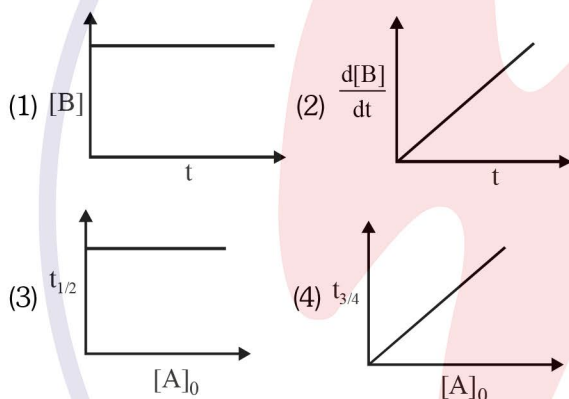


1. In a reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$, the rate of appearance of NH_3 is $2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ sec}^{-1}$. The rate of reaction & rate of disappearance of H_2 will be ($\text{In mol L}^{-1} \text{ sec}^{-1}$)
- $3.75 \times 10^{-4}, 1.25 \times 10^{-4}$
 - $1.25 \times 10^{-4}, 2.5 \times 10^{-4}$
 - $1.25 \times 10^{-4}, 3.75 \times 10^{-4}$
 - $5.0 \times 10^{-4}, 3.75 \times 10^{-4}$

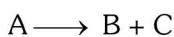
2. The rate constant of a zero order reaction is $0.2 \text{ mol dm}^{-3} \text{ h}^{-1}$. If the concentration of the reactant after 30 minutes is 0.05 mol dm^{-3} . Then its initial concentration would be :
- 0.15 mol dm^{-3}
 - 1.05 mol dm^{-3}
 - 0.25 mol dm^{-3}
 - 4.00 mol dm^{-3}

3. Which graph represents zero order reaction $[A(g) \rightarrow B(g)]$:



4. A reaction is of first order. After 100 minutes, 75 g of the reactant A are decomposed when 100g are taken initially. Calculate the time required when 150g of the reactant A are decomposed, the initial weight taken is 200g.
- 100 minutes
 - 200 minutes
 - 150 minutes
 - 175 minutes

5. Consider the reaction :



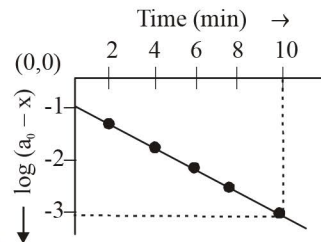
Initial concentration of A is 1 M. 20 minutes time is required for completion of 80 % reaction.

If $\frac{d[B]}{dt} = k[A]$, then half life ($t_{1/2}$) is

(Use : $\ln 5 = 1.6, \ln 2 = 0.7$)

- 55.44 min.
- 50 min
- 8.75 min
- 12.5 min

6. For the first order decomposition of $SO_2Cl_2(g)$, $SO_2Cl_2(g) \rightarrow SO_2(g) + Cl_2(g)$ a graph of $\log(a_0 - x)$ vs t is shown in figure. What is the rate constant (sec^{-1})?



- 0.2
- 4.6×10^{-1}
- 7.7×10^{-3}
- 1.15×10^{-2}

7. At certain temperature, the half life period for the thermal decomposition of a gaseous substance depends on the initial partial pressure of the substance as follows

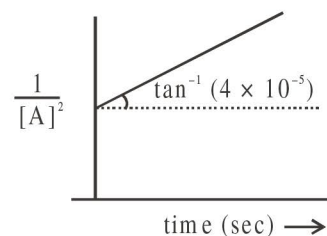
P(mmHg)	500	250
$t_{1/2}$ (in min.)	235	950

Find the order of reaction

[Given $\log(23.5) = 1.37$; $\log(95) = 1.97$; $\log 2 = 0.30$]

- 1
- 2
- 2.5
- 3

8. For a reaction $A \rightarrow \text{Product}$



What is the value of k for the given reaction-

- $4 \times 10^{-5} \text{ M}^{-1} \text{ s}^{-1}$
- $\frac{4}{3} \times 10^{-5} \text{ M}^{-2} \text{ s}^{-1}$
- $2 \times 10^{-5} \text{ M}^{-2} \text{ s}^{-1}$
- $\frac{2}{3} \times 10^{-5} \text{ M}^{-2} \text{ s}^{-1}$

9. For a 1st order homogeneous gaseous reaction $A \rightarrow 2B + C$, if the pressure after time t was P_t and after long time was P_∞ , then rate constant (k) in terms of P_t & P_∞ and t is -

$$(1) k = \frac{2.303}{t} \log \left(\frac{P_\infty}{P_\infty - P_t} \right)$$

$$(2) k = \frac{2.303}{t} \log \left(\frac{2P_\infty}{P_\infty - P_t} \right)$$

$$(3) k = \frac{2.303}{t} \log \left(\frac{2P_\infty}{3(P_\infty - P_t)} \right)$$

