CHEMISTRY

BOOKS - NARENDER AVASTHI CHEMISTRY (HINGLISH)

CHEMICAL KINETIC & NUCLEAR CHEMISTRY

Exercise

1. The differential rate law equation for the elementary reaction $A + 2B \xrightarrow{k} 3C$, is

A. $-\frac{d[A]}{dt} = \frac{d[B]}{dt} = \frac{d[C]}{dt} = k[A][B]^2$

B. $-\frac{d[A]}{dt} = \frac{1}{2}\frac{d[b]}{dt} = \frac{1}{3}\frac{d[C]}{dt} = k[A]^2[B]$

C. $-\frac{d[A]}{dt} = \frac{1}{2}\frac{d[b]}{dt} = \frac{1}{3}\frac{d[C]}{dt} = k[A][B]^2$

D. None of these

Answer: C

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2. The rate of a reaction is expressed in different ways as follows:

$$+\frac{1}{2}\frac{d[C]}{dt} = -\frac{1}{3}\frac{d[D]}{dt} = +\frac{1}{4}\frac{d[A]}{dt} = -\frac{d[B]}{dt}$$

the reaction is

A. $4A + B \rightarrow 2C + 3D$

B. $B + 3D \rightarrow 4A + 2C$

C. $A + B \rightarrow C + D$

D. $B + D \rightarrow C + D$

Answer: B

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3. In the reaction , $A + 2B \rightarrow 6C + 2D$, if the initial rate $-\frac{d[A]}{dt}$ at t= 0 is $2.6 \times 10^{-2} M \sec^{-1}$, what will be the value of $-\frac{d[B]}{dt}$ at t=0?

A. $8.5 \times 10^{-2} M \sec^{-1}$

B. $2.5 \times 10^{-2} M \sec^{-1}$

C. $5.2 \times 10^{-2} M \sec^{-1}$

D. $7.5 \times 10^{-2} M \sec^{-1}$

Answer: C

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4. For the reaction $2A \to B + 3C$, if $-\frac{d[A]}{dt} = k_1[A]^2, -\frac{d[B]}{dt} = k_2[A]^2, -\frac{d[C]}{dt} = k_3[A]^2$ the correct reaction between k_1, k_2 and k_3 is :

A. $k_1 = k_2 = k_3$

B. $2k_1 = k_2 = 3k_2$

C. $4k_1 = k_2 = 3k_2$

D. $\frac{k_1}{2} = k_2 = \frac{k_3}{3}$

Answer: D

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5. The rate constant of n^{th} order has units :

A. $\text{litre}^{1-n} mol^{1-n} \sec^{-1}$

B. $\text{Mol}^{1-n} litre^{1-n} \sec$

C. $\text{Mol}^{1-n^2} litre^{n^2} \sec^{-1}$

D. $\text{Mole}^{1-n} litre^{n-1} \sec^{-1}$

Answer: D

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6. Which of the following statement is incorrect?

A. Unit of rate of disapearence is Ms^{-1}

B. Unit if rate of reaction is Ms^{-1}

C. Unit of rate constant k depends upon order

D. Unit of k for first order reaction is Ms^{-1}

Answer: D

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7. Which of the following relation is correct for k_f and k_b in an equibilirium process that contains equal moles of rectants and products.

A. $k_f = k_b$

B. $k_f > k_b$

C. $k_f < k_b$

D. we cannot predict

Answer: D

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8. Listed in the table are forward and reverse rate constants for the reaction

$2NO(g) \Leftrightarrow N_2(g) + O_2(g)$

$Temperature(K)$	$k_f(M^{-1}s^{-1})$	$k_b(M^{-1}s^{-1})$
1400	0.29	1.1×10^{-6}
1500	1.3	1.4×10^{-5}

Select the correct statement

A. Reaction is exothermic and value of eqilibrium constatnt(K_{eq}) at 1400 K is 3.79×10^{-6}

B. Reaction is endothermic and value of k_{eq} 1400 K is 2.63×10^5

C. Reaction is exothermic and value of k_{eq} 1400 K is 2.63×10^5

D. Reaction is endothermic and value of k_{eq} 1500 K is 9.28×10^4

Answer: C

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9. The rate of constatnt depends on

A. temperature

B. pressure

C. extent of reaction

D. Initial concentraton of the rectant

Answer: A

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10. In the following reaction, how is the rate of appearance of the underlined Product related to the rate of disappearance of the underlined reactant ?

$$BrO_3^{\ominus}(aq) + 5\underline{Br}^{\ominus}(aq) + 6H^{\oplus}(aq) \rightarrow 3\underline{Br_2}(l) + 3H_2O(l)$$

A. $-\frac{d\left[BrO_3^-\right]}{dt} = \frac{d[Br_2]}{dt}$

B. $-\frac{1}{3}\frac{d\left[BrO_3^-\right]}{dt} = \frac{d[Br_2]}{dt}$

C. $-\frac{d[BrO_3^-]}{dt} = \frac{1}{3}\frac{d[Br_2]}{dt}$

D. None of these

Answer: C

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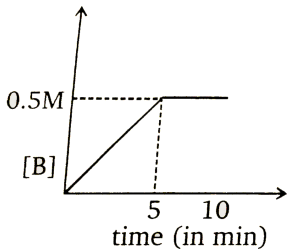
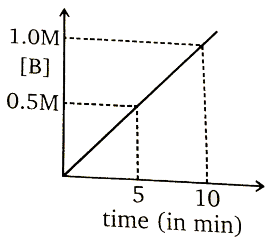
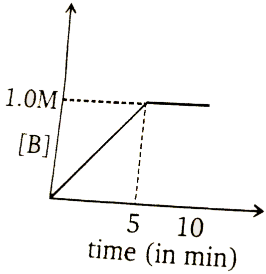
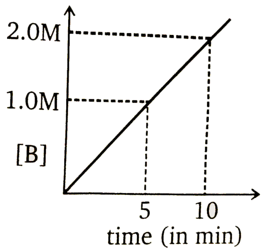
11. Consider a reaction $A(g) \xrightarrow{k = 0.1 M \min^{-1}} 2B(g)$. If initial concentration of A is 0.5 M then select correct graph.

A. 

B. 

C. 

D. 

Answer: C

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12. Which of the following statement is incorrect?

A. A second order reaction must be a bimolecular elementry reaction

B. A bimolecular elementry reaction must be a second order reacton

C. Zero order reaction must be a complex reaction

D. First order reaction may be complex or elementary reaction

Answer: A

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13. The molecularity of a complex reaction given below is :

$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$

A. 1

B. 2

C. 3

D. no meaning

Answer: D

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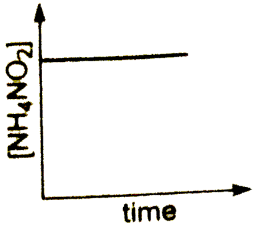
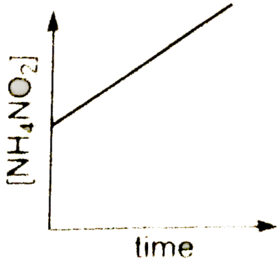
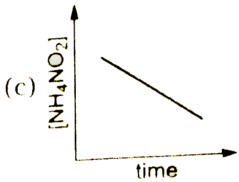
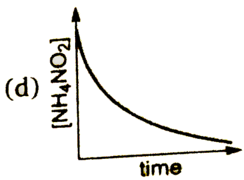
14. Decomposition of $NH_4NO_2(aq$ into $N_2(g)$ and $2H_2O(l)$ is first order reaction.

A. 

B. 

C. 

D. 

Answer: D

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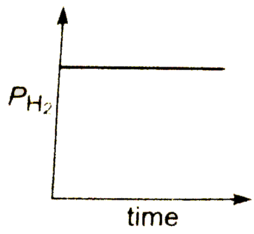
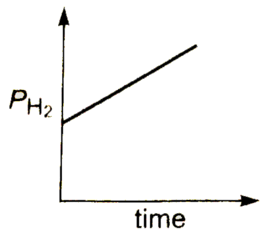
15. Decomposition of $Hl(g)$ on Gold surface is zero order reaction. Initially, few moles of H_2 are present in container then which of the following graph is correct ?

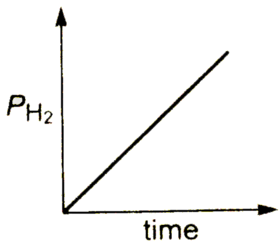
A.



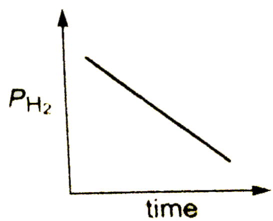
B.



C.



D.



Answer: B

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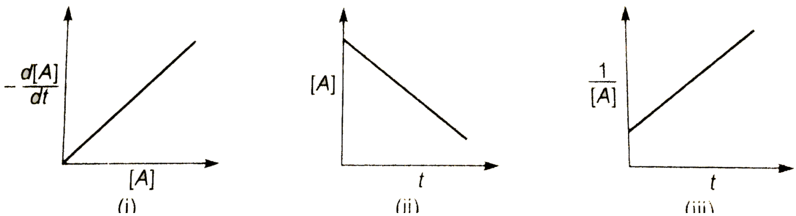
16. Consider the plots for the types of reaction

$nA \rightarrow B + C$



These plots respectively correspond to the reaction orders :

A. 0,2,1

B. 0,1,2

C. 1,1,2

D. 1,0,2

Answer: D

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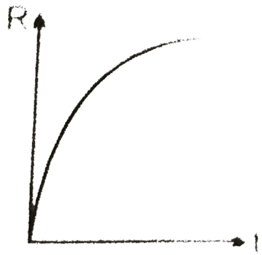
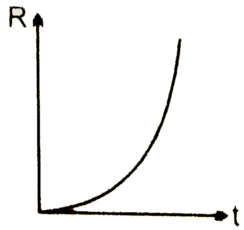
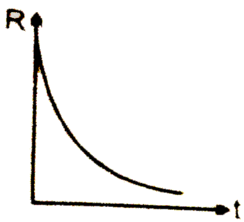
17. If decompositon reaction `A(g)toB(g) follows first order linetics then the graph of rate of formation (R) of B against time t will be :



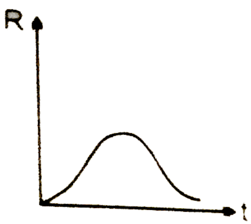
A.



B.



C.



D.

Answer: C

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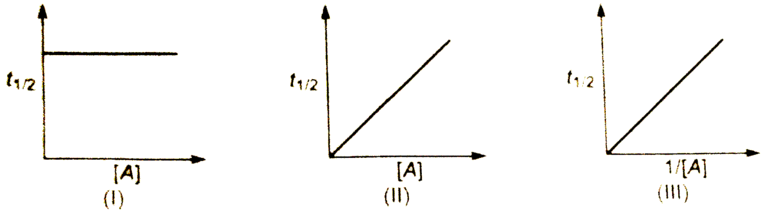
18. Consider the plots for the types of reaction

$nA \to B + C$



These plots respectively correspond to the reaction orders :

A. 0,1,2

B. 1,2,0

C. 1,0,2

D. None of these

Answer: C

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19. For a zero order reaction, the plot of concentration, vs time is linear with

A. $+ve$ slope and zero intercept

B. $-ve$ slope and zero intercept

C. $+ve$ slope and non-zero intercept

D. $-ve$ slope and non-zero intercept

Answer: D

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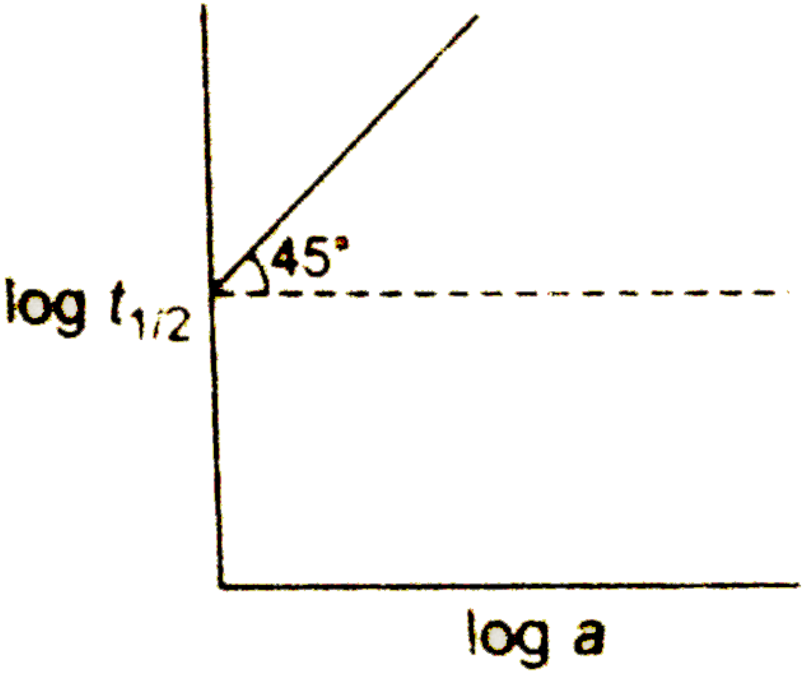
20. What will be the order of reaction for a chemical change having $\log t_{\frac{1}{2}}$ vs log a? (where a = initial concentration of rectant, $t_{\frac{1}{2}}$ =half life)



