CHEMISTRY

BOOKS - BITSAT GUIDE

CHEMICAL KINETICS

Practice Exercise

1. For a chemical reaction $2X + Y \rightarrow Z$, the rate of appearance of Z is 0.05 mol L^{-1}. The rate of disappearance of X will be

A. 0.05 mol L^{-1} $\min^{-1}$

B. 0.05 mol $L^{-1}h^{-1}$

C. 0.1 mol L^{-1} $\min^{-1}$

D. 0.25 mol L^{-1} $\min^{-1}$

Answer: C

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2. A gaseous $A_2(g) \rightarrow B(g) + \frac{1}{2}C(g)$, shows increase in pressure from 100 mm to 120 mm in 5 min. The rate of disappearance of A_2 is

A. 4 mm $\min^{-1}$

B. 8 mm $\min^{-1}$

C. 16 mm $\min^{-1}$

D. 2 mm $\min^{-1}$

Answer: B

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3. For the reaction $2N_2O_4 \Leftrightarrow 4NO_2$, given that $\frac{-d[N_2O_4]}{dt} = K$ and $\frac{d[NO_2]}{dt} = K$, then

A. K=2K

B. K'=K

C. 2K'= K

D. None of these

Answer: A

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4. The rate constant of a first order reaction is $2.0 \times 10^{-5} s^{-1}$ and the initial concentration is 0.10 mol L^{-1}. The initial rate is

A. $2.0 \times 10^{-6} \text{mol} \quad L^{-1} s^{-1}$

B. $1.0 \times 10^{-6} \text{mol} \quad L^{-1} s^{-1}$

C. $1.5 \times 10^{-6} \text{mol} \quad L^{-1} s^{-1}$

D. $0.5 \times 10^{-6} \text{mol} \quad L^{-1} s^{-1}$

Answer: A

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5. The chemical reaction $2O_3 \xrightarrow{k_1} 3O_2$ proceeds as follows:

$O_3 \overset{k_{eq}}{\Longleftrightarrow} O_2 + O$ (fast)

$O + O_3 \xrightarrow{k} 2O_2$ (slow)

What should be the rate law expresison ?

A. $r = k'[O_3]^2$

B. $r = k'[O_3]^2[O_2]^{-1}$

C. $r = k'[O_3][O_2]$

D. Unpredictable

Answer: B

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6. The rate for the decomposition of NH_3 on platinum surface is zero order. What are the rate of production of N_2 and H_2 if $K = 2.5 \times 10^{-4} mollitre^{-1} s^{-1}$?

A.

1.25×10^{-4} and mol $L^{-1}s^{-1}$ and 3.75×10^{-4} and mol $L^{-1}s^{-1}$

B.

3.75×10^{-4} and mol $L^{-1}s^{-1}$ and 1.25×10^{-4} and mol $L^{-1}s^{-1}$

C.

2.5×10^{-4} and mol $L^{-1}s^{-1}$ and 3.75×10^{-4} and mol $L^{-1}s^{-1}$

D.

1.25×10^{-4} and mol $L^{-1}s^{-1}$ and 2.5×10^{-4} and mol $L^{-1}s^{-1}$

Answer: A

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7. In a reversible reaction $2NO_2 \underset{k_2}{\overset{k_1}{\rightleftharpoons}} N_2O_4$, the rate of disappearance of NO_2 is equal to

A. $\frac{2k_1}{k_2}[NO_2]^2$

B. $2k_1[NO_2]^2 - 2k_2[N_2O_4]$

C. $2k_1[NO_2]^2 - k_2[N_2O_4]$

D. $(2k_1 - k_2)[NO_2]$

Answer: B

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8. The concentration of a reactant changes form $0.03M$ to $0.02M$ in $25\ \min$. Calculate the average rate of reaction uisng of time both in minutes and seconds.

A. $6.66 \times 10^{-5} Ms^{-1}$

B. $6.6 \times 10^{-6} Ms^{-1}$

C. $5.67 \times 10^{-5} Ms^{-1}$

D. $7.26 \times 10^{-6} Ms^{-1}$

Answer: B

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9. Rate law for the reaction, $A + 2B \rightarrow C$ is found to be

Rate $= k[A][B]$

Concentration of reactant 'B' is doubled keeping the concentration of 'A' constant, the value of rate constant will be _____

A. the same

B. doubled

C. quadrupled

D. halved

Answer: B

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10. For the reaction $2H_2 + O_2 \rightarrow 2H_2O$, the rate law expression is , $r = k[H_2]^n$. When the concentration of H_2 is doubled, the rate of

reaction found to be quadrupled. The value of n is

A. 0

B. 1

C. 2

D. 3

Answer: C

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11. Consider the following reaction,

