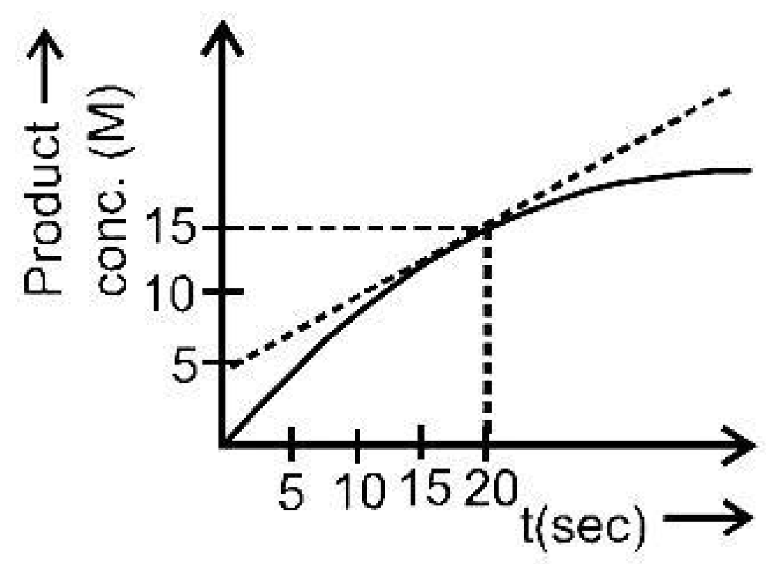
DPP No: 25

Maximum Time
50 Min

Chemistry
TARGET
JEE-MAINS

SYLLABUS : Chemical Kinetics

1. 

Rate of formation of product at t = 20 seconds is

(A) 0.5 MS^{-1} (B) 1 M S^{-1} (C) 1.5 M S^{-1} (D) 2MS^{-1}

2. In the following reaction : $xA \longrightarrow yB$

$$\log\left[-\frac{d[A]}{dt}\right] = \log\left[\frac{d[B]}{dt}\right] + 0.3$$

where –ve sign indicates rate of disappearance of the reactant. Thus, x : y is :

(A) 1 : 2 (B) 2 : 1 (C) 3 : 1 (D) 3 : 10

3. Rate of formation of SO_3 in the following reaction $2SO_2 + O_2 \rightarrow 2SO_3$ is 100 g min^{-1}. Hence rate of disappearance of O_2 is :

(A) 50 g min^{-1} (B) 40 g min^{-1} (C) 200 g min^{-1} (D) 20 g min^{-1}

4. $aA + bB \longrightarrow$ Product, $dx/dt = k[A]^a[B]^b$. If concentration of A is doubled, rate is four times. If concentration of B is made four times, rate is doubled. What is relation between rate of disappearance of A and that of B ?

(A) $-\{d[A]/dt\} = -\{d[B]/dt\}$ (B) $-\{d[A]/dt\} = -\{4\,d[B]/dt\}$

(C) $-\{4\,d[A]/dt\} = -\{d[B]/dt\}$ (D) None of these

5. For the reaction, $2NO(g) + 2H_2(g) \longrightarrow N_2(g) + 2H_2O(g)$ the rate expression can be written in the following ways:

$\{d[N_2]/dt\} = k_1[NO][H_2]$; $\{d[H_2O]/dt\} = k[NO][H_2]$; $\{-d[NO]/dt\} = k'_1[NO][H_2]$; $\{-d[H_2]/dt\} = k''_1[NO][H_2]$

The relationship between k, k_1 , k'_1 and k''_1. is :

(A) $k = k_1 = k'_1 = k''_1$ (B) $k = 2k_1 = k'_1 = k''_1$

(C) $k = 2k'_1 = k_1 = k''_1$ (D) $k = k_1 = k'_1 = 2k''_1$

6. For the irreversible process, A + B $\longrightarrow$ products, the rate is first–order w.r.t. A and second–order w.r.t. B. If 1.0 mol each of A and B introduced into a 1.0 L vessel, and the initial rate was 1.0×10^{-2} mol L^{-1} s^{-1} , rate when half reactants have been turned into products is :

(A) 1.25×10^{-3} mol L^{-1} s^{-1} (B) 1.0×10^{-2} mol L^{-1} s^{-1}

(C) 2.50×10^{-3} mol L^{-1} s^{-1} (D) 2.0×10^{-2} mol L^{-1} s^{-1}

7. If rate constant is numerically the same for the three reactions of first, second and third order respectively. Assume all the reactions of the kind A $\rightarrow$ products. Which of the following is correct :

(A) if [A] = 1 then $r_1 = r_2 = r_3$ (B) if [A] < 1 then $r_1 > r_2 > r_3$

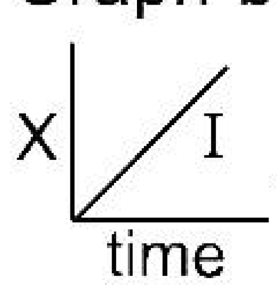
(C) if [A] > 1 then $r_3 > r_2 > r_1$ (D) All

8. The rate constant of the reaction A $\rightarrow$ 2B is 1.0×10^{-3} mol lit^{-1} min^{-1}, if the initial concentration of A is 1.0 mole lit^{-1} what would be the concentration of B after 100 minutes.