A. zero order

B. First order

C. Second order

D. None of these

Answer: A

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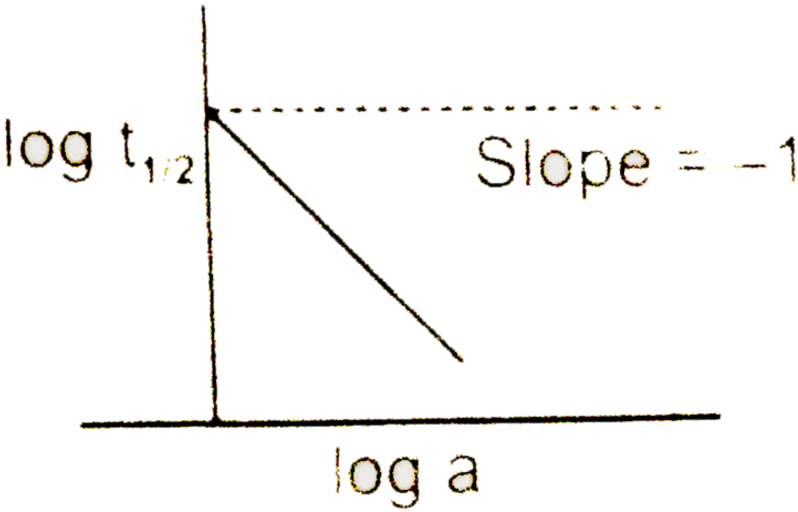
21. A graph between $\log t_{\frac{1}{2}}$ and log a (abscissa), a being the initial concentration of A in the reaction For reaction $A \rightarrow$ Product, the rate law is :



A. $-\frac{d[A]}{dt} = K$

B. $-\frac{d[A]}{dt} = K[A]$

C. $-\frac{d[A]}{dt} = K[A]^2$

D. $-\frac{d[A]}{dt} = K[A]^3$

Answer: C

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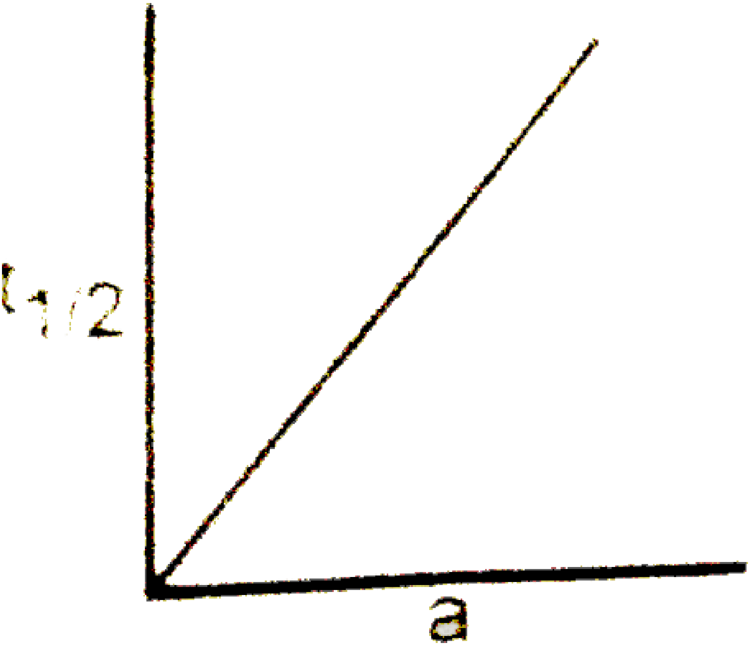
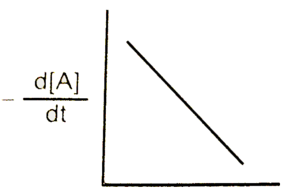
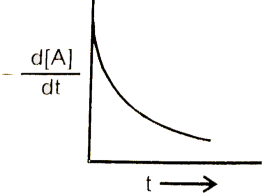
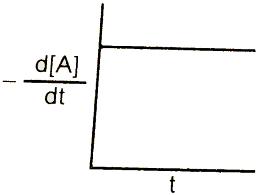
22. For the reaction $A \rightarrow B$, for which graph between half life `(t_(1//2)) and initial concentration (a) of the rectant is given below

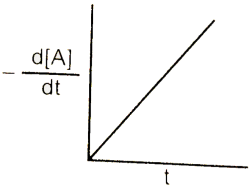


Hence graph between $-\frac{d[A]}{dt}$ and time will be:

A.


B. 

C. 

D. 

Answer: C

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23. For the ideal gaseous reaction, the rate is generally expressed in terms of $\frac{dP}{dt}$ instead of $\frac{dC}{dt}$ or $\frac{dn}{dt}$ (where C=$\frac{n}{V}$ is concentration and n the no. of moles). What is the relation among these three expressions if T and V are constant?

A. $\frac{dC}{dt} = \frac{dn}{dt} = \frac{dP}{dt}$

B. $\frac{dC}{dt} = \frac{1}{V}\frac{dn}{dt} = \frac{1}{Rt}\left(\frac{dP}{dt}\right)$

C. $RT\frac{dC}{dt} = \frac{dn}{dt} = \frac{dP}{dt}$

D. None of these

Answer: B

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24. $A_2 + B_2 \rightarrow 2AB$, R.O.R.=$k[A_2]^a[B_2]^b$

$\text{Initial}[A_2]$	$\text{Initial}[B_2]$	$R.\,O.\,R.\,(r)Ms^{-1}$
0.2	0.2	0.04
0.1	0.4	0.04
0.2	0.4	0.08

Order of reaction with respect to A_2 and B_2 are respectively :

A. a=1,b=1

B. a=2,b=0

C. a=2,b=1

D. None

Answer: A

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25. For a reaction initial rate is given as : $R_0 = k[A_0]^2[B_0]$. By what factor, the initial rate of reaction will increase if initial concentration is taken 1.5 times and B is tripled?

A. 4.5

B. 2.25

C. 6.75

D. None of these

Answer: C

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26. For $A_{(s)} + B_{(s)} \to C_{(s)}$,rate=$k[A]^{1/2}[B]^{2}$, if initial concentration of A and B are increased by factors 4 and 2 respectively, then the initial rate is changed by the factor:

A. 4

B. 6

C. 8

D. None of these

Answer: C

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27. Reaction $A \to B$ follows second order kinetics. Doubling the concentration of A wil increase the rate of formation of B by a factor of :

A. $1/4$

B. $1/2$

C. 2

D. 4

Answer: D

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28. The reaction of A_2 and B_2 follows the equation

$A_2(g) + B_2(g) \rightarrow 2AB(g)$

The following data were observed

$[A_2]_0$	$[B_2]_0$	Initial rate of appearance of AB(g)(inMs^{-1}
0.10	0.10	2.5×10^{-4}
0.20	0.10	5×10^{-4}
0.20	0.20	10×10^{-4}

The value of rate constatnt for the above reaction is :

A. 2.5×10^{-4}

B. 2.5×10^{-2}

C. 1.25×10^{-2}

D. None of these

Answer: C

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29. The unit of rate constant of elementary reaction depends upon the

A. temperature of the reaction

B. concentration of recytants

C. activation energy of the reaction

D. Molecularity of the reaction

Answer: D

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30. Select the rate law that corresponds to the datashown for the reaction $A + B \rightarrow C$

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

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

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

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

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

Answer: A

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31. An elementary reaction A and B is second order reaction. Which of the following rate equation must be correct?

A. $r = k[A]^2[B]^0$

B. $r = k[A]^{3/2}[B]^{1/2}$

C. $r = k[A]^0[B]^2$

D. $r = k[A][B]$

Answer: D

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32. If a is the initial concentration of the rectant, the half life period of the reaction of n^{th} order is inversely proportional to :

A. a^{n-1}

B. a^{n}

C. a^{1-n}

D. a^{n+1}

Answer: A

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33. Which of the following expressions is correct for zero order respectively [Where a is initial concentration]?

A. $t_{1/2} \alpha a, t_{1/2} \alpha \frac{1}{a}$

B. $t_{1/2} \alpha a, t_{1/2} \alpha a^0$

C. $t_{1/2} \alpha a^0, t_{1/2} \alpha a$

D. $t_{1/2} \alpha a, t_{1/2} \alpha \frac{1}{a^2}$

Answer: B

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34. The unit of rate constant of zero order and first order chemical reactions are respectively :

A. $molL^{-1}s^{-1}, molL^{-1}s^{-1}$

B. $s^{-1}, molL^{-1}s^{-1}$

C. $molL^{-1}s^{-1}, s^{-1}$

D. None of these

Answer: C

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35. The unit of rate of reaction and rate of rate constant are same for a :

A. zero order reaction

B. first order reaction

C. Second order reaction

D. third order reaction

Answer: A

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36.

$CH_3COOC_2H_5(aq) + H_2O(l) \xrightarrow{H^+(aq)} CH_3COOH(aq) + C_2H_5OH(aq)$

. What type of reaction is this?

A. unimolecular elementary

B. Pseudo first order

C. Zero order reaction must be a complex reaction

D. Second order

Answer: B

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37. When ethyl acetate was was hydrolysedin presemce of 0.1 M HCl, the rate constant was found to be $5.4 \times 10^{-5} s^{-1}$. But in presence of 0.1 M H_2SO_4 the rate constant was found to be $6.25 \times 10^{-5} s^{-1}$. Thus it may be concluded that:

A. H_2SO_4 furnishes more H^+ than HCl

B. H_2SO_4 furnishes less H^+ than HCl

C. both have the same strength

D. will depend on concentration of ethyl acetate

Answer: A

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38. For an elementary reaction $2A + B \rightarrow A_2B$ if the volume of vessel is quickly reduced to half of it's original volume then rate of reaction will :

A. remain unchanged

B. increase four times

C. increase eight times

D. decrease eight times

Answer: C

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39. In the reaction $A \rightarrow B + C$, rate constant is $0.001 Ms^{-1}$. If we start with 1 M of A then conc. Of A and B after 10 minutes are respectively :

A. 0.5 M, 0.5 M

B. 0.6 M, 0.4 M

C. 0.4 M, 0.6 M

D. none of these

Answer: C

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40. For a reaction $A \xrightarrow{k_r = 0.6 M \min^{-1}} 2B$

starting with 1 M of 'A' only, concentration of B (in M) after 100 sec. and 200 sec. is respectively?

A. 2 and 4

B. 1 and 2

C. 2 and 3

D. None of these

Answer: D

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41. For the zero order reaction $A \rightarrow B + C$, initial concentration of A is 0.1 M. If [A]=0.08 M after 10 minutes,then its half-life and completion time are respectively :

A. 10 min, 20 min

B. 2×10^{-3} min , 4×10^{-3} min

C. 25 min, 50 min

D. 250 min, 500 min

Answer: C

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42. For an elementary reaction , $X(g) \rightarrow Y(g) + Z(g)$ the half life period is 10 min. In what period of time would the concentration of X be reduced to 10% of original concentration?

A. 20 min

B. 33 min

C. 15 min

D. 25 min

Answer: B

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43. In the presence of acid, the initial concentration, of cane sugar was reduced form $0.2M$ to 0.1 in $5hr$ and to $0.05M$ in $10hr$. The reaction must be of

A. Zero order

B. First order

C. Second order

D. Third order

Answer: B

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44. A first order reaction is 75% completed in 100 minutes. How long time will it take for its 87.5% completion?

A. 125 min

B. 150 min

C. 175 min

D. 200 min

Answer: B

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

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

B. $1.44 \times \text{sec}^{-1}$

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

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

Answer: A

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46. Rate constant k=2.303 $\min^{-1}$ for a particular reaction. The initial concentration of the reactant is 1 mol / litre then rate of reaction after 1 minute is:

A. 2.303 M $\min^{-1}$

B. 0.2303 M $\min^{-1}$

C. 0.1 M $\min^{-1}$

D. None of these

Answer: B

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47. For the reaction $3A(g) \xrightarrow{k} B(g) + C(g)$ k is $10^{-4} L / mol. \min$.

If [A] = 0.5M then the value of $-\frac{d[A]}{dt}$(in ms^{-1} is:

A. 7.5×10^{-5}

B. 3×10^{-4}

C. 2.5×10^{-5}

D. None of these

Answer: D

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48. 99% at a first order reaction was completed in 32 min. When will 99.9% of the reaction complete.