$2N_2O_5 \rightarrow 4NO_2 + O_2$, $\frac{d[NO_2]}{dt} = k_2[N_2O_5]$,

$\frac{d[O_2]}{dt} = k_3[N_2O_5]$ and $\frac{d}{dt}[N_2O_5] = k_1$

The relation between k_1, k_2 and k_3 is

A. $k_1 = k_2 = k_3$

B. $2k_1 = k_2 = 4k_3$

C. $2k_1 = 4k_2 = k_3$

D. None of these

Answer: B

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12. The rate of formation of SO_3 in the reaction

$2SO_2 + O_2 \rightarrow 2SO_3$

is 100 g $\min^{-1}$ Hence rate of disappearance of O_2 is

A. 29 g $\min^{-1}$

B. 20 g $\min^{-1}$

C. 50 g $\min^{-1}$

D. 200 g $\min^{-1}$

Answer: B

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13. Consider the following reaction,

$2A + B + C \rightarrow$ Products

How will the rate of reaction changes when the concentration of A is doubled and that of B is triplet while C is taken in excess ?

A. The rate reduces 8 times of its original value

B. The rate reduces 12 times of its original value

C. The rate increases 8 times of its original value

D. The rate increases 12 times of its original value

Answer: D

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14. In the reaction $2A \rightarrow$ Products, the concentration of A Calculate from 1.0 mol L^{-1} to 0.8 mol L^{-1} in 20 min. Calculate the rate during this interval.

A. 0.5 mol L^{-1} $\min^{-1}$

B. 0.005 mol L^{-1} $\min^{-1}$

C. 0.05 mol L^{-1} $\min^{-1}$

D. 0.0005 mol L^{-1} $\min^{-1}$

Answer: B

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15. The unit of the rate constant of nth order is

A. $\text{mol}^{1-n}L^{n-1}s^{-1}$

B. $\text{mol}^{n-1}L^{1-n}s^{-1}$

C. $\text{mol}^{n-1}L^{n-1}s$

D. $\text{mol}^{n}L^{1-n}s^{-1}$

Answer: A

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16. In the presence of acid, the initial concentration of cane sugar was reduced from 0.2 M to 0.1 M in 5 h and to 0.05 M in 10 h. The reaction must be of

A. zero order

B. first order

C. second order

D. fractional order

Answer: B

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17. The rate constant of a reaction is $3.25 \times 10^{-3} \ \text{mol}^{-2}L^2 \ \text{min}^{-1}$. The order of raction is

A. zero

B. 1

C. 2

D. 3

Answer: D

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18. The half-life period of a first order process is 1.6 min. It will be 90% completed in

A. 0.8 min

B. 3.2 min

C. 5.3 min

D. 1.6 min

Answer: C

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19. The hydrolysis of ester in alkaline medium is a

A. first order reaction with molecularity 1

B. second order reaction with molecularity 2

C. first order reaction with molecularity 2

D. second order reaction with molecularity 1

Answer: B

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20. The rate constant of first order reaction whose half-life is 480 s, is

A. $1.44 \times 10^{-3} s^{-1}$

B. $1.44 s^{-1}$

C. $0.72 \times 10^{-3} s^{-1}$

D. $2.88 \times 10^{-3} s^{-1}$

Answer: A

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21. In accordance to Arrhenius equation, the plot of log k against $\frac{1}{T}$ is a straight line. The slope of the line is equal to

A. $\frac{-E_a}{R}$

B. $\frac{-2.303}{E_a.\ R}$

C. $\frac{-E_a}{2.303R}$

D. $\frac{-E_a}{2.303}$

Answer: C

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22. For the first order reaction, $k = 5.48 \times 10^{-4} s^{-1}$, the two-third life time for this reaction is

A. 2005 s

B. 1000 s

C. 2000 s

D. 3005 s

Answer: A

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23. The rate constant for a zero order reaction is

A. $k = \frac{C_0}{2t}$

B. $k = \frac{C_0 - C_t}{t}$

C. $k = \ln. \frac{C_0 - C_t}{t}$

D. $k = \frac{C_0}{C_t}$

Answer: B

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24. The time required for 100 percent completion of a zero order reaction is:

A. ak

B. $\frac{a}{2k}$

C. $\frac{a}{k}$

D. $\frac{2k}{a}$

Answer: C

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25. Pieces of wood burn faster than a log of wood of the same mass because

A. surface area of log of wood is larger and needs more time to burn

B. pieces of wood have larger surface area

C. all pieces of wood catch fire at the same time

D. log of wood has higher density than pieces of the same wood

Answer: B

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26. What is the order of a reaction which has a rate expression, i.e. rate = $k[A]^{3/2}[B]^{-1}$?