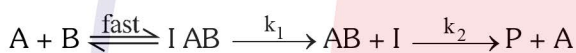
- None of these

10. Activation energy of a reaction is –
- (1) The energy released during the reaction
 - (2) The energy evolved when activated complex is formed
 - (3) Minimum amount of energy needed to overcome the potential barrier of reaction
 - (4) The energy needed to form one mole of the product

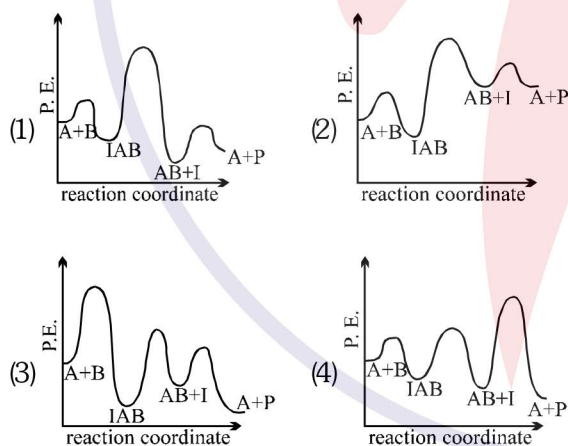
11. For producing the effective collisions, the colliding molecules must possess:-
- (1) A certain minimum amount of energy
 - (2) Energy equal to or greater than threshold energy
 - (3) Proper orientation
 - (4) Threshold energy as well as proper orientation of collision

12. For the first order reaction $A \longrightarrow B + C$, carried out at 27°C if $3.8 \times 10^{-16} \%$ of the reactant molecules can overcome energy barrier, the E_a (activation energy) of the reaction is $[\log 3.8 = 0.58, 2.303 \times 8.314 \times 17.42 = 333.33]$
- (1) 12 kJ/mole
 - (2) 831.4 kJ/mole
 - (3) 100 kJ/mole
 - (4) 111.11 J/mole

13. The following mechanism has been proposed for the exothermic catalyzed complex reaction.



If k_1 is much smaller than k_2 . The most suitable qualitative plot of potential energy (P.E.) versus reaction coordinate for the above reaction.



14. Which of the following is **INCORRECT** for first order reaction ?

- (1) On introducing catalyst, both rate constant and rate of reaction increases.
- (2) On increasing temperature both rate constant & rate of reaction increases.
- (3) On decreasing volume both rate constant & rate of gaseous reaction increases.
- (4) On increasing concentration of gaseous reactant at constant volume & constant temperature both total pressure and rate of the reaction increases.

15. Thermal decomposition of compound X is a first order reaction. If 75% of X is decomposed in 100 min. How long will it take for 90% of the compound to decompose? **Given : $\log 2 = 0.30$**
- (1) 190 min
 - (2) 176.66 min
 - (3) 166.66 min
 - (4) 156.66 min

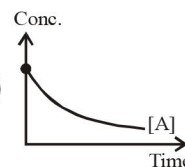
16. For the reaction $A + B \rightarrow \text{product}$,
Given : $[A]_0 = [B]_0$

List-I
(Observed Rate Law) is-

List-II
(Graph)

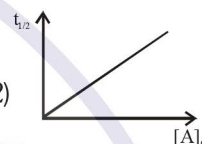
(P) $r = k[A]$

(1)



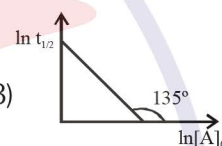
(Q) $r = k[A]^{1/2}[B]^{1/2}$

(2)



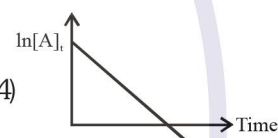
(R) $r = k[A][B]$

(3)



(S) $r = k[A]^0[B]$

(4)



Code :

	P	Q	R	S
(1)	4	1	3	2
(2)	2	3	1	4
(3)	1	2	3	4
(4)	4	3	2	1

Match the Columns for Reaction $A \rightarrow P$

Column - I	Column - II	Column - III
(I) First Order	(i) Reaction complete in finite time	(P) Rate depends on concentration
(II) Second Order	(ii) Reaction complete in infinite time	(Q) After equal interval of time concentration of reactant left are in G.P.
(III) Third Order	(iii) Half life is independent of concentration of reactant	(R) After equal interval of time concentration of reactant left are in A.P.
(IV) Zero Order	(iv) Half life decreases when concentration of reactant increases	(S) Half life depends on temperature