A. 50 min

B. 46 min

C. 48 min

D. 49 min

Answer: C

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49. Which of the following represent the expression for $\frac{3}{4}$th life of first order reaction

A. $\frac{k}{2.303}\log 4/3$

B. $\frac{2.303}{k}\log 3/4$

C. $\frac{2.303}{k}\log 4$

D. $\frac{2.303}{k}\log 3$

Answer: C

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50. Consider following two competing first ordr reactions,

$P \xrightarrow{k_1} A + B, Q \xrightarrow{k_2} C + D$

if 50% of the reaction oof P wascompleted when 96% of Q was complete ,then the ratio (k_2/k_1) will be :

A. 4.06

B. 0.215

C. 1.1

D. 4.65

Answer: D

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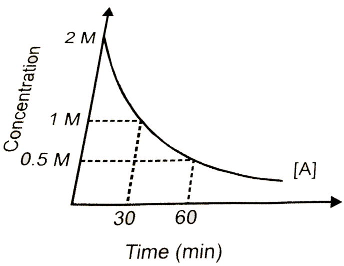
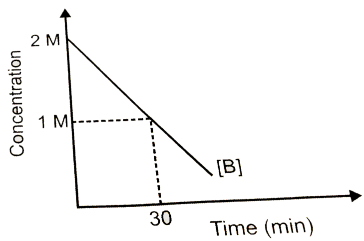
51. For the reaction

(i) $A \xrightarrow{k_I} P$

(ii) $B \xrightarrow{K_{II}} Q$, following observation is made.





Calculate $\frac{k_1}{k_{II}}$, where k_I and k_{II} and rate constant for the respective reaction.

A. 2.303

B. 1

C. 0.36

D. 0.693

Answer: D

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52. For the homogenous gaseous reaction $A \rightarrow 3B$, if pressure after time t was P_t and after completion of reaction, pressure was P_∞ then select correct relation

A. $k = \frac{1}{t} \text{in}\left(\frac{P_\infty}{3(P_\infty - P_t)}\right)$

B. $k = \frac{1}{t} \text{in}\left(\frac{2P_\infty}{(P_\infty - P_T)}\right)$

C. $k = \frac{1}{t} \text{in}\left(\frac{3P_\infty}{2P_\infty - P_t}\right)$

D. $k = \frac{1}{t} \text{in}\left(\frac{P_\infty}{3(P_\infty - P_T)}\right)$

Answer: D

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53. The half-life of first order decomposition of NH_4NO_3 is 2.10 hr at 288 K temperature

$NH_4NO_3(aq) \rightarrow N_2O(g) + 2H_2O(l)$. If 6.2 of NH_4NO_3 is allowed to decompose, the required for NH_4NO_3 to decompose 90 % is :

A. 6.978 hr

B. 0.319

C. 0.319 hr

D. None of these

Answer: A

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54. For a first order homogenous gaseous reaction, $A \rightarrow 2B + C$ then initial pressure was P_i while total pressure after time 't' was P_t. The right expression for the rate constants k in terms of P_i, P_t and t is :

A. $k = \frac{2.303}{t} \log\left(\frac{2P_i}{3P_i - P_t}\right)$

B. $k = \frac{2.303}{t} \log\left(\frac{2P_i}{2P_t - P_i}\right)$

C. $k = \frac{2.303}{t} \log\left(\frac{P_i}{P_i - P_t}\right)$

D. None of these

Answer: A

Watch Video Solution

55. The decomposition of azo methane, at certain temperature acccording to the equation $(CH_3)_2N_2 \rightarrow C_2H_6 + N_2$ is a first order reaction.

After 40 minutes from the start, the total pressure developed is found to be 350 mm Hg in place of initial pressure 200 mm Hg of azo methane. The value of rate constant k is :

A. $2.88 \times 10^{-4} \sec(-1)$

B. $1.25 \times 10^{-4} \sec(-1)$

C. $5.77 \times 10^{-4} \sec(-1)$

D. None of these

Answer: C

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56. The hydrolysis of sucrose was studied with the help of calorimeter and following data were

$$\begin{array}{llll} \text{Collected time (min.)} & : 0 & 70 & \infty \\ \text{observed rotation (degrees)} & : 44 & 16.5 & -11 \end{array}$$

the time taken when reaction mixture wil be optically inactive ? (Given : In 2=0.7,in 3=1.1, in 5=1.6)

A. 16 min

B. 69.47 min

C. 160 min

D. None of these

Answer: C

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57. For a partiocular reaction with initial conc. Of the rectents as a_1 and a_2, the half-life period are t_1 and t_2 respectively. The order of the reaction (n) is given by :

A. $n = 1 + \dfrac{\log(t_2 / t_1)}{\log(a_2 / a_1)}$

B. $n = \dfrac{\log(t_2 / t_1)}{\log(a_2 / a_1)}$

C. $n = 1 + \dfrac{\log(t_1 / t_2)}{\log(a_2 / a_1)}$

D. None of these

Answer: C

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58. The value of $\dfrac{t_{0.875}}{t_{0.50}}$ for n^{th} order reaction is

A. $2^{(2n-2)}$

B. $2^{(2n-2)-1}$

C. $\frac{8^{n-1}-1}{2^{n-1}-1}$

D. None of these

Answer: C

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59. $A \to B$ first order reaction A is ooptical active and B is optically inactive. A series of experiment were conducted on a solution of A

$$\begin{array}{llll} \text{Time} & 0 & 60 \text{ min} & \infty \\ \text{optical rotation} & 82^\circ & 77^\circ & 2^\circ \end{array}$$

assume some imurity is present calculate the otical rotation for 5 hours.)

(Given in 1.066=0.064, $e^{0.16}$=1.17)

A. 60

B. 30

C. 20

D. 120

Answer: A

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60. At 300 K the half-life of a sample of a gaseous compound initially at 1 atm is 100 sec. When the pressure is 0.5 atm the half-life is 50 sec. The order of reaction is :

A. 0

B. 1

C. 2

D. 3

Answer: A

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61. A decomposes as . The rate of appearance of B, taking 2 M concentration of A, is equal to :

A. $2 \times 10^{-3} M s^{-1}$

B. $4 \times 10^{-3} M s^{-1}$

C. $8 \times 10^{-3} M s^{-1}$

D. None of these

Answer: C

62. For an endothermic reaction, where ΔH represents the enthalpy of reaction in $kJ mol^{-1}$, the minimum value for the energy of activation will be

A. less than ΔH

B. more than ΔH

C. equal to ΔH

D. Zero

Answer: B

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63. The activation energy of the reaction, $A + B \rightarrow C + D + 38$ kcal is 20 kcal. What would be the activation energy pof the following reaction.

$C + D \rightarrow A + B$

A. 20 kcal

B. $-20 kcal$

C. 18 kcal

D. 58 kcal

Answer: D

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64. When the activation energies of the forward and backward reactions are equal, then :

A. ΔU=0,ΔS=0

B. ΔU=0,ΔG=0

C. ΔS=0,ΔG=0

D. Only ΔU=0

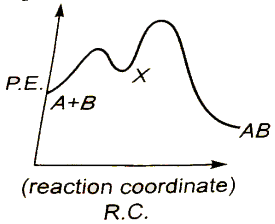
Answer: D

Watch Video Solution

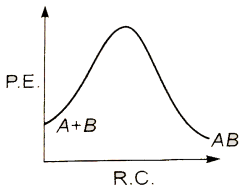
65. For an exothermic chemical process ocuuring in two process occuring in two steps as follows

$(i) A + B \rightarrow X(\text{slow})$ $(ii) X \rightarrow AB(\text{fast})$

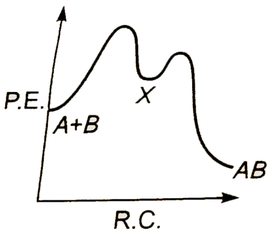
The progress of reaction can be best described by :



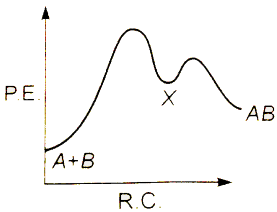
A.



B.



C.



D.

Answer: C

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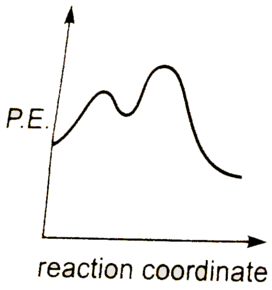
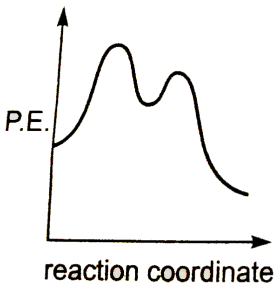
66. Select the correct diagram for an endothermic reaction that proceeds through two steps with the second steps is rate determining :



A.



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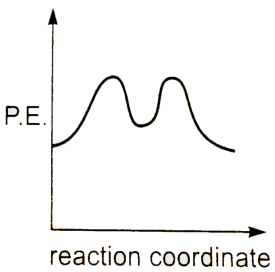
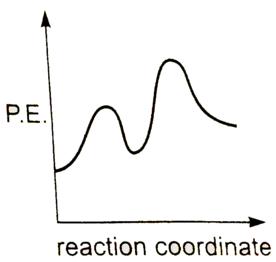


C.



D.

Answer: D

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67. $\frac{k_{34^\circ}}{k_{35^\circ}} < 1$, then

A. Rate increase with the rise in temperature

B. rate decrease with rise in temperature

C. rate does not change with rise in temperature

D. None of the above

Answer: A

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68. The plot of In 1/T is linear with slope of :

A. $-E_a / R$

B. $E_a / R)$

C. $E_a / 2.303R$

D. $- E_a / 2.303R$

Answer: A

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69. Rate constant for a chemical reaction taking place at 500K is expressed as $K = A. e^{-1000}$ The activation energy of the reaction is :

A. 100 cal/mol

B. 1000 kcal/mol

C. 10^4 kcal/mol

D. 10^6 kcal/mol

Answer: B

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70. For a complex reaction $A \xrightarrow{k}$ products

$E_{a1} = 180 kJ/mole, E_{a2} = 80 kJ/mol, E_{a3} = 50 kJ/mol$

Overall rate constant k is related to individual rate constant by the equation $k = \left(\frac{k_1 k_2}{k_3}\right)^{2/3}$. Activation energy (kJ/mol) for the overall reaction is :

A. 100

B. 43.44

C. 150

D. 140

Answer: D

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71. For reaction A $\rightarrow$ B , the rate constant $K_1 = A_1\left(e^{-E_{a_1}/RT}\right)$ and the reaction $X \rightarrow Y$, the rate constant $K_2 = A_2\left(e^{-E_{a_2}/RT}\right)$. If $A_1 = 10^9$,

$A_2 = 10^{10}$ and E_{a_1}=1200 cal/mol and E_{a2} =1800 cal/mol , then the temperature at which $K_1 = K_2$ is : (Given , R=2 cal/K-mol)

A. 300K

B. $300 \times 2.303K$

C. $\frac{300}{2.303}K$

D. None of these

Answer: C

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72. The activation energies of the forward and backward reactions in the case of a chemical reaction are 30.5 and 45.5 KJ/mol , respectively . The reaction is:

A. exothermic

B. endothermic

C. neither exothermic

D. independent of temperature

Answer: A

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73. A reaction rate constant is given by : $K = 1.2 \times 10^{14} e^{\frac{-25000}{RT}} \sec^{-1}$. It means :

A. log K versus log T will give a straight line with a slope as 25000

B. log K versus log T will give a straight line with a slope as -25000

C. log k versus T will give a striaght line with a slope as -25000

D. log K versus 1/T will give a striaght line

Answer: D

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74. The temperature coefficient of a reaction is:

A. the rate constant

B. the rate constant at a fixed temperature

C. the ratio of rate constant at two temperature

D. the ratio of rate constant differing by 10° C preferably $k\frac{308}{k_{298}}$

Answer: D

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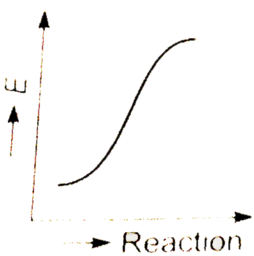
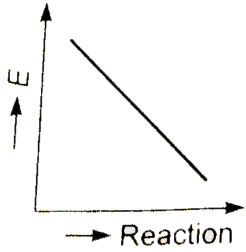
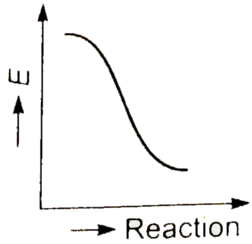
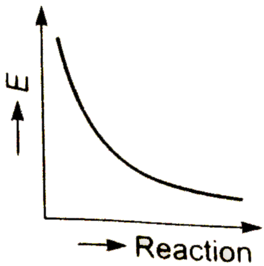
75. Which graph shows zero activation energy ?