A. $\frac{3}{2}$

B. $\frac{1}{2}$

C. Zero

D. None of these

Answer: B

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27. If initial concentration is doubled, the time for half-reaction is also doubled, the order of reaction is

A. zero

B. first

C. second

D. third

Answer: A

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28. If the graph of concentration of [A] vs T for completion of reaction is a straight line, then the order of reaction is

A. zero

B. second

C. first

D. third

Answer: A

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29. For a reaction, temperature increases by $10^{\circ} C$, the equilibrium will be attained faster

A. 2 times

B. same

C. $\frac{1}{2}$ same

D. 4 times

Answer: A

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30. 75% of a first order reaction was completed in 32 min. When was 50% of the reaction completed ?

A. 16 min

B. 24 min

C. 8 min

D. 4 min

Answer: A

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31. The rate of a reaction becomes 4 times when temperature is raised from 293 K to 313 K. The activation energy for such reaction would be

A. 50.855 kJ mol^{-1}

B. 52.849 kJ mol^{-1}

C. 54.855 kJ mol^{-1}

D. 56.855 kJ mol^{-1}

Answer: B

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32. Half-life of a hypothetical reaction is found to be inversely proportional to the cube of initial concentration. The order of reaction is

A. 4

B. 3

C. 5

D. 2

Answer: A

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33. H_2O and O-atom react in upper atmosphere bimolecularly to form two OH radicals. ΔH for the reaction is 72 kJ at 500 K and energy of activation is 77 kJ mol^{-1}. E_a for bimolecular recombination of two OH radicals to form H_2O and O-atom, will be

A. 5 kJ mol^{-1}

B. 72 kJ mol^{-1}

C. 77 kJ mol^{-1}

D. 149 kJ mol^{-1}

Answer: A

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34. Calculate the half-life of the first order reaction, $C_2H_4O(g) \rightarrow CH_4(g) + CO(g)$. If the initial pressure of $C_2H_4O(g)$ is 80 mm and the total pressure at the end of 20 min is 120 mm.

A. 40 min

B. 120 min

C. 20 min

D. 80 min

Answer: C

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35. The half-lives for two samples are 0.1 and 0.8 s whose concentrations are 400 and 50 mol L^{-1} respectively. The order of the reaction is

A. 0

B. 1

C. 2

D. 3

Answer: C

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36. The rate constant for the first order reaction is $60s^{-1}$. How much time will it take to reduce the concentration of the reactant to $1/16th$ value ?

A. $4.6 \times 10^{4}s$

B. $4.6 \times 10^{-4}s$

C. $4.6 \times 10^{-2}s$

D. $4.6 \times 10^{2}s$

Answer: C

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37. The half-time of the following first order decomposition of nitramide is 2.1 h at $15^{\circ}C$:

$NH_2NO_2(aq) \rightarrow N_2O(g) + H_2O(l)$

If 6.2 g of nitramide is allowed to decompose then time taken for it to decompose 99%, will be

A. 2.1 h

B. 12 h

C. 13.96 h

D. 33 h

Answer: C

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38. A first order reaction is found to have a rate constant, $k = 4.2 \times 10^{-12} s^{-1}$. Find the half-life of the reaction.

A. $1.26 \times 10^{13} s$

B. $1.65 \times 10^{11} s$

C. $1.65 \times 10^{-11} s$

D. $1.26 \times 10^{-13} s$

Answer: B

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39. The value of $\log \frac{k_2}{k_1}$ is equal to

A. $\frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$

B. $\frac{E_a}{2.303R}\left[\frac{T_1 T_2}{T_2 - T_1}\right]$

C. $\frac{E_a}{2.303R}\left[\frac{T_2 + T_1}{T_1 T_2}\right]$

D. $\frac{E_a}{2.303R}\left[\frac{T_1 T_2}{T_1 + T_2}\right]$

Answer: A

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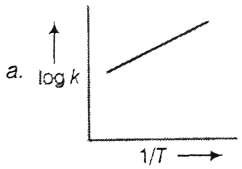
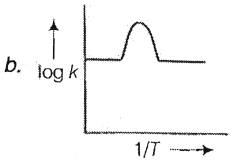
40. A graph plotted between log k vs $\frac{1}{T}$ is represented by

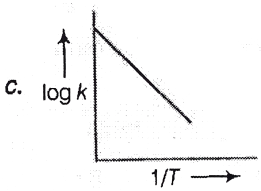
A.



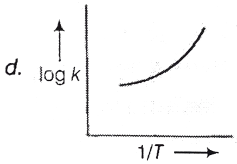
B.



C.



D.