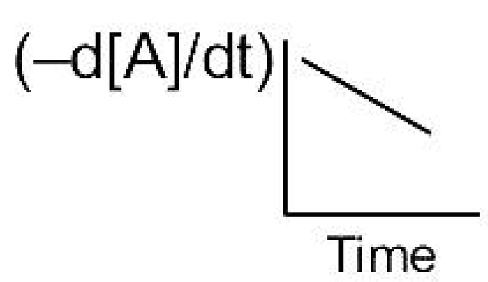
(A) 0.1 mol lit^{-1} (B) 0.2 mol lit^{-1} (C) 0.9 mol lit^{-1} (D) 1.8 mol lit^{-1}

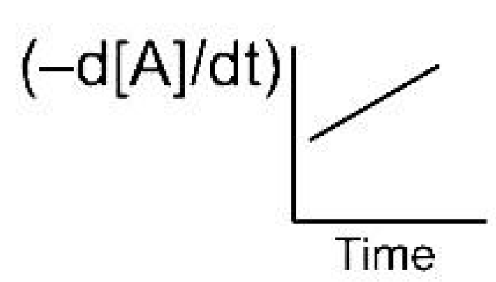
9. A drop of solution (volume 0.05 mL) contains 3.0×10^{-6} moles of H^+. If the rate constant of disappearance of H^+ is 1.0×10^{7} mole $litre^{-1}$ sec^{-1}. How long would it take for H^+ in drop to disappear :

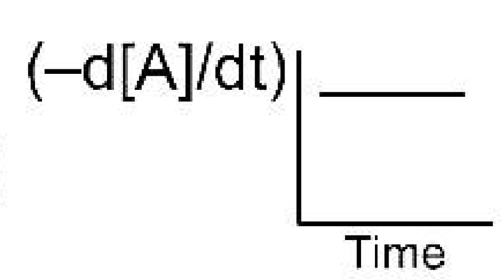
(A) 6×10^{-8} sec (B) 6×10^{-7} sec (C) 6×10^{-9} sec (D) 6×10^{-10} sec

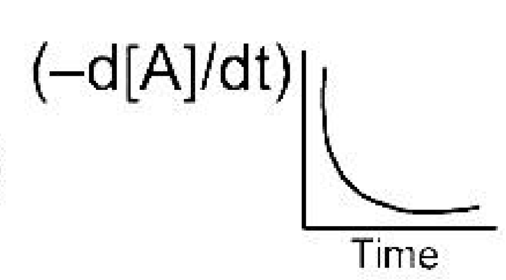
10. Graph between concentration of the product and time of the reaction A $\rightarrow$ B is of the type 

. Hence graph between – d[A]/dt and time will be of the type :

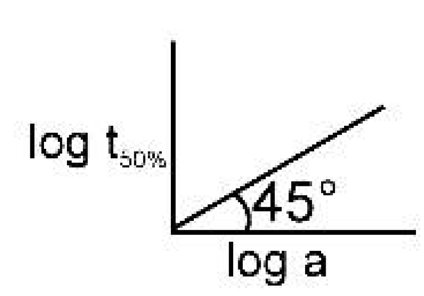
(A) 

(B) 

(C) 

(D) 

11. What will be the order of reaction and rate constant for a chemical change having log $t_{50\%}$ vs log concentration of (A) curves as :



(A) 0, 1/2 (B) 1, 1 (C) 2, 2 (D) 3, 1

12. For a reaction 2A + B $\rightarrow$ product, rate law is $-\frac{d[A]}{dt}$ = k[A]. At a time when t = $\frac{1}{k}$, concentration of the reactant is : (C_0 = initial concentration)

(A) $\frac{C_0}{e}$ (B) C_0e (C) $\frac{C_0}{e^2}$ (D) $\frac{1}{C_0}$

13. Two substances A ($t_{1/2}$ = 5 min) and B ($t_{1/2}$ = 15 min) are taken in such a way that initially [A] = 4[B]. The time after which both the concentration will be equal is : (Assume that reaction is first order)

(A) 5 min (B) 15 min

(C) 20 min (D) concentration can never be equal

14. In a first order reaction the reacting substance has half-life period of ten minutes. What fraction of the substance will be left after an hour the reaction has occurred ? :

(A) 1/6 of initial concentration (B) 1/64 of initial concentration

(C) 1/12 of initial concentration (D) 1/32 of initial concentration

15. A reaction, which is second order, has a rate constant of 0.002 L mol^{-1} s^{-1}. If the initial conc. of the reactant is 0.2 M. how long will it take for the concentration to become 0.0400 M ?