A. 

B. 

C. 

D. 

Answer: C

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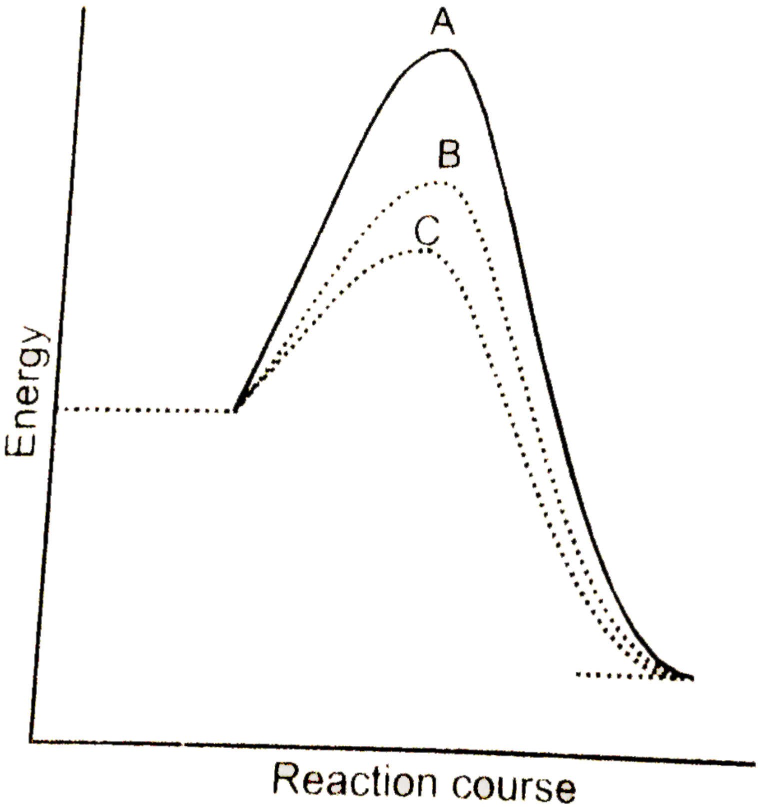
76. A homogenous catalytic reaction takes place through the three alternative plots A, B, and C shown in the given figure. Which one of the following indicates the relative ease with which the reaction cant take place?



A. $A > B > C$

B. $C > B > A$

C. $A > C > B$

D. A=B=C

Answer: B

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77. The rate of a reaction gets doubled when temperature increase by $27^{\circ} C \text{to} 37^{\circ}$. By what factor will it change for the temperature range 17° C to 27° C

A. 1.81

B. 1.71

C. 2.1

D. 2.41

Answer: C

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78. Which of the following explains the increase of the reaction rate by catalyst?

A. Catalyst decreases the rate of backward reaction so that the rate of forward reaction increases

B. Catalyst provides extra energy to reacting molecules so that they may reduce effective collisions

C. Catalyst provides an alternative path of lower activation energy to the reactants.

D. Catalyst increases the number of collisions between the reacting molecules.

Answer: C

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79. Collision theory is satisfactory for:

A. First order reactions

B. Zero order reactions

C. Bimolecular elementary reactions

D. Any order reactions

Answer: C

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80. For the first order reaction $A \rightarrow B + C$, carried out at 27° C . If $3.8 \times 10^{-16}\%$ of the reactant molecules exists in the activated state , the E_a (activation energy) of the reaction is:

A. 12 KJ/mol

B. 831.4 KJ/mol

C. 100 KJ/mol

D. 88.57 KJ/mol

Answer: C

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81. A following mechanism has been proposed for a reaction

$2A + B \to D \to E$

$A + B \to C + D$(slow)

$A + C \to E$ (fast)

The rate law expression for the reaction by RDS methd is:

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

B. $r = k[A][B]$

C. $r = k[A]^2$

D. $r = k[A][C]$

Answer: B

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82. A hypothetical reaction $A_2 + B_2 \to 2AB$ follows the mechanism as given below:

$A_2 \Leftrightarrow A + A(\text{fast})$

$A + B_2 \rightarrow AB + B$ (slow)

$A + B \rightarrow AB$ (fast)

The order of the overall reaction is

A. 2

B. 1

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

D. 0

Answer: C

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83. Chemical reaction occurs as a result of collisions between reacting molecules. Therefore, the reaction rate is given by

A. total number of collisions occuring in a unit volume per second

B. fraction of molecules which passes energy less than the threshold energy

C. total number of effective collisions which have enough activation energy

D. none of the above

Answer: C

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84. Radioactivity is affected by:

A. temperature

B. pressure

C. electric and magnetic field

D. none of these

Answer: D

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85. The radiation from naturally occuring radioactive substance as seen after deflection by a magnetic field in one direction are :

A. α -rays

B. β-rays

C. both α and β rays

D. either α or β-rays

Answer: D

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86. During α-decay:

A. $\frac{n}{p}$ ratio decreases

B. $\frac{n}{p}$ ratio increases

C. $\frac{n}{p}$ ratio remains emission constant

D. $\frac{n}{p}$ ratio may increase or decrease

Answer: B

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87. Atoms $._{7}X^{A}$, $._{8}Y^{B}$ and $._{9}Z^{17}$ are such that $._{8}Y$ is an isobar of $._{7}X$ and atom $._{9}Z^{17}$ is isotone of $._{8}Y$. Mass no. of X and no of neutrons in Y are respectively :

A. 8,8

B. 17,7

C. 9,8

D. 16,8

Answer: D

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88. $._{90}Th^{234}$ disintegrates to give $._{82}Pb^{206}Pb$ as the final product. How many alpha and beta particles are emitted during this process ?

A. 6

B. 7

C. 8

D. 13

Answer: D

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89. An isotone of $._{32}^{76}Ge$ is-

(a) $._{32}^{77}Ge$

(b).$_{33}^{77}As$

(c).$_{34}^{77}Se$

(d).$_{34}^{78}Se$

A. $\_\,(32)^{77}Ge$

B. $\_\,(33)^{77}As$

C. $\_\,(34)^{77}Se$

D. $\_\,(36)^{77}Se$

Answer: B

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90. Isodiaphers are atoms having:

A. n/p same

B. p/n same

C. (n-p) same

D. (n-p) different

Answer: C

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91. The number of neutrons accompanying the formation of $._{54}Xe^{139}$ and $._{38}Sr^{94}$ from the absorption of a slow neutron by $._{92}U^{235}$, followed by nuclear fission is

A. 0

B. 1

C. 2

D. 3

Answer: D

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92. Complete the following nuclear equation by suppling the symbol for the other product of the fission :

$._{92}^{235}U+_{0}^{1}n\rightarrow_{38}^{94}Sr+\ldots\ldots\ldots+2_{0}^{1}n$

A. $._{54}^{139} Xe$

B. $._{54}^{140} Xe$

C. $._{64}^{104} Gd$

D. none of these

Answer: B

Watch Video Solution

93. $X \rightarrow_{82}^{206} Pb +_2^4 He$ .In this reaction predict the position of group of X:

A. II B

B. IV B

C. VI A

D. VI B

Answer: C

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94. $._{90}Th$ is a member of III group . After losing α-particle it forms a new element belonging to :

A. I group

B. II group

C. III group

D. IV group

Answer: B

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95. Alpha decay of $._{92}^{238}U$ forms $._{90}^{234}Th$. What kind of decay from $._{90}^{234}Th$ produces $._{84}^{234}Ac$?

A. α

B. β

C. β^+ (positron)

D. γ -emission

Answer: C

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96. A radioactive sample had an initial activity of 56 dpm . After 69.3 minutes, it was found to have an activity of 28 dpm . Find the number of atoms in a sample having an activity of 100 dpm.

A. 693

B. 100

C. 1000

D. 10000

Answer: D

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97. A radioactive sample has initial activity of 28 dpm 30 minutes later its activity 14 dpm . How many atoms of nuclide were present initially?

A. 2800

B. 1212

C. 528

D. 2802

Answer: B

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98. The value of decay constant of Co^{60} is $2.5 \times 10^{-7} \text{min}^{-1}$. The activity of 2.0 g of the sample is nearly :

A. 5×10^{5} dpm

B. 2.5×10^{10}dpm

C. 5×10^{15} dpm

D. 10^{10}dpm

Answer: C

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99. Half-life $(t_{1/2})$ for a radioactive decay is 6930 sec. The time required to fall the rate of decay to $\left(\frac{1}{100}\right)^{th}$ of its initial value is:

A. 69.3 sec

B. 20000 sec

C. 46060 sec

D. None of these

Answer: C

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100. A sample of radioactive substance is found 90% of its initial amount after one day . What % of the original sample can be found after 3 days?

A. 81

B. 72.9

C. 25

D. 65.61

Answer: B

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101. If time t is required for a radioactive substance to become one third of its initial amount, what fraction would be left after 0.5 t ?

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

B. $\frac{1}{\sqrt{3}}$

C. $\frac{1}{3}$

D. $\sqrt{\frac{2}{3}}$

Answer: B

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102. The present activity of the hair of Egyption mummy is 1.75 dpm $t_{1/2}$ of $._{6}^{14}C$ is 5770 year and disintegration rate of fresh smaple of C^{14} is 14 dpm . Find out age of mummy.

A. 23080 year

B. 138480 year

C. 11998.3 year

D. 17310 year

Answer: D

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103. A 0.50g sample of rock was found to have 2.5×10^{-6} mol of $._{19}^{40}K\left(t_{1/2} = 1.3 \times 10^{9}\text{yr}\right)$ and 7.5×10^{-6} mol of $._{20}^{40}Ca$. How old is the rock?

A. 6.5×10^{8} yr

B. 1.3×10^{9} yr

C. 2.6×10^{9} yr

D. 5.2×10^{9} yr

Answer: C

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104. Indium -112 is radioactive and has a very short half-life ($t_{1/2} = 14$ min). Its decay constant and average life are repectively:

A. 0.0495 min^{-1}, 9.7 min

B. 0.495min^{-1}, 20.2 min

C. 9.7min^{-1},20.2 min

D. 0.0495min^{-1},20.2 min

Answer: D

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105. The half-life of a radioactive element is 100 minutes . The time interval between the stage to 50% and 87.5% decay will be:

A. 100 min

B. 50 min

C. 200 min

D. 25 min

Answer: C

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106. The half-life of Tc^{99} is 6.0 hr. The total residual activity in a patient 30 hr after receiving an injection containing Tc^{99} must be more than 0.01 μC_i. What is the maximum activity $(\text{in}\mu C_i)$ that the sample injected can have?

A. 0.16

B. 0.32

C. 0.64

D. 0.08

Answer: B

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107. A pure radio-chemical preparation was observed to disintegrate at the rate of 2140 counts/minutes at 12.35 P.M. of the same day, the disintegration rate of the sample was only 535 count/minutes. What is the half-life of the material?

A. 50 min

B. 100 min

C. 200 min

D. None of these

Answer: B

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108. A radioactive substance decay 25% in 10 minutes . If at start there are 4×10^{20} atoms present. After how much time will the number of atoms be reduced t0 10^{20} atoms? (given In 3=1.098)

A. 10.98 min

B. 21.97 min

C. 48.19 min

D. None of these

Answer: C

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109. Time taken of decay for a nuclear reaction is given by $t = 4t_{1/2}$. The relation between the mean life (T) and time of decay (t) is given by :

A. 2 T In 2

B. 4 T In 2

C. $2T^4$ In 2

D. $\frac{1}{T^2}$ In 2

Answer: B

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110. Two radioactive nuclides A and B have half-lives 50 min and 10 min respectively . A fresh sample contains the nuclides of B to be eight times that of A. How much time should elapse so that the mumber of nuclides of A becomes double of B ?

A. 30

B. 40

C. 50

D. 100

Answer: C

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111. A radioactive nuclide is produced at a constant rate of α per second . It's decay constant is λ. If N_0 be the no. of nuclei at time t=0 , then max. no. nuclei possible are :

A. N_0

B. α / λ

C. $N_0 + \frac{\alpha}{\lambda}$

D. $\frac{\lambda}{\sigma} + N_0 s$

Answer: B

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112. An analysis of the rock shows that the relative number of Sr^{87} and $Rb^{87}\left(t_{1/2} = 4.7 \times 10^{10}\right.$ year) atoms is 0.05 . What is the age of the rock? Assume all the Sr^{87} have been formed from Rb^{87} only

A. 7.26×10^9 year

B. 1.43×10^9 year

C. 3.28×10^9 year

D. 4.32×10^8 year

Answer: C

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113. A radioactive substance (parent) decays to its daughter element . The age of radioactive substance (t) is related to the daughter (d)/parent (p) ratio by the equation :

A. $t = \frac{1}{\lambda}\text{In}\left(1 + \frac{p}{d}\right)$

B. $t = \frac{1}{\lambda}\text{In}\left(1 + \frac{d}{p}\right)$

C. $t = \frac{1}{\lambda}\text{In}\left(\frac{d}{p}\right)$

D. $t = \frac{1}{\lambda}\text{In}\left(\frac{p}{d}\right)$

Answer: B

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114. The reaction A(g) + 2B(g) $\rightarrow$ C(g) is an elementary reaction. In an experiment involving this reaction, the initial pressures of A and B are P_A = 0.40 atm and P_B = 1.0 atm respectively. When P_C=0.3 atm, the rate of the reaction relative to the initial rate is:-

A. $\frac{1}{12}$

B. $\frac{1}{50}$

C. $\frac{1}{25}$

D. none of these

Answer: C

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115. Which of the following is incorrect statement ?