17. For the reaction $H_2 + I_2 \rightleftharpoons 2HI$, the true relationship is -

(1) $-\frac{d[H_2]}{dt} = \frac{d[I_2]}{dt} = \frac{d[HI]}{dt}$

(2) $\frac{d[H_2]}{dt} = -\frac{d[I_2]}{dt} = \frac{1}{2} \frac{d[HI]}{dt}$

(3) $-\frac{2d[H_2]}{dt} = -\frac{2d[I_2]}{dt} = \frac{d[HI]}{dt}$

(4) $\frac{2d[H_2]}{dt} = -\frac{2d[I_2]}{dt} = \frac{1}{2} \frac{d[HI]}{dt}$

18. A chemical reaction $[2A] + [2B] + [C] \rightarrow \text{product}$ follows the rate equation : $r \propto [A][B]^2$ then order of reaction is -
 (1) 0 (2) 1 (3) 2 (4) 3
19. The unit of rate constant of first & second order reaction is respectively -
 (1) time^{-1} , $\text{mole}^{-1} \cdot \text{litre} \cdot \text{time}^{-1}$
 (2) $\text{mole}^{-1} \text{litre}^{-1}$, time^{-1}
 (3) $\text{mole}^{-1} \cdot \text{litre} \cdot \text{time}^{-1}$, time^{-1}
 (4) sec^{-1} , litre^{-1}
20. In the equation $kt = \ln C_0 - \ln C_t$, the curve between t and $\ln C_t$ is -
 (1) a straight line (2) a parabola
 (3) a hyperbola (4) none of these
21. In respect of the equation $k = Ae^{-E_a/RT}$ in chemical kinetics, which one of the following statement is correct ?
 (1) E_a is energy of activation
 (2) R is Rydberg's constant
 (3) k is equilibrium constant
 (4) A is adsorption factor
22. For the reaction system : $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g})$ volume is suddenly reduced to half its value by increasing the pressure on it. If the reaction is of first order with respect to O_2 and second order with respect to NO , the rate of reaction will -
 (1) Increase to eight times of its initial value
 (2) Increase to four times of its initial value
 (3) Diminish to one-fourth of its initial value
 (4) Diminish to one-eighth of its initial value
23. The rate law for a reaction between substances A and B is given by, $\text{Rate} = k[A]^n[B]^m$. On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of the reaction will be as :
 (1) $(n - m)$ (2) $2^{(n - m)}$
 (3) $\frac{1}{2^{(m+n)}}$ (4) $(m + n)$
24. The rate equation for the reaction $2A+B \rightarrow C$ is found to be : $\text{rate} = k[A][B]$. The correct statement in relation to this reaction is that the
 (1) rate of formation of C is twice the rate of disappearance of A.
 (2) Half life is a constant
 (3) unit of k must be s^{-1}
 (4) value of k is independent of the initial concentrations of A and B
25. Consider an endothermic reaction : $X \rightarrow Y$ with the activation energies E_b and E_f for the backward and forward reactions, respectively. In general
 (1) $E_b > E_f$
 (2) $E_b < E_f$
 (3) there is no definite relation between E_b and E_f
 (4) $E_b = E_f$
26. A reaction involving two different reactant can never be -
 (1) first order reaction
 (2) unimolecular reaction
 (3) biomolecular reaction
 (4) second order reaction
27. Which of the following statement(s) is (are) correct
 (1) A plot of $\log K_p$ versus $1/T$ is linear
 (2) A plot of $\log [X]$ versus time is linear for a first order reaction, $X \rightarrow P$
 (3) A plot of $\log P$ versus $1/T$ is linear at constant volume.
 (4) A plot of P versus $1/V$ is linear at constant temperature.
28. The rate constant for the reaction
 $2\text{N}_2\text{O}_5 \rightarrow 4\text{NO}_2 + \text{O}_2$
 is $3.0 \times 10^{-5} \text{ sec}^{-1}$. if the rate is $2.4 \times 10^{-5} \text{ mol litre}^{-1} \text{ sec}^{-1}$, then the concentration of N_2O_5 (in mol litre^{-1}) is
 (1) 1.4 (2) 1.2 (3) 0.004 (4) 0.8
29. In a first order reaction the concentration of reactant decreases from 800 mol/dm^3 to 50 mol/dm^3 in $2 \times 10^4 \text{ sec}$. The rate constant of reaction in sec^{-1} is
 (1) 2×10^4 (2) 3.45×10^{-5}
 (3) 1.3486×10^{-4} (4) 2×10^{-4}
30. The reaction, $X \rightarrow \text{Product}$ follows first order kinetics. In 40 minutes the concentration of X changes from 0.1 M to 0.025 M. Then the rate of reaction when concentration of X is 0.01 M
 (1) $1.73 \times 10^{-4} \text{ M min}^{-1}$
 (2) $3.47 \times 10^{-5} \text{ M min}^{-1}$
 (3) $3.47 \times 10^{-4} \text{ M min}^{-1}$
 (4) $1.73 \times 10^{-5} \text{ M min}^{-1}$

ANSWER KEY
Exercise-1

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	3	1	4	1	3	3	4	3	3	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	4	3	1	3	3	1	3	4	1	1
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	1	1	2	4	2	2	1,2,4	4	3	3