Answer: C

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41. Rate of a reaction can be expressed by Arrhenius equation as:

$k = Ae^{-E_a/RT}$

In this equation, E_a represents:

A. the total energy of the reacting molecules at a temperature T

B. the energy above which all the colliding molecules will react

C. the energy below which colliding molecules will not react

D. the fraction of molecules with energy greater than the activation energy of the reaction

Answer: C

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42. Compounds A and B react according to the following chemical equation :

$A(g) + 2B(g) \rightarrow 2C(g)$

Concentration of either A or B were changed keeping the concentrations of one of the reactant constants and rates were measured as a function of initial concentration, Following results were obtained.

Experiment	Initial concentration of [A] / mol L^{-1}	Initial concentration of [B] / mol L^{-1}	Initial rate of formation of [C] / mol $L^{-1}s^{-1}$
1.	0.30	0.30	0.10
2.	0.30	0.60	0.40
3.	0.60	0.30	0.20

Choose the correct option for the rate equations for this reaction.

A. Rate = $k[A]^2[B]$

B. Rate = $k[A][B]^2$

C. Rate = $k[A][B]$

D. Rate = $k[A]^2[B]^0$

Answer: B

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43. For a chemical reaction $2X + Y \rightarrow Z$, the rate of appearance of Z is 0.05 mol L^{-1}. The rate of disappearance of X will be

A. 0.05 mol L^{-1} $\min^{-1}$

B. 0.05 mol $L^{-1}h^{-1}$

C. 0.1 mol L^{-1} $\min^{-1}$

D. 0.25 mol L^{-1} $\min^{-1}$

Answer: C

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44. A gaseous $A_2(g) \rightarrow B(g) + \frac{1}{2}C(g)$, shows increase in pressure from 100 mm to 120 mm in 5 min. The rate of disappearance of A_2 is

A. 4 mm $\min^{-1}$

B. 8 mm $\min^{-1}$

C. 16 mm $\min^{-1}$

D. 2 mm $\min^{-1}$

Answer: B

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45. For the reaction $2N_2O_4 \Leftrightarrow 4NO_2$, given that $\frac{-d[N_2O_4]}{dt} = K$ and $\frac{d[NO_2]}{dt} = K$, then

A. K=2K

B. K'=K

C. 2K'= K

D. None of these

Answer: A

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46. The rate constant of a first order reaction is $2.0 \times 10^{-5} s^{-1}$ and the initial concentration is 0.10 mol L^{-1}. The initial rate is

A. $2.0 \times 10^{-6} \text{mol } L^{-1} s^{-1}$

B. $1.0 \times 10^{-6} \text{mol } L^{-1} s^{-1}$

C. $1.5 \times 10^{-6} \text{mol} \quad L^{-1} s^{-1}$

D. $0.5 \times 10^{-6} \text{mol} \quad L^{-1} s^{-1}$

Answer: A

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47. The chemical reaction $2O_3 \xrightarrow{k_1} 3O_2$ proceeds as follows:

$O_3 \overset{k_{eq}}{\Longleftrightarrow} O_2 + O$ (fast)

$O + O_3 \xrightarrow{k} 2O_2$ (slow)

What should be the rate law expresison ?

A. $r = k'[O_3]^2$

B. $r = k'[O_3]^2[O_2]^{-1}$

C. $r = k'[O_3][O_2]$

D. Unpredictable

Answer: B

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48. The rate for the decomposition of NH_3 on platinum surface is zero order. What are the rate of production of N_2 and H_2 if $K = 2.5 \times 10^{-4} mollitre^{-1} s^{-1}$?

A.

1.25×10^{-4} and mol $L^{-1}s^{-1}$ and 3.75×10^{-4} and mol $L^{-1}s^{-1}$

B.

3.75×10^{-4} and mol $L^{-1}s^{-1}$ and 1.25×10^{-4} and mol $L^{-1}s^{-1}$

C.

2.5×10^{-4} and mol $L^{-1}s^{-1}$ and 3.75×10^{-4} and mol $L^{-1}s^{-1}$

D.

1.25×10^{-4} and mol $L^{-1}s^{-1}$ and 2.5×10^{-4} and mol $L^{-1}s^{-1}$

Answer: A

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49. In a reversible reaction $2NO_2 \underset{k_2}{\overset{k_1}{\rightleftharpoons}} N_2O_4$, the rate of disappearance of NO_2 is equal to

A. $\frac{2k_1}{k_2}[NO_2]^2$

B. $2k_1[NO_2]^2 - 2k_2[N_2O_4]$

C. $2k_1[NO_2]^2 - k_2[N_2O_4]$

D. $(2k_1 - k_2)[NO_2]$

Answer: B

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50. For the reaction $R \rightarrow P$, the concentration of a reactant changes from 0.03 M to 0.02 M in 25 min. Calculate the average rate of reaction using units of time in seconds.