A. Stoichiometry of a reaction tells about the order of the elementry reaction.

B. For a zero order reaction. Reate and the rate constant are identical .

C. A zero order reaction is controlled by factors other than concentration of reactants

D. A zero order reaction is an elementary reaction

Answer: D

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116. Two first order freaction have half-lives in the ratio $8:1$ Calculate the ratio of time intervals $t_1 : t_2$ and t_1 and t_2 are the time period for $\left(\frac{1}{4}\right)^{th}$ and $\left(\frac{3}{4}\right)^{th}$ completion.

A. $1:0.301$

B. $0.125:0.602$

C. $1:0.602$

D. none of these

Answer: C

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117. Reaction $A+B \rightarrow C+D$ follows rate law $.r=k[A]^{1/2}[B]^{1/2}$ Starting with 1 M of A and B each. What is the time taken fro concetration of A become $0.1M$?

(Given$k = 2.303 \times 10^{-2} \sec^{-1}$)

A. 10 sec

B. 100 sec

C. 1000 sec

D. 434 sec

Answer: B

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118. For a first order homogeneous gaseous reaction

$A \rightarrow 2B + C$

if the total pressure after time t was P_1 and after long time $(t \rightarrow \infty)$ was P_∞ then K in terms of P_{t_1} P_∞ t is

A. $k = \frac{2.303}{t} \log\left(\frac{P\infty}{P\infty - P_t}\right)$

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

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

D. none of these

Answer: C

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119. A hydrogenation reaction is carried out at $500K$. If the same reaction is carried out in the presence of a catalyst at the same rate, the temperature required is $400K$. Calculate the activation energy of the reaction if the catalyst lowers the activation barrier by $20kJmol^{-1}$.

A. 100 kJ/mol

B. 80 kJ/mol

C. 60 kJ/mol

D. none of these

Answer: B

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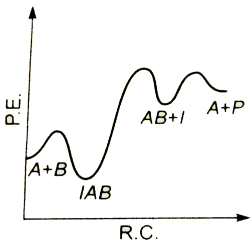
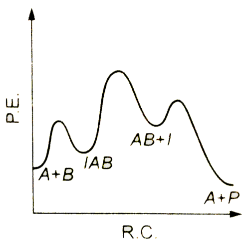
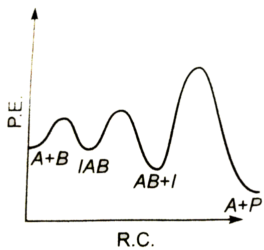
120. The following mechanism has been proposed for the exothermic catalyzed cmplex reaction:

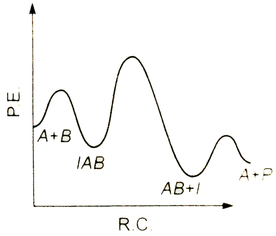
$$A+B \xrightarrow{\text{Fast}} IAB \xrightarrow{k_1} AB+I \xrightarrow{k_2} P+A$$

If k_1 is much smaller than k_2, the most suitable qualitative plot of potential energy (PE) versus reaction coordinates for the above reaction is

A. 

B. 

C. 

D. 

Answer: B

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121. A radioactive isotope X with half-life of 693×10^9 years decay to Y which is stable. A sample of rock from of the moon was found to contain both the elements X Y in the mole ratio $1:7$. What is the age of the rock ?

A. 2.079×10^{12} years

B. 1.94×10^{10} years

C. 1.33×10^9 years

D. 10^{10} years

Answer: A

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122. The ratio of activities of two ratio niculides X and Y in a mixture at time $t=0$ was found to be $4:1$ After two hours, the ratio activities become $1:1$. If the $t_{1/2}$ of radio nuclide X is 20 min then $t_{1/2}$ [in mintes] of ratio nuclide Y is ,

A. 10

B. 20

C. 30

D. 40

Answer: C

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123. Two consecutive irreversible fierst order reactions can be represented

by

$A \xrightarrow{k_1} B \xrightarrow{k_2} C$

The rate equation for A is readily interated to obtain

$[A]_t = [A]_0 . e^{-k_1 t}$, and $[B]_t = \dfrac{k_1[A]_0}{k_2 - k_1}\left[e^{-k_1^t} - e^{-k_2^t}\right]$

At what time will B be present in maximum concentration ?

A. $\dfrac{K_1}{K_2 - K_1}$

B. $\dfrac{1}{k_1 - k_2}$ In $k_1 \dfrac{)}{k_2}$

C. $\dfrac{1}{k_2 - k_1}$ In $k_1 \dfrac{)}{k_2}$

D. none of these

Answer: B

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124. Two consecutive irreversible fierst order reactions can be represented

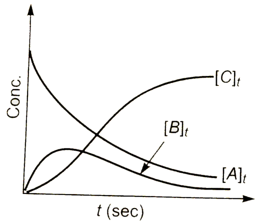
by

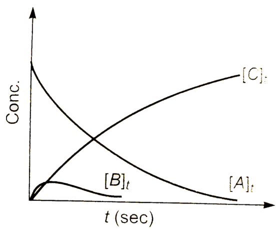
$$A \xrightarrow{k_1} B \xrightarrow{k_2} C$$

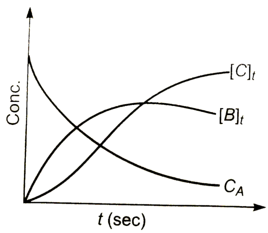
The rate equation for A is readily interated to obtain

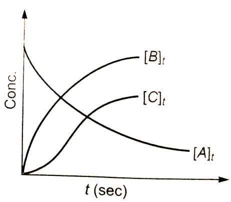
$[A]_t = [A]_0 . e^{-k_1 t}$, and $[B]_t = \dfrac{k_1[A]_0}{k_2 - k_1}\left[e^{-k_1^t} - e^{-k_2^t}\right]$

When $k_1 = 1s^{-1}$ and $k_2 = 500s^{-1}$, select most appropriate graph

A. 

B. 

C. 

D. (d) 

Answer: B

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125. Two consecutive irreversible fierst order reactions can be represented by

$A \xrightarrow{k_1} B \xrightarrow{k_2} C$

The rate equation for A is readily interated to obtain

$[A]_t = [A]_0 . e^{-k_1 t}$, and $[B]_t = \dfrac{k_1 [A]_0}{k_2 - k_1} \left[e^{-k_1^t} - e^{-k_2^t} \right]$

Select the corret statement for given reaction:

A. A decreases linearly

B. B rise to a max. and then constant

C. B rises to a max and the falls

D. The slowest rate of increases of C occuring where B is max

Answer: C

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126. Arrhenius studies the effect of temperature on the rate of a reaction and postulted that rate constant varies with temperature exponentially as $k = Ae^{E_a / RT}$. Thuis method is generally used for finding the activation energy of a reaction. Keeping temperature constant, the effect of catalyst on the activation energy has also been studied.

The pre-exponetial factor in the Arrhenius equation of a first order reaction has the unit :

A. mol $L^{-1}s^{-1}$

B. L $mol^1 s^{-1}$

C. s^{-1}

D. `dimensionaless

Answer: C

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127. Arrhenius studies the effect of temperature on the rate of a reaction and postulted that rate constant varies with temperature exponentially as $k = Ae^{E_a / RT}$. Thuis method is generally used for finding the activation energy of a reaction. Keeping temperature constant, the effect of catalyst on the activation energy has also been studied.

If x is the fraction of molecules having energy greater than E_a it will be given by :

A. $x = -\frac{E_a}{RT}$

B. In $x = -\frac{E_a}{RT}$

C. $x = e^{E_a / RT}$

D. Any of these

Answer: B

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128. Arrhenius studies the effect of temperature on the rate of a reaction and postulted that rate constant varies with temperature exponentially as $k = Ae^{E_a / RT}$. Thuis method is generally used for finding the activation energy of a reaction. Keeping temperature constant, the effect of catalyst on the activation energy has also been studied.

If the rate of reaction doubles for $10^{\circ} C$ rise of temperature form 290K to 300K, the activation energy of the reaction will be approximately :

A. 40 Kcal mol^{-1}

B. 12 Kcal mol^{-1}

C. 60 Kcal mol^{-1}

D. 70 Kcal mol^{-1}

Answer: B

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129. An important parameter of a photochemical reaction is the quantum effeiciency or quantum yield (ϕ) which is defined as

$$\phi = \frac{\text{moles of the substance reaction}}{\text{moles of photons absorbed}}$$

Absorption of UV radiation decompose acetone according to the reaction

$$(CH_3)_2CO \xrightarrow{hv} C_2H_6 + CO$$

The quantum yield of a reaction at $\lambda = 330nm$ is 0.4 . A sample of acetone absorbs monochromatic radiation at $\lambda 330mn$ at the rate of $7.2 \times 10^{-3} Js^{-1}$ (given : $N_A = 6 \times 10^{23}, h = 6.6 \times 10^{-34}$ in S.I unit).

The rate of formation of $CO(mol / s)$ is :

A. 2×10^{-8}

B. 8×10^{-8}

C. 8×10^{-9}

D. none of these

Answer: C

Watch Video Solution

130. An important parameter of a photochemical reaction is the quantum effeiciency or quantum yield (ϕ) which is defined as

$$\phi = \frac{\text{moles of the substance reaction}}{\text{moles of photons absorbed}}$$

Absorption of UV radiation decompose acetone according to the reaction

$$(CH_3)_2CO \xrightarrow{hv} C_2H_6 + CO$$

If quantum yield in 0.8 then rate of formation of $C_2H_6(mol/s)$ is :

A. 2×10^{-8}

B. 1.6×10^{-9}

C. 16×10^{-9}

D. 8×10^{-9}

Answer: C

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131. Radioactive disintegration is a first order reaction and its rate depends only upon the nature of nucleus and does not depend upon external factors like temperature and pressure. The rate of radioactive disintegration (Activity) is represented as

$-\frac{dN}{dt} = \lambda N$ Where $\lambda =$ decay constant, N= number of nuclei at time t, N_0 =intial no. of nuclei. The above equation after integration can be represented as

$$\lambda = \frac{2.303}{t}\log\left(\frac{N_0}{N}\right)$$

Half-life period of $U^{2.5 \times 10^5}$ years. In how much thime will the amount of U^{237} remaining be only $25\ \%$ of the original amount ?

A. 2.5×10^5 year

B. 1.25×10^5 years

C. 5×10^5 years

D. none of these

Answer: C

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132. Radioactive disintegration is a first order reaction and its rate depends only upon the nature of nucleus and does not depend upon external factors like temperature and pressure. The rate of radioactive disintegration (Activity) is represented as

$-\frac{dN}{dt} = \lambda N$ Where $\lambda =$ decay constant, N= number of nuclei at time t, N_0 =intial no. of nuclei. The above equation after integration can be represented as

$$\lambda = \frac{2.303}{t} \log\left(\frac{N_0}{N}\right)$$

Calculate the half-life period of a radioactive element which remains only $1/16$ of its original amount in 4740 years:

A. 1185 years

B. 2370 years

C. 52.5 years

D. none of these

Answer: A

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133. Radioactive disintegration is a first order reaction and its rate depends only upon the nature of nucleus and does not depend upon external factors like temperature and pressure. The rate of radioactive disintegration (Activity) is represented as

$-\frac{dN}{dt} = \lambda N$ Where $\lambda =$ decay constant, N= number of nuclei at time t, N_0 =intial no. of nuclei. The above equation after integration can be represented as

$\lambda = \frac{2.303}{t} \log\left(\frac{N_0}{N}\right)$

What is the activity in Ci (curie) of 1.0mole plutonium -239 ? $(t_{1/2} = 24000$ yeasrs)

A. 1.49 Ci

B. 14.9 Ci

C. 5.513×10^{11} Ci

D. `None of these

Answer: B

134. Size of nucleus was obtained by the equation $r = R_0 A^{1/3}$, Where r is the radius of nucleus of mass no A. and R_0 is a constant whose valie is equal to 1.5×10^{-15} metre.

(Given : 1 amu = $1.66 \times 10^{-24} g$)

What is the density of a nucleus of mass number A ?