(A) 1000 sec (B) 400 sec (C) 200 sec (D) 10, 000 sec

16. Which is not true for a second order reaction ?

(A) It can have rate constant 1×10^{-2} L mol^{-1} s^{-1}

(B) Its half-life is inversely proportional to its initial concentration

(C) Time to complete 75% reaction is twice of half-life

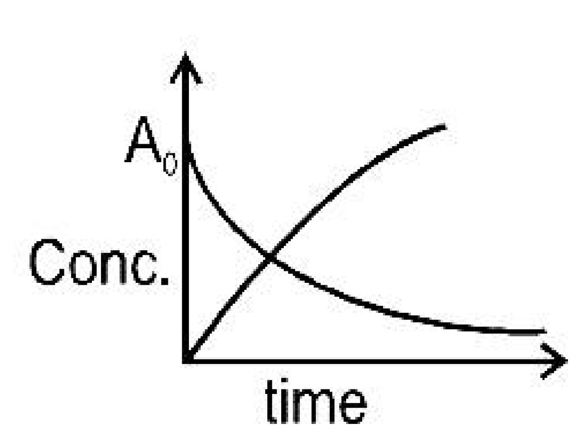
(D) $T_{50} = \frac{1}{K \times \text{Initial conc.}}$

17. For the reaction $2NO_2 \longrightarrow N_2O_2 + O_2$, rate expression is as follows :

$-\frac{d[NO_2]}{dt} = k\,[NO_2]^n$, where k = 3×10^{-3} mol^{-1} L sec^{-1}. If the rate of formation of oxygen is 1.5×10^{-4} mol L^{-1} sec^{-1}, then the molar concentration of NO_2 in mole L^{-1} is

(A) 1.5×10^{-4} (B) 0.0151 (C) 0.214 (D) 0.316

18. At the point of intersection of the two curves shown, the conc. of B is given by.......for, $A \rightarrow nB$:



(A) $\frac{nA_0}{2}$ (B) $\frac{A_0}{n-1}$ (C) $\frac{nA_0}{n+1}$ (D) $\left(\frac{n-1}{n+1}\right)A_0$

19. The data for the reaction $A + B \rightarrow C$ is

Exp.	$[A]_0$	$[B]_0$	initial rate
1	0.012	0.035	0.10
2	0.024	0.035	0.80
3	0.012	0.070	0.10
4	0.024	0.070	0.80

The rate law is

(A) $r = k [B]^3$ (B) $r = k [A]^3$ (C) $r = k [A] [B]^4$ (D) $r = k [A]^2 [B]^2$.

20. The kinetic data for the given reaction $A(g) + 2B(g) \longrightarrow C(g)$ is provided in the following table for three experiments at 300 K.

Ex. No.	[A/M]	[B/M]	[Initial rate (M sec^{-1})]
1	0.01	0.01	6.930×10^{-6}
2	0.02	0.01	1.386×10^{-5}
3	0.02	0.02	1.386×10^{-5}

In another experiment starting with intitial concentration of 0.5 and 1 M respectively for A and B at 300 K. Find the rate of reaction after 50 minutes from start of experiment (in m/sec)?

(A) 6.93×10^{-4}

(B) 0.25×10^{-7}

(C) 4.33×10^{-5}

(D) 3.46×10^{-9}

21. At 373 K, a gaseous reaction $A \rightarrow 2B + C$ is found to be of first order. Starting with pure A, the total pressure at the end of 10 min was 176 mm of Hg and after a long time when A was completely dissociated, it was 270 mm of Hg. The pressure of A at the end of 10 minutes was:

(A) 94 mm of Hg (B) 47 mm of Hg (C) 43 mm of Hg (D) 90 mm of Hg

22. The rate constant, the activation energy and the frequency factor of a chemical reaction at 25°C are $3.0 \times 10^{-4}\ s^{-1}$, 104.4 KJ mol^{-1} and $6.0 \times 10^{14}\ s^{-1}$ respectively. The value of the rate constant as $T \rightarrow \infty$ is :

(A) $2.0 \times 10^{18}\ s^{-1}$

(B) $6.0 \times 10^{14}\ s^{-1}$

(C) infinite

(D) $3.6 \times 10^{30}\ s^{-1}$

23. Consider a reaction **aG + bH $\rightarrow$ Products** . When concentration of both the reactants G and H is doubled, the rate increases by eight times. However, when concentration of G is doubled keeping the concentration of H fixed, the rate is doubled. The overall order of the reaction is :

24. The half lives of decomposition of gaseous CH_3CHO at constant temperature but at initial pressure of 364 mm and 170 mm Hg were 410 second and 880 second respectively. Hence **order of reaction** is :

25. The order of a reaction **A** $\rightarrow$ **product**, in which half the reagent is reacted in half an hour, three quarters in one hour and seven - eighth in one and half hours is

ANSWER KEY

1.	(A)	2.	(B)	3.	(D)	4.	(B)	5.	(B)	6.	(A)	7.	(D)
8.	(B)	9.	(C)	10.	(C)	11.	(A)	12.	(A)	13.	(B)	14.	(B)
15.	(D)	16.	(C)	17.	(D)	18.	(C)	19.	(B)	20.	(C)	21.	(B)
22.	(B)	23.	(3)	24.	(2)	25.	(1)						