A. $6.66 \times 10^{-5} Ms^{-1}$

B. $6.6 \times 10^{-6} Ms^{-1}$

C. $5.67 \times 10^{-5} Ms^{-1}$

D. $7.26 \times 10^{-6} Ms^{-1}$

Answer: B

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51. Rate law for the reaction $A + 2B \rightarrow C$, is found to be Rate = k [A] [B]. If the concentration of reactant B is doubled keeping the concentration of A constant, the value of rate constant will be

A. the same

B. doubled

C. quadrupled

D. halved

Answer: B

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52. For the reaction $2H_2 + O_2 \rightarrow 2H_2O$, the rate law expression is , $r = k[H_2]^n$. When the concentration of H_2 is doubled, the rate of reaction found to be quadrupled. The value of n is

A. 0

B. 1

C. 2

D. 3

Answer: C

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53. Consider the following reaction,

$2N_2O_5 \rightarrow 4NO_2 + O_2$, $\frac{d[NO_2]}{dt} = k_2[N_2O_5]$,

$\frac{d[O_2]}{dt} = k_3[N_2O_5]$ and $\frac{d}{dt}[N_2O_5] = k_1$

The relation between k_1, k_2 and k_3 is

A. $k_1 = k_2 = k_3$

B. $2k_1 = k_2 = 4k_3$

C. $2k_1 = 4k_2 = k_3$

D. None of these

Answer: B

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54. The rate of formation of SO_3 in the following reaction is $100g \ \min^{-1}.2SO_2 + O_2 \rightarrow 2SO_3$

The rate of disappearance of O_2 is

A. 29 g $\min^{-1}$

B. 20 g $\min^{-1}$

C. 50 g $\min^{-1}$

D. 200 g $\min^{-1}$

Answer: B

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55. Consider the following reaction,

$2A + B + C \rightarrow$ Products

How will the rate of reaction changes when the concentration of A is doubled and that of B is triplet while C is taken in excess ?

A. The rate reduces 8 times of its original value

B. The rate reduces 12 times of its original value

C. The rate increases 8 times of its original value

D. The rate increases 12 times of its original value

Answer: D

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56. In the reaction $2A \rightarrow$ Products, the concentration of A Calculate from 1.0 mol L^{-1} to 0.8 mol L^{-1} in 20 min. Calculate the rate during this interval.

A. 0.5 mol L^{-1} $\min^{-1}$

B. 0.005 mol L^{-1} $\min^{-1}$

C. 0.05 mol L^{-1} $\min^{-1}$

D. 0.0005 mol L^{-1} $\min^{-1}$

Answer: B

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57. The unit of the rate constant of nth order is

A. $\text{mol}^{1-n}L^{n-1}s^{-1}$

B. $\text{mol}^{n-1}L^{1-n}s^{-1}$

C. $\text{mol}^{n-1}L^{n-1}s$

D. $\text{mol}^n L^{1-n} s^{-1}$

Answer: A

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58. In the presence of acid, the initial concentration of cane sugar was reduced from 0.2 M to 0.1 M in 5 h and to 0.05 M in 10 h. The reaction must be of

A. zero order

B. first order

C. second order

D. fractional order

Answer: B

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59. The rate constant of a reaction is 3.25×10^{-3} $\text{mol}^{-2}L^2$ min^{-1}. The order of raction is

A. zero

B. 1

C. 2

D. 3

Answer: D

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60. The half-life period of a first order process is 1.6 min. It will be 90% completed in

A. 0.8 min

B. 3.2 min

C. 5.3 min

D. 1.6 min

Answer: C

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61. The hydrolysis of ester in alkaline medium is a

A. first order reaction with molecularity 1

B. second order reaction with molecularity 2

C. first order reaction with molecularity 2

D. second order reaction with molecularity 1

Answer: B

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62. The rate constant for a first order reaction whose half life is 480 sec, is :

A. $1.44 \times 10^{-3} s^{-1}$

B. $1.44 s^{-1}$

C. $0.72 \times 10^{-3} s^{-1}$

D. $2.88 \times 10^{-3} s^{-1}$

Answer: A

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63. In accordance to Arrhenius equation, the plot of log k against $\frac{1}{T}$ is a straight line. The slope of the line is equal to

A. $\frac{-E_a}{R}$

B. $\frac{-2.303}{E_a . R}$

C. $\frac{-E_a}{2.303R}$

D. $\frac{-E_a}{2.303}$

Answer: C

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64. For the first order reaction, $k = 5.48 \times 10^{-4} s^{-1}$, the two-third life time for this reaction is