A. $\frac{4}{3}\pi\left(1.5 \times 10^{-15}\right)^3$ A

B. $1.17 \times 10^{17} kg / cm^3$

C. $1.17 \times 10^{-17} kg / m^3$

D. none of these

Answer: B

135. Size of nucleus was obtained by the equation $r = R_0 A^{1/3}$, Where r is the radius of nucleus of mass no A. and R_0 is a constant whose valie is equal to 1.5×10^{-15} metre.

(Given : 1 amu = $1.66 \times 10^{-24} g$)

Nucleus radius of $._6 C^{12}$ is 3×10^{-15} metre. What is density ratio of d_c / d_{H_2O} ?

A. 1.76×10^{17}

B. 1.76×10^{14}

C. 17.6×10^{7}

D. 17.6×10^{17}

Answer: B

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136. Select the correct statement(s):

A. Rate constant are never negative

B. Partial orders are never negative

C. Molecularity and order of reaction both are equal for elementary reaction

D. Order of reaction may be change with change in practical conditions (temp. and pressure)

Answer: A::C::D

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137. Select the correct statement(s):

A. the rate of reaction decreases with decreases in temperature

B. The rate of reaction is uniform in zero order reaction

C. The rate of reaction depends upon the surface area of the solid reactants

D. Average and instantaneous rate of reaction defined for macro andmicro-scopic time interval respectively

Answer: A::B::C

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138. Select the correct statement(s) :

A. The rate law of the elementary reaction , $2A \rightarrow B + C$, must be $r = k[A]^2$

B. The rate law for the complex reaction $A + B \rightarrow C$, might not be r=k[A][B]

C. If the partial orders differ from the stoichiometric coefficients in the balanced reaction, the reaction must be complex

D. If the partial orders are equal to corresponding coefficients in the balanced reaction, the reaction must be elementary

Answer: A::B::C

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139. Select the correct statement(s) :

A. Every substance tht appears in the rate law of reaction must be a reactant or product in that reaction

B. If we know the rate law of a reaction , we can deduce its mechanism

C. If the reaction has rate $r = k[A][B]^{3/2}$ then reaction may be elementary

D. A zero order reaction must be a complex reaction

Answer: D

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140. Select the correct statement(s) :

A. In the reaction $._{92}^{235} U +_{0}^{1} n \rightarrow_{56}^{140} Ba + 2_{0}^{1} n + x, x \text{is}_{36}^{94} Kr$

B. In the reaction $._{11}^{23} Na + z \rightarrow_{12}^{23} Mg +_{0}^{1} n,$ the bombarding particle z is deuteron

C. Very large amount of energy is produced during nuclear fusion and nuclear fission

D. In a fission reaction , a loss in mass occurs releasing a vast amount of energy

Answer: A::C::D

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141. In the decay process:

$A \xrightarrow{-\alpha} B \xrightarrow{-\beta} C \xrightarrow{-\beta} D$ a)A and B are isodiaphers b)A and C are isotones c)A and C are isotopes d)B, C and D are isobars

A. A and B are isobars

B. A and D are isotopes

C. B,C and D are isobars

D. A and C are isotones

Answer: B::C

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142. Match the following columns

Column-I	Column-II
(A) Unit of k is always equals to	(P) 1/time
(B) Unit of k in zero order	(Q) M/time
(C) Unit of k in first order	(R) Time^{-1} M^{-1}
(D) Unit of k in second order	(S) Unit of A (pre-exponential factor)

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143. Match the following columns

Column-I	Column-II
(A) Molecularity of a reaction	(P) 0, 1 Possible
(B) Order of reaction	(Q) 1, 2 Possible
(C) The dissociation of H_2O_2 (aq) is	(R) First order reaction
(D) $H_2(g) + Cl_2(g) \xrightarrow{h\nu} 2HCl$ is	(S) Zero order reaction

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144. Match the following columns

Column-I (Curve)

(A) C vs t (abscissa) for zero order

(B) $\log C$ vs t (abscissa) for first order

(C) $\left(\frac{-dc}{dt}\right)$ vs C for zero order

(D) $\ln\left(\frac{-dc}{dt}\right)$ vs $\ln C$ for first order

Column-II (Slope)

(P) unity

(Q) zero

(R) $-k$

(S) $-\frac{k}{2.303}$

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145. Match the following columns

Column-I
(First order of reaction $A \rightarrow B$)

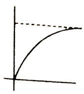
(A) $[B]$ vs t

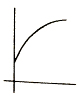
(B) $[A]$ vs t

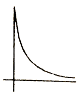
(C) $\frac{1}{[A]}$ vs t

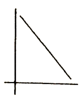
(D) $\ln k$ vs $\frac{1}{T}$

Column-II

(P) 

(Q) 

(R) 

(S) 

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146. Match the following columns

Column-I	Column-II
(A) Isotones	(P) ${}^{234}_{91}Pa$ and ${}^{234}_{90}Th$
(B) Isobars	(Q) ${}^{12}_{6}C$ and ${}^{14}_{6}C$
(C) Isotopes	(R) ${}^{39}_{19}K$ and ${}^{19}_{9}F$
(D) Isodiaphers	(S) ${}^{39}_{18}Ar$ and ${}^{40}_{19}K$

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147. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1:Molecurity has no meaning for a complex reactions

STATEMENT-2:Molecurity defined only for RDS

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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148. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: An elementry reaction cannot have fractional order.

STATEMETNT-2:Stoichiometric coefficients in an elementary reaction can be fractional.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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149. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1:Concentration of reactant in zero order reaction is constant.

STATEMENT-2: For zero order reaction $A \to B$, successive half life of reaction decrease with the progress of the reaction.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

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150. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: The order of reaction can have fractional value.

STATEMENT-2: For an elementary reaction, the parial orders are determined by the reaction stoichiometry

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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151. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Catalyst may increase the rate constant to a large extent.

STATEMENT-2:By using suitable catalyst, we can significantly increase yield.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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152. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Product is formed only when the required orientation and energy conditions are met.

STATEMENT-2: All collisions between reactants yield the desired product

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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153. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: The plot of k versus 1/T is linear.

STATEMENT-2: $k = A.\, e^{-E_a / RT}$

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

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154. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: For exothermic reaction equilibrium constant decrease with increase in temperature.

STATEMETN-2: For exothermic reaction rate constant decrease with decrease in temperature.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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155. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT -1: If the activation energy of reaction is zero, temperature will have no effect on the rate constant.

STATEMENT-2: Lower the activation energy faster is the raction.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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156. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Active complex is an intermediate product.

STATEMENT-2: Active complex is unstable with high vibrational energy.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

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157. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: The pre-exponential factor A has the same units for all reactions.

STATEMENT -2: $e^{-E_a/RT}$ has no unit.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

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158. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT -1: $\gamma -$ rays have very high penetrating power.

STATEMENT-2: γ-rays are electromagnetic raidations of high energy.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

159. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Disintegration of $_(1)^3H$ (tritium) is accompanied by $\beta -$ emission.

STATEMENT-2: Tritium has high n/p ratio.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

Watch Video Solution

160. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: The life of radiactive object (organic origin) can found with the help of carbon dating.

STATEMENT-2: $\_(6)^{14}C$ is a α and β-emitter.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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161. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Neutron are the best bombarding particles.

STATEMENT-2: Neutrons are neutral particles.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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162. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Nucleus does not contain fee electrons, yet it emit beta-particles

STATEMENT-2: At high n/p ratio, one neutron supposed to give 1 proton and 1 $e^{-}(\beta)$.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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163. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Rate of disintegration of thorium increases with the increase in moles of thorium.

STATEMENT-2: Rate of disintegration does not depend upon temperature, pressure

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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164. The rate of decomposition of $NH_3(g)$ at 10 atm on platinum surface is zero order . What is rate of formation (in M min^{-1}) of H_2(g) , if rate constant of reaction $2NH_{3(g)} \rightarrow N_2(g) + 3H_2(g)$ is 2.0 M min^{-1} ?

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165. In an elementary reaction $A(g) + 2B(g) \rightarrow C(g)$ the initial pressure of A and B are $P_A = 0.40$ atm and P_B=0.60 atm respectively. After time T, if pressure of C is observed 0.1 atm, then find the value of $\frac{r_i(\text{ initial rate of reaction})}{r_t(\text{ rate of reaction after time t})}$.

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166. Carbon monoxide reacts with O_2 to form CO_2:

$2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

Infromations about this reaction are given in the table below.

$[CO]$ mol/L	$[O_2]$ mol/L	Rate of reaction (mol/L.min)
0.02	0.02	4×10^{-5}
0.04	0.02	1.6×10^{-4}
0.02	0.04	8×10^{-5}

What is the value for the rate constant for the reaction in properly related unit?

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167. Half-life for the zero order reaction $A(g) \rightarrow B(g) + C(g)$ and half-life for the first order reaction $X(g) \rightarrow Y(g) + Z(g)$ are equla. If completion time for the zero order reaction is 13.86 min, then calculate the rate constant (in hr^{-1}) of the reaction $X(g) + \rightarrow Y(g) + Z(g)$.

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168. For any acid catalysed reaction, $A \xrightarrow{H^+} B$

half- life period is independent of concentration of A at given pH. At definite concentration of A half- time is 10min at pH=2 and half- time is

100 min at pH=3. If the rate law expression of reaction is $r = k[A]^x[H^+]^y$ then calulate the value of (x+y).

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169. Iiodine -131 is a radioactive isdotpe. If 1.0 mg of ${}^{131}I$ has an activity of 4.6×10^{12}Bq. What is the half-life of ${}^{131}I$ (in days)

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170. The average life of a radioactive element is 7.2 min. Calculate the time travel (in min) between the stages of 33.33% and 66.66% decay

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171. A,B and C are isodiaphers while C,D and E are isobars. Calculate the difference of protons between A and E .${}^{206}_{82}A \rightarrow B \rightarrow C \rightarrow D \rightarrow E$

Given: Isodiaphers and isobars are formed in successive α and $\beta -$ emission respectively.

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172. How may $\alpha -$ and $\beta -$ particles will be emitted when $._{90}Th^{232}$ changes into $._{82}Pb^{208}$?

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173. In the given radioactive disintegration series

$._{92}^{235}U \rightarrow _{82}^{207}Pb$

Calculate difference between number of α and number of β particles emitted in this series.

Watch Video Solution

Level 1 Q 3 To Q 32

1. Above given question, the value of rate constant for appearance of AB(g) is :

A. 2.5×10^{-4}

B. 2.5×10^{-2}

C. 1.25×10^{-2}

D. None of these

Answer: B

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2. The following data pertain to reaction between A and B

S.No	$[A]$	$[B]$	Rate
	$molL^{-1}$	$molL^{-1}$	$molL^{-1}\sec^{-1}$
I	1×10^{-2}	2×10^{-2}	2×10^{-4}
II	2×10^{-2}	2×10^{-2}	4×10^{-4}
III	2×10^{-2}	4×10^{-2}	8×10^{-4}

Which of the following interference(s) can be drawn from the above data

(a) Rate constatnt of the reaction 10^{-4}

(b) Rate law of reaction is k[A][B]

(c) Rate of reaction increases four times on doubling the concentration of both the reactant Select the correct answer codes

A. a,b and C

B. a and b

C. b and c

D. c alone

Answer: C

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Level 1 Q 33 To Q 62

1. Half-life ($t_{1/2}$) and completion time (T) of the above reaction ($A \rightarrow 2B$) are :

A. 500 min, 750 min

B. 500 sec, 750 sec

C. 50 sec, 100 sec

D. None of these

Answer: C

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2.

column I			column II
$P.$	Zero order reaction	1.	$t_{1/2} \alpha \frac{1}{[A]_0}$
$Q.$	First order reaction	2.	$t_{100\%} = [A]_0 / k$
$R.$	second order reactions	3.	Involves at least two react
$S.$	Pseudo unimolecular reaction	4.	$[A] = [A]_0 e^{-kt}$

A. $\begin{matrix} P & Q & R & S \\ 2 & 1 & 4 & 2 \end{matrix}$

B. $\begin{matrix} P & Q & R & S \\ 2 & 4 & 1 & 3 \end{matrix}$

C. $\begin{matrix} P & Q & R & S \\ 2 & 1 & 3 & 4 \end{matrix}$

D. $\begin{matrix} P & Q & R & S \\ 3 & 2 & 1 & 4 \end{matrix}$

Answer: B

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3. The decomposition of N_2O in carbon tetrachloride was followed bymesuring the volume of O_2 gas evolved : $2N_2O_5(\mathrm{CCL}_4) \rightarrow 2N_2O_4(CCL_4) + O_2(g)$. The maximum volume of O_2 gas obtained was 100 cm^3. In 500 minutes, 90 cm of O_2 were evolved. The first order rate constant (in $\min^{-1}$ for the dissaperance of N_2O is :

