a factor of 27
E) increase by a factor of 9
- 26) A reaction was found to be zero order in A. Increasing the concentration of A by a factor of 3 will cause the reaction rate to _____. 26) _____
- A) triple
B) decrease by a factor of the cube root of 3
C) increase by a factor of 27
D) remain constant
E) increase by a factor of 9

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



Experiment Number	[A] (M)	[B] (M)	Initial Rate (M/s)
1	0.273	0.763	2.83
2	0.273	1.526	2.83
3	0.819	0.763	25.47

27) The order of the reaction in A is _____. 27) _____

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

28) The order of the reaction in B is _____. 28) _____

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

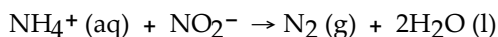
29) The overall order of the reaction is _____. 29) _____

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

30) For a first-order reaction, a plot of _____ versus _____ is linear. 30) _____

- A) $\ln [A]_t \frac{1}{t}$ B) $t, \frac{1}{[A]_t}$ C) $[A]_t, t$ D) $\ln [A]_t, t$ E) $\frac{1}{[A]_t}, t$

31) The following reaction occurs in aqueous solution: 31) _____



The data below is obtained at 25°C.

$[\text{NH}_4^+]$ (M)	$[\text{NO}_2^-]$ (M)	Initial rate (M/s)
0.0100	0.200	3.2×10^{-3}
0.0200	0.200	6.4×10^{-3}

The order of the reaction in NH_4^+ is _____.

- A) -1 B) 0 C) +1 D) +2 E) -2

32) The rate constant for a particular second-order reaction is $0.47 \text{ M}^{-1}\text{s}^{-1}$. If the initial concentration of reactant is 0.25 mol/L, it takes _____ s for the concentration to decrease to 0.13 mol/L. 32) _____

- A) 1.7 B) 7.9 C) 0.13 D) 1.4 E) 3.7

33) 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. 33) _____

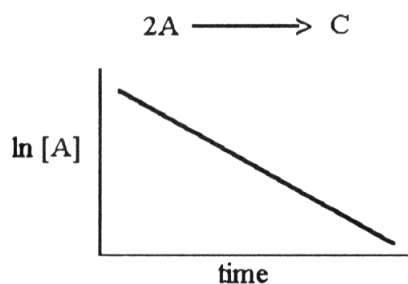
- A) 1.4 B) 0.13 C) 1.2 D) 0.85 E) 0.51

- 34) The initial concentration of reactant in a first-order reaction is 0.27 M. The rate constant for the reaction is 0.75 s^{-1} . What is the concentration (mol/L) of reactant after 1.5 s? 34) _____
- A) 3.8 B) 0.135 C) 8.8×10^{-2} D) 2.0×10^{-2} E) 1.7

- 35) The rate constant for a second-order reaction is $0.13 \text{ M}^{-1}\text{s}^{-1}$. If the initial concentration of reactant is 0.26 mol/L, it takes _____ s for the concentration to decrease to 0.13 mol/L. 35) _____
- A) 0.50 B) 1.0 C) 30 D) 0.017 E) 4.4×10^{-3}

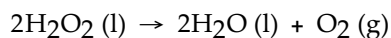
- 36) The half-life of a first-order reaction is 13 min. If the initial concentration of reactant is 0.085 M, it takes _____ min for it to decrease to 0.055 M. 36) _____
- A) 8.4 B) 3.6 C) 11 D) 0.048 E) 8.2

- 37) The graph shown below depicts the relationship between concentration and time for the following chemical reaction. 37) _____



The slope of this line is equal to _____.

- A) $-1/k$ B) k C) $\ln[A]_0$ D) $1/k$ E) $-k$
- 38) The reaction below is first order in $[\text{H}_2\text{O}_2]$: 38) _____



A solution originally at 0.600 M H_2O_2 is found to be 0.075 M after 54 min. The half-life for this reaction is _____ min.

- A) 14 B) 54 C) 18 D) 6.8 E) 28
- 39) 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 _____ $\text{M}^{-1}\text{s}^{-1}$. 39) _____
- A) 1.3 B) 18 C) 7.8×10^{-2} D) 2.0×10^{-2} E) 3.8×10^{-2}

Answer Key

Testname: CHAPTER 14.PRACTICE QUESTIONSTST

- 1) A
- 2) B
- 3) A
- 4) A
- 5) C
- 6) C
- 7) B
- 8) D
- 9) D
- 10) E
- 11) E
- 12) D
- 13) A
- 14) A
- 15) D
- 16) E
- 17) B
- 18) B
- 19) E
- 20) B
- 21) D
- 22) D
- 23) C
- 24) A
- 25) D
- 26) D
- 27) B
- 28) E
- 29) B
- 30) D
- 31) C
- 32) B
- 33) C
- 34) C
- 35) C
- 36) E
- 37) E
- 38) C
- 39) C