A. 2005 s

B. 1000 s

C. 2000 s

D. 3005 s

Answer: A

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65. The rate constant for a zero order reaction is

A. $k = \frac{C_0}{2t}$

B. $k = \frac{C_0 - C_t}{t}$

C. $k = \ln. \frac{C_0 - C_t}{t}$

D. $k = \frac{C_0}{C_t}$

Answer: B

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66. The time required for 100% completion of a zero order reaction is

A. ak

B. $\frac{a}{2k}$

C. $\frac{a}{k}$

D. $\frac{2k}{a}$

Answer: C

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67. Pieces of wood burn faster than a log of wood of the same mass because

A. surface area of log of wood is larger and needs more time to burn

B. pieces of wood have larger surface area

C. all pieces of wood catch fire at the same time

D. log of wood has higher density than pieces of the same wood

Answer: B

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68. What is the order of a reaction which has a rate expression, i.e. rate = $k[A]^{3/2}[B]^{-1}$?

A. $\frac{3}{2}$

B. $\frac{1}{2}$

C. Zero

D. None of these

Answer: B

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69. If initial concentration is doubled, the time for half-reaction is also doubled, the order of reaction is

A. zero

B. first

C. second

D. third

Answer: A

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70. If the graph of concentration of [A] vs T for completion of reaction is a straight line, then the order of reaction is

A. zero

B. second

C. first

D. third

Answer: A

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71. For a reaction, temperature increases by $10^{\circ} C$, the equilibrium will be attained faster

A. 2 times

B. same

C. $\frac{1}{2}$ same

D. 4 times

Answer: A

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72. 75% of a first order reaction was completed in 32 min. When was 50% of the reaction completed ?

A. 16 min

B. 24 min

C. 8 min

D. 4 min

Answer: A

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73. The rate of a reaction becomes 4 times when temperature is raised from 293 K to 313 K. The activation energy for such reaction would be

A. 50.855 kJ mol^{-1}

B. 52.849 kJ mol^{-1}

C. 54.855 kJ mol^{-1}

D. 56.855 kJ mol^{-1}

Answer: B

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74. Half-life of a hypothetical reaction is found to be inversely proportional to the cube of initial concentration. The order of reaction is

A. 4

B. 3

C. 5

D. 2

Answer: A

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75. H_2O and O-atom react in upper atmosphere bimolecularly to form two OH radicals. ΔH for the reaction is 72 kJ at 500 K and energy of activation is 77 kJ mol^{-1}. E_a for bimolecular recombination of two OH radicals to form H_2O and O-atom, will be

A. 5 kJ mol^{-1}

B. 72 kJ mol^{-1}

C. 77 kJ mol^{-1}

D. 149 kJ mol^{-1}

Answer: A

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76. Calculate the half life of the first-order reaction:

$C_2H_4O(g) \rightarrow CH_4(g) + CO(g)$

The initial pressure of $C_2H_4O(g)$ is $80mm$ and the total pressure at the end of $20\ \text{min}$ is $120mm$.

A. 40 min

B. 120 min

C. 20 min

D. 80 min

Answer: C

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77. The half-lives for two samples are 0.1 and 0.8 s whose concentrations are 400 and 50 mol L^{-1} respectively. The order of the reaction is

A. 0

B. 1

C. 2

D. 3

Answer: C

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78. The rate constant for the first order reaction is $60s^{-1}$. How much time will it take to reduce the concentration of the reactant to $1/16th$ value ?

A. $4.6 \times 10^{4}s$

B. $4.6 \times 10^{-4}s$

C. $4.6 \times 10^{-2}s$

D. $4.6 \times 10^{2}s$

Answer: C

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79. The half-time of the following first order decomposition of nitramide is 2.1 h at $15^{\circ}C$:

$NH_2NO_2(aq) \rightarrow N_2O(g) + H_2O(l)$

If 6.2 g of nitramide is allowed to decompose then time taken for it to decompose 99%, will be

A. 2.1 h

B. 12 h

C. 13.96 h

D. 33 h

Answer: C

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80. A first order reaction is found to have a rate constant, $k = 4.2 \times 10^{-12} s^{-1}$. Find the half-life of the reaction.