A. $\frac{2.303}{500}$

B. $\frac{2.303}{500}\log\frac{100}{90}$

C. $\frac{2.303}{500}\log\frac{90}{100}$

D. $\frac{100}{10 \times 500}$

Answer: A

View Text Solution

Level 1 Q 63 To Q 92

1. A first order reaction is 50% completed in 20 minutes at 27° C and in 5 minutes at 47° . The energy of activation of the reaction is :

A. 43.85 KJ/mol

B. 55.14 KJ/mol

C. 11.97 KJ/mol

D. 6.65 KJ/mol

Answer: B

View Text Solution

2. A catalyst lowers the activation energy for a certain reaction from 83.314 to 75 KJ mol^{-1} at 500 K . What will be the rate of reaction as compared to uncatalyst reaction ? Assume other things being equal

A. Double

B. 28 times

C. 7.38 times

D. 7.38×10^3 times

Answer: C

View Text Solution

Level 1 Q 93 To Q 122

1. In the radioactive decay $._z X^A \rightarrow_{Z+1} Y^A \rightarrow_{Z-1} \underset{\text{high energy}}{Z^{A-4}} \rightarrow_{Z-1} \underset{\text{low energy}}{Z^{A-4}}$ the sequence of the radiation emitted is :

A. α, β, γ

B. γ, α, β

C. β, γ, α

D. β, α, γ

Answer: D

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2. A radioactive nuclide emitts γ- rays due to the :

A. emission of an electron from its orbital

B. nuclear energy transition from a higher state to a lower state

C. presence of less neutrons than protons

D. presence of more neutrons than protons

Answer: B

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3. Consider the following decay $._{Z}^{A}X \rightarrow_{Z+1}^{A}Y +^{0}_{-1}e, X$ is unstable because:

A. its nucleus has excess energy

B. $\frac{n}{p}$ ratio is high

C. $\frac{n}{p}$ ratio is low

D. none of these

Answer: B

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4. Consider the following decay $._{Z}^{A}X \rightarrow _{Z-1}^{A}Y + _{+1}^{0}e, (\beta^{+})X$ is unstable because:

A. its nucleus has excess energy

B. $\frac{n}{p}$ ratio is high

C. $\frac{n}{p}$ ratio is low

D. none of these

Answer: C

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5. Which of the following processes causes the emission of X-ray?

A. α-emission

B. β-emission

C. β^+ (Positron) emission

D. electron capture

Answer: D

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6. Which of the following processes result in an increase in the atomic number of a nuclide?

A. α-emission

B. electron capture

C. γ-emission

D. β-(Beta) emission

Answer: D

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7. .... Is produced when a positron and an electron collide.

A. X-ray

B. Neutron

C. γ-radiation

D. Neutrino

Answer: C

View Text Solution

8. $\_(67)^{165}Ho$ is stable isotope. $\_(67)^{150}Ho$ is expected to distegrate by:

A. α-emission

B. β-emission

C. Positron emission

D. γ -emission

Answer: C

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9. $\_(1)^{1}H$ is a stable isotope . $\_(1)^{3}H$ is expected to disintegrated by :

A. α-emission

B. β-emission

C. Positron emission

D. proton emission

Answer: B

View Text Solution

10. Emission of β -particle is equivatent to:

A. increase of one proton only

B. decrease of one neutron only

C. both (a) and (b)

D. none of these

Answer: C

View Text Solution

11. Pair of isobar is :

A. $._{6}^{77}C,_{7}^{13}N$

B. $._{6}^{13}C,_{7}^{14}N$

C. $._{6}^{14}C,_{8}^{15}N$

D. None of these

Answer: A

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12. The 'group displacement law' was given by :

A. Bacqueral

B. Rutherford

C. Madam Curie

D. Soddy and Fajan

Answer: D

View Text Solution

13. $._{7}^{7}Li+_{1}^{1}P\rightarrow X$, Identify X if reaction is (p,α) type.

A. $._{4}^{8}Be$

B. $._{2}^{4}He$

C. $._{0}^{0}\gamma$

D. none of these

Answer: B

View Text Solution

14. Identify reaction type:

$_(13)^{27}Al+_{1}^{2}H\rightarrow_{13}^{28}Al+_{1}^{1}H$

A. (d,p)

B. (p,p)

C. (p,d)

D. none of these

Answer: A

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15. $._{23}^{28}Al +_1^1 P \rightarrow X +_0^0 \gamma$, type artifical radioactive reaction.

A. $._{13}^{28}Al$

B. $._{14}^{27}Si$

C. $._{14}^{28}Si$

D. none of these

Answer: C

View Text Solution

16. What will be the product of reaction $._{101}^{255}Md(\alpha, 2n)$?

A. $._{103}^{256}Lr$

B. $._{54}^{257} No$

C. $._{103}^{257} Lr$

D. $._{82}^{205} Pb$

Answer: C

View Text Solution

17. $._{92}^{235} U +_0^1 n \rightarrow_{56}^{139} Ba +_{36}^{94} Kr + 3_0^1 n + 200 MeV$

Total energy released (in MeV) after 5^{th} stage of fission is:

A. 48600

B. 16200

C. 24200

D. None of these

Answer: C

View Text Solution

18. Proton bombardment on Th^{230} followed by emission of two alpha particles will produce:

A. Rn^{232}

B. Ra^{233}

C. Fr^{223}

D. Fr^{222}

Answer: C

View Text Solution

19. $._{83}^{214}Bi$ decays to A by α -emission . A then decays to B by beta emission , which further decays to C by another beta emission . Element C decays to D by still another beta emission , and D deacays by α-emission to form a stable isotope E. What is element E?

A. _ $(81)^{207}T1$

B. _ $(80)^{206}Hg$

C. _ $(79)^{206}Au$

D. _ $(82)^{206}Pb$

Answer: D

View Text Solution

20. The activity of a radioactive nuclide $\left(X^{100}\right.$ is 6.023 curie at a certain time 't' . If its disintegration constant is $3.7 \times 10^4 s^{-1}$ the mass of X after t sec is :

A. 6.022×10^6 g

B. $10^{-13}g$

C. 10^{-15} g

D. 10^{-17} g

Answer: C

View Text Solution

Level 1 Q 123 To Q 150

1. Activity of a radioactive substance is A_1 at time t_1 and A_2 at time $t_2(t_2 > t_1)$, then the ratio of f$\frac{A_2}{A_1}$ is:

A. $e^{\lambda(t_2+t_1)}$

B. $e^{\lambda(t_1-t_2)}$

C. $e^{-\lambda(t_1+t_2)}$

D. $\frac{t_2}{t_1}$

Answer: B

View Text Solution

2. The half-life of $._{6}^{14}C$ is 5730 year. What fraction of its original C^{14} would left after 22920 year of storage?

A. 0.5

B. 0.25

C. 0.125

D. 0.0625

Answer: D

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3. The amount of $._{6}^{14}C$ isotope in a piece of wood is found to one fourth (1/4) of that present in a fresh piece of wood. Calculate the age of the piece of wood $\left(t_{12}\text{of } {}_{6}^{14}C = 5770\text{years}\right)$

A. 7999 year

B. 11540 year

C. 16320 year

D. 23080 year

Answer: B

View Text Solution

4. A radioactive element undergoing decay is left 20% of its initial weight after certain period of time t. How many such periods should elapse from the start for the 50% of the element to be left over?

A. 3

B. 4

C. 5

D. none of these

Answer: D

View Text Solution

5. In a sample of wood, the reading of a counter is 32 dpm and in a fresh sample of tree it is 122dpm . Due to error counter gives the reading 2 dpm in absence of $.^{14}C$. Half life of $.^{14}C$ is 5770 years .

The approximate age (in years) of wood sample is :

A. 7997.2

B. 57570

C. 11540

D. 15140

Answer: C

View Text Solution

6. A certain radioactive isotope $._{Z}^{A}X(t_{1/2} = 100$ days decays to $._{Z-2}^{A-8}Y$. If 1 mole of $._{Z}^{A}X$ is kept in sealed container , how much He gas will accumulate at STP in 200 days?

A. 11.2 litres

B. 33.6 litres

C. 22.4 litres

D. 44.8 litres

Answer: B

View Text Solution

7. Two radio isotopes A and B of atomic mass X and Y are mixed in equal amount by mass. After 20 days , their mass ratio is found to be $1:4$. Isotope A has a half-life of 1 day. The half-life of isotope B is :

A. $1.11\frac{Y}{X}$ days

B. $0.11\frac{X}{Y}$ day

C. 0.6237 day

D. 1.10 day

Answer: D

View Text Solution

8. There are two radio nuclei A and B is a α -emitter and B is β-emitter. Their disintegration constant are in the ratio of 1:2 . What should be the number of atoms ratio of A and B at time t=0 , so that initially probability of getting of α and β-particles are same.

A. $2:1$

B. $4:1$

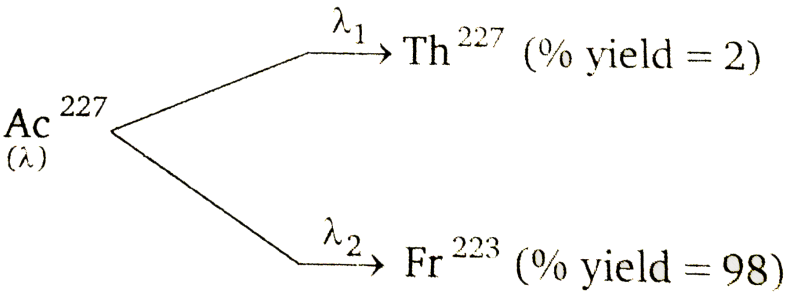
C. $1:2$

D. $1:4$

Answer: A

View Text Solution

9. Ac^{227} has a half-life of 22 years . The decays follows two parallel paths



What are the decay constant (λ) for Th and Fr respectively ?

A. 0.03087,0.00063

B. 0.00063,0.03087

C. 0.02,0.98

D. None of these

Answer: B

View Text Solution

10. $._{84}^{218}Po(t_{1/2}=183 \text{ sec})$ decay to $._{82}Pb(t_{1/2}=161 \text{ sec})$ by α-emission, while Pb^{214} is a β-emitter. In an experiment starting with 1 mole of pure Po^{218}, how many time would be required for the number of nuclei of $._{82}^{214} Pb$ to reach maximum ?

A. 147.5

B. 247.5

C. 182

D. 304

Answer: B

View Text Solution

Level 2

1. The forward rate constant for the elementary reversible gaseous reaction

$C_2H_6 < \Rightarrow 2CH_3 \text{is} 1.57 \times 10^{-3} s^{-1} at 100K$

What is the rate constant for the backward reaction at this temperature if 10^{-4} moles of CH_3 and 10 moles of C_2H_6 are present in a 10 litre vessel at equilibrium .

A. $1.57 \times 10^9 L\text{mole}^{-1} s^{-1}$

B. $1.57 \times 10^{10} L\text{mole}^{-1} s^{-1}$

C. $1.57 \times 10^{11} L\text{mole}^{-1} s^{-1}$

D. $1.57 \times 10^7 L\text{mole}^{-1} s^{-1}$

Answer: D

View Text Solution

2. For a hypothetical reaction,

$A + 3B \rightarrow P \qquad \Delta H = -ex$ Kj/ "mole" of A

$\& M \rightarrow 2Q + R \qquad \Delta H = + \times$ kJ/ "mole" of M

These reactions are carried simultaneously in a reactor such that temperature is not changing If rate of disppearance of B is y sec^{-1} then rate of formation (in Msec^{-1}) of Q is :

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

B. $\frac{3}{2}y$

C. $\frac{4}{3}y$

D. $\frac{3}{4}y$

Answer: C

View Text Solution

Level 2 Q 3 To Q 32

1. The kinetic date for the given reaction $A(g) + 2B(g) \xrightarrow{K} C(g)$ 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.	0.2	0.02	1.386×10^{-5}

$< b > Ina \neg her \exp erin$

0.5

and $1 M respectivelyf$ or A and $B at 300 K, f \in d the rate of reaction after$

//`sec).