A. $1.26 \times 10^{13} s$

B. $1.65 \times 10^{11} s$

C. $1.65 \times 10^{-11} s$

D. $1.26 \times 10^{-13} s$

Answer: B

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81. The value of $\log \frac{k_2}{k_1}$ is equal to

A. $\frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$

B. $\frac{E_a}{2.303R}\left[\frac{T_1 T_2}{T_2 - T_1}\right]$

C. $\frac{E_a}{2.303R}\left[\frac{T_2 + T_1}{T_1 T_2}\right]$

D. $\frac{E_a}{2.303R}\left[\frac{T_1 T_2}{T_1 + T_2}\right]$

Answer: A

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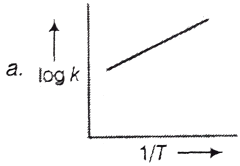
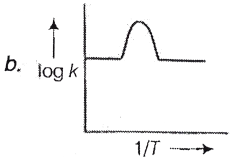
82. A graph plotted between $\log k$ versus $1/T$ for calculating activation energy is shown by

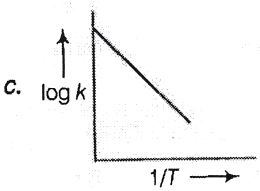
A.



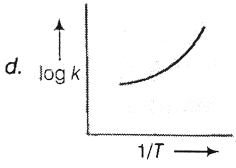
B.



C.



D.



Answer: C

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83. Rate of a reaction can be expressed by Arrhenlus equation, $k = Ae^{-E_a/RT}$. Here, E is

A. the total energy of the reacting molecules at a temperature T

B. the energy above which all the colliding molecules will react

C. the energy below which colliding molecules will not react

D. the fraction of molecules with energy greater than the activation energy of the reaction

Answer: C

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84. Compounds A and B react according to the following chemical equation :

$A(g) + 2B(g) \rightarrow 2C(g)$

Concentration of either A or B were changed keeping the concentrations of one of the reactant constants and rates were measured as a function of initial concentration, Following results were obtained.

Experiment	Initial concentration of [A] / mol L^{-1}	Initial concentration of [B] /mol L^{-1}	Initial rate of formation of [C] / mol $L^{-1}s^{-1}$
1.	0.30	0.30	0.10
2.	0.30	0.60	0.40
3.	0.60	0.30	0.20

Choose the correct option for the rate equations for this reaction.

A. Rate = $k[A]^2[B]$

B. Rate = $k[A][B]^2$

C. Rate = $k[A][B]$

D. Rate = $k[A]^2[B]^0$

Answer: B

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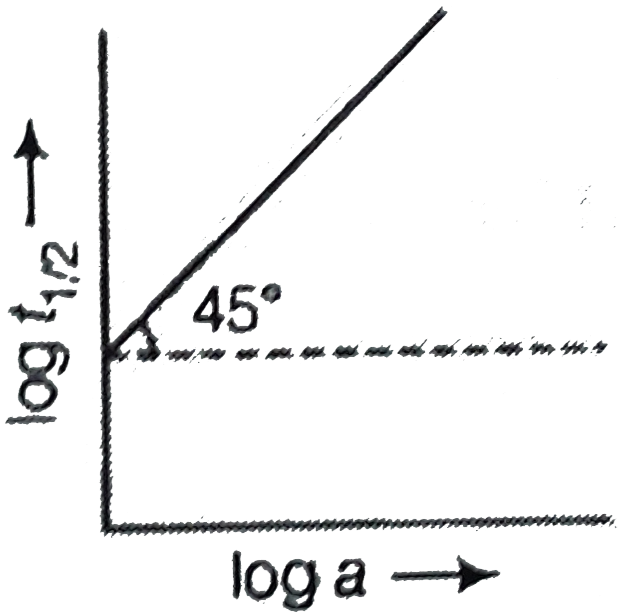
1. Following is the graph between log T_{50} and log a (a = initial concentration) for a given reaction at $27^\circ C$.



Hence, order is

A. 1

B. 2

C. 3

D. 0

Answer: D

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2. Choose the law that corresponds to data shown for the reaction, $A + B \rightarrow$ products.

Experiment	[A]	[B]	Initial rate
1	0.012	0.035	0.1
2	0.024	0.070	0.8
3	0.024	0.035	0.1
4	0.012	0.070	0.8

A. Rate = $k[B]^3$

B. Rate = $k[B]^4$

C. Rate = $k[A][B]^3$

D. Rate = $k[A]^3[B]$

Answer: A

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3. A reaction takes place in three steps. The rate constant are k_1, k_2 and k_3. The overall rate constant $k = \frac{k_1 k_3}{k_2}$. If E_1, E_2 and E_3 (energy of activation) are 60, 30 and 10 kJ, respectively, the overall energy. Of activation is

A. 40 kJ

B. 30 kJ

C. 400 kJ

D. 300 kJ

Answer: A

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4. Consider the following reaction

$2N_2O_5 \Leftrightarrow 4NO_2 + O_2$.

If rate and rate constant for above reaction are 2.40×10^{-5} mol $L^{-1}s^{-1}$ and $3 \times 10^{-5}s^{-1}$ respectively, then calculate the concentration of N_2O_5.

A. 1.4 mol L^{-1}

B. 1.2 mol L^{-1}

C. 0.04 mol L^{-1}

D. 0.8 mol L^{-1}

Answer: D

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5. For a given reaction, $t_{1/2} = 1/ka$. The order of this reaction is

A. 0

B. 1

C. 2

D. 3

Answer: C

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6. The time taken for 90% of a first order reaction to be completed is approximately

A. 1.1 times that of half-life

B. 2.2 times that of half-life

C. 3.3 times that of half-life

D. 4.4 times that of half-life

Answer: C

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7. What is the energy of activation of a reaction is its rate doubles when the temperature is raised from 290 K to 300 K ?

A. 12 kcal

B. 15 kcal

C. 10 kcal

D. 20 kcal

Answer: A

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8. The active mass of solid is generally taken as

A. > 1

B. $= 1$

C. < 1

D. 0

Answer: B

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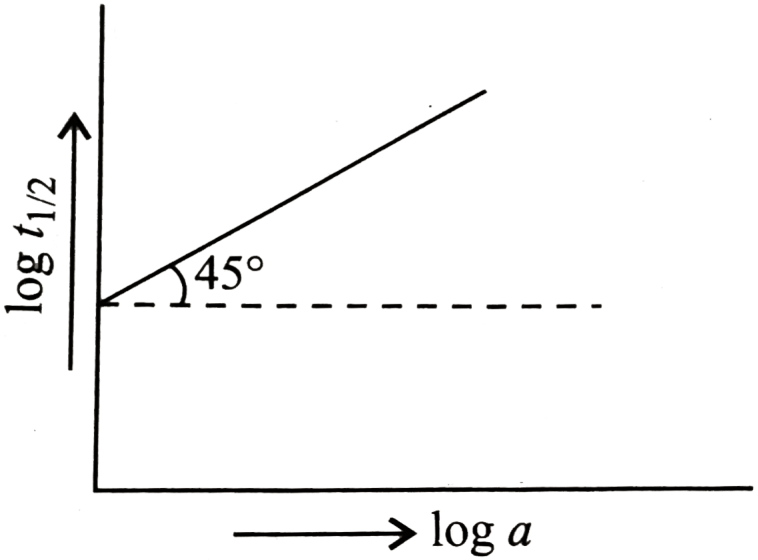
9. Following is the graph between $\log T_{50}$ and $\log a$ ($a =$ initial concentration) for a given reaction at $27^\circ C$. Hence order is



A. 1

B. 2

C. 3

D. 0

Answer: D

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10. Select the law that corresponds to data shown for the following reaction $A + B \rightarrow$ Products

Exp	$[A]$	$[B]$	Initial rate
1	0.012	0.035	0.1
2	0.024	0.070	0.8
3	0.024	0.035	0.1
4	0.012	0.070	0.8

A. Rate = $k[B]^3$

B. Rate = $k[B]^4$

C. Rate = $k[A][B]^3$

D. Rate = $k[A]^3[B]$

Answer: A

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11. A reaction takes place in three steps. The rate constant are k_1, k_2 and k_3. The overall rate constant $k = \frac{k_1 k_3}{k_2}$. If E_1, E_2 and E_3 (energy of activation) are 60, 30 and 10 kJ, respectively, the overall energy. Of activation is

A. 40 kJ

B. 30 kJ

C. 400 kJ

D. 300 kJ

Answer: A

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12. Consider the following reaction

$2N_2O_5 \Leftrightarrow 4NO_2 + O_2$.

If rate and rate constant for above reaction are 2.40×10^{-5} mol $L^{-1}s^{-1}$ and $3 \times 10^{-5}s^{-1}$ respectively, then calculate the concentration of N_2O_5.

A. 1.4 mol L^{-1}

B. 1.2 mol L^{-1}

C. 0.04 mol L^{-1}

D. 0.8 mol L^{-1}

Answer: D

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13. For a given reaction, $t_{1/2} = 1/ka$. The order of this reaction is

A. 0

B. 1

C. 2

D. 3

Answer: C

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14. The time taken for 90% of a first order reaction to be completed is approximately

A. 1.1 times that of half-life

B. 2.2 times that of half-life

C. 3.3 times that of half-life

D. 4.4 times that of half-life

Answer: C

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15. What is the energy of activation of a reaction is its rate doubles when the temperature is raised from 290 K to 300 K ?

A. 12 kcal

B. 15 kcal

C. 10 kcal

D. 20 kcal

Answer: A

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16. The active mass of solid is generally taken as

A. > 1

B. $= 1$

C. < 1

D. 0

Answer: B

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