A. 6.93×10^{-4}

B. 0.25×10^{-7}

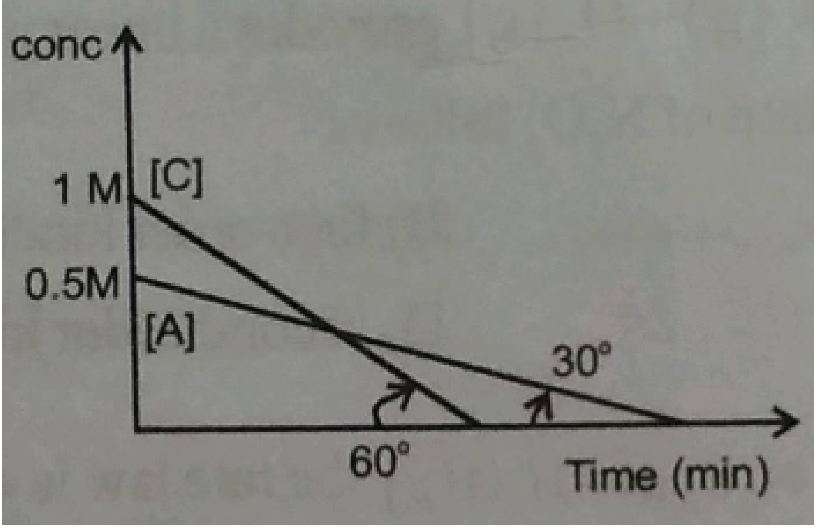
C. 4.33×10^{-5}

D. 3.46×10^{-4}

Answer: C

View Text Solution

2. For the two reactions $I: \rightarrow BIII: \rightarrow B, II: C \rightarrow D$ following graph is obtained.



Which of the following is true:

A. If [B]=[A] then at than time [D] $= 0.75M$

B. If [C]=[A] then at that time $[B] > [D]$

C. $(t_{100\%})_{\text{ReactonI}} = (t_{100\%})_{\text{Reaction}II}$

D. [A]=[C]at$t = \frac{\sqrt{3}}{2}$ min .

Answer: A

View Text Solution

3. The reaction $A(g) \to B(g) + 2C(g)$ is a first order reaction with rate constant $2.772 \times 10^{-3} s^{-1}$, Starting with 0.1 mole of A in 2 litre vessel, find the concentration of A after 250 sec when the reaction is allowed to take place at constant pressure and at 300 K?

A. $0.0125M$

B. $0.025M$

C. $0.05M$

D. none of these

Answer: A

View Text Solution

4. $A(aq) \to B(aq) + C(aq)$ is first order reaction.

Time	t	∞
moles of reagent	n_1	n_2

Reaction prgress is measured with the help of titration of reagent 'R'. If all A, B and C react with reagent and have 'n' factors [n factor,eq. mass= $\frac{\text{mol.mass}}{n}$ in the ratio of $1:2:3$ with the reagent, the k in terms of t, n_1 and n_(2)` is :

A. $k = \frac{10}{t}\ln\left(\frac{n_2}{n_2 - n_1}\right)$

B. $k = \frac{1}{t}\ln.\left(\frac{2n_2}{n_2 - n_1}\right)$

C. $k = \frac{1}{t}\ln.\left(\frac{4n_2}{n_2 - n_1}\right)$

D. $k = \frac{1}{t}\ln.\left(\frac{4n_2}{5(n_2 - n_1)}\right)$

Answer: D

View Text Solution

5. The gaseous decomposition reaction, $A(g) \rightarrow 2B(g) + C(g)$ is observed to first order over the excess of liquid water at $25^\circ C$. It is found that after 10 minutes the total pressure of system is 188 torr and after very long time it is 388 torr. The rate constant of the reaction (in hr $\hat{}\,(-1))$ is : [Given : vapour pressure of H_2O at 25° is 28 torr (ln $2 = 0.7$, ln3 $= 1.1$, $\ln 10 = 2.3$)]

A. 0.02

B. 1.2

C. 0.2

D. none of these

Answer: B

View Text Solution

6. The reaction ,Sucrose $\xrightarrow{H^+}$ Glucose $+$ Fructose, take place at certain temperature while the volume of solution is maintained at 1 litre. At time zero the initial rotation of the mixture is 34°. After 30 minutes the total rotation of solutions is 19° and after a very long time, the total roation is $-11^\circ C$ Find the time when solution was potically inaactive.

A. 135 min

B. 103.7 min

C. 38.7 min

D. 45 min

Answer: B

View Text Solution

7. A gaseous compound A reacts by three independent first order process (as shown in figure) with rate constant $2 \times 10^{-3}, 3 \times 10^{-3}$ and $1.93 \times 10^{-3} \sec^{-1}$ for products B, C and D respectively, If initially pure A was taken in a closed container with p=8 atm then the partial pressure of B (in atm) after 100 sec from starting the experiment.

A. 0.288

B. 0.577

C. 1.154

D. none of these

Answer: C

View Text Solution

8. A compound A dissociates by two parallel first order paths at certain temperature

$$A(g) \xrightarrow{k_1\left(\overset{-1}{\min}\right)} 2B(g) \qquad k_1 = 6.93 \times 10^{-3}\ \overset{-1}{\min}$$

$$A(g) \xrightarrow{k_1\left(\overset{-1}{\min}\right)} C(g) \qquad k_2 = 6.93 \times 10^{-3}\ \overset{-1}{\min}$$

The reaction is started with 1 mole of pure 'A' litre closed container with initial pressure 2 atm. What is the pressure (in atm) developed in container after 50 minutes from start of experiment?

A. 1.25

B. 0.75

C. 1.50

D. 2.50

Answer: D

View Text Solution

9. For given hypothetical elementary parallel reaction,

Intially only 2 moles of A are present. The total no. of moles of A, B and C at the end of 75% reaction are:

A. 2

B. 3

C. 4

D. 3.5

Answer: D

View Text Solution

10. The reaction cis-Xcis-X $\underset{k_b}{\overset{k_f}{<}} \Rightarrow$ trans-X is first order in both direction At $25^\circ C$, the equilibrium constant is 0.10 and the rate constant $k_f = 3 \times 10^{-4} s^{-1}$ In an experiment starting with the pure cis- from , how long would it take for half of the equilibrium amount of the trans-iomer to be fromed?

A. 150 sec

B. 200 sec

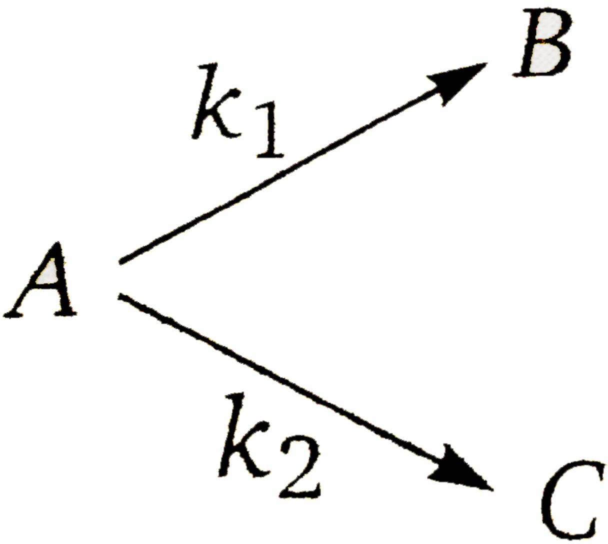
C. 240 sec

D. 210 sec

Answer: D

View Text Solution

11. Consider the reaction.



The rate constant for two parallel reactions were found to be $10^{-2} dm^{-2} mol^{-1} s^{-1}$ and $4 \times 10^{-2} dm^{-3} mol^{-1} s^{-1}$. If the corresponding energies of activation of the parallel reaction are 100 and 120 kJ/mol respectively, what is the net energy of activation (E_a) of A

A. 100 kJ/mol

B. 120 kJ/mol

C. 116 kJ/mol

D. 220 kJ/mol

Answer: C

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12. A reaction takes place in various steps. The rate constatn for first, second, third and fifth steps are k_1, k_2, k_3 and k_5 respectively The overall rate constant is given by

$$k = \frac{k_2}{k_3}\left(\frac{k_1}{k_5}\right)^{1/2}$$

If activation energy are 40, 60, 50, and 10 kJ/mol respectively, the overall energy of activation (kJ/mol) is :

A. 10

B. 20

C. 25

D. none of these

Answer: C

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13. For reaction $A \rightarrow B$, the rate constant $k_1 = A_1^{-Ea_{1}/(RT)}$ and for the reactio $X \rightarrow Y$, the rate constant $k_2 = A_2^{-Ea_{1}/(RT)}$. If $A_1 = 10^8$, $A_2 = 10^{10}$ and $E_{a_1} = 600$ cal /mol, $E_{a_2} = 1800$ cal/mol then the temperature at which $k_1 = k_2$ is (Given :R=2 cal/K-mol)

A. 1200 K

B. $1200 \times 4.606 K$

C. $\dfrac{1200}{4.606} K$

D. $\dfrac{600}{4.606} K$

Answer: D

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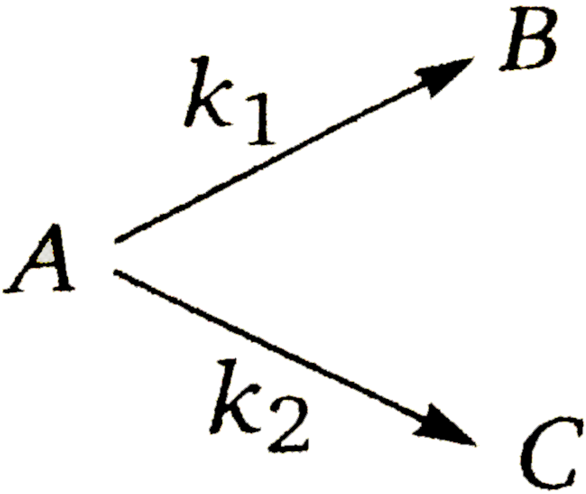
14. For first order parallel reactions k_1 and k_2 are 4and $2 \text{ min } (-1)$ respectively at 300 K. If the activation energies for the formation of B and C are respectively 30,00 and 38,314 joule/ mol respectively, the

temperature at which B and C will be obtained in equimolar ratio is :



A. 757.48 k

B. 378.74k

C. 600 k

D. none of these

Answer: B

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15. In the series reaction

$A \xrightarrow{K_2} B \xrightarrow{K_2} C \xrightarrow{K_2} D$, if $K_1 > K_2 > K_3$ then the rate determing step of the reaction is

A. $A \rightarrow B$

B. $C \rightarrow D$

C. $B \rightarrow C$

D. Any step

Answer: B

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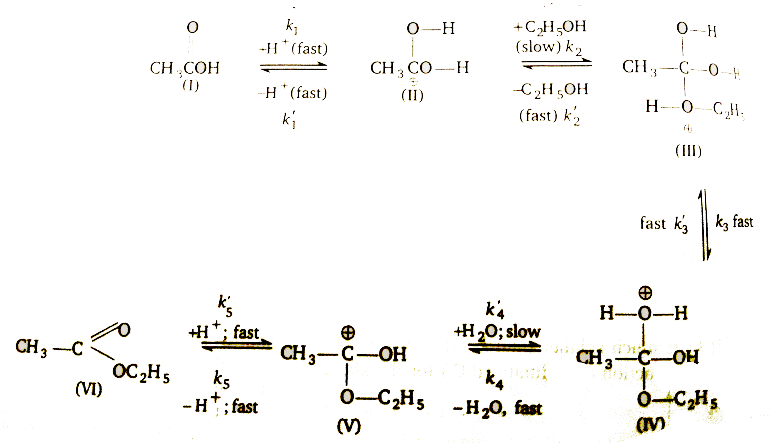
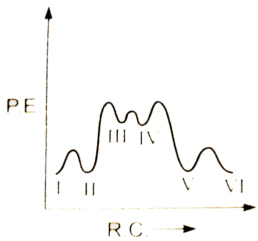
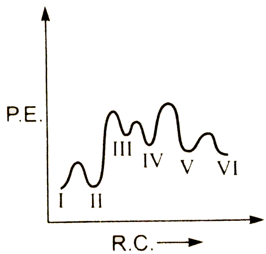
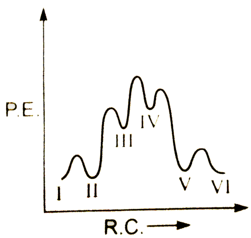
16. The mechanism of esterification in presence of acid catalyst (H_2SO_4) is proposed as follows:

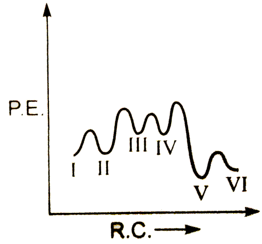


Which of the following potential energy Vs reaction co-ordinate diagram is consitent with given mechanism ?

A. 

B. 

C. 

D. 

Answer: A

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17. For the first order reaction $A \rightarrow B + C$, carried out at $27^{\circ} C$ if $3.8 \times 10^{-16} \%$ of the reactant molecules exists in the activated state, the E_a (activation energy) of the reaction is :

A. $12 kJ/mol$

B. $831.4 kJ/mol$

C. $100 kJ/mol$

D. $88.57 kJ/mol$

Answer: C

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18. Upon irradiating californium with neutrons, a scientist discovered a new nuclide having mass number of 250 and a half-life of 30 min. After 90 min. of irradiation, the observed radioactivity due to nuclied was 100 dis/min. How many atoms of the nucliede were prepared intially?

A. 2.4×10^4

B. 3.46×10^4

C. 1900

D. 800

Answer: B

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19. The average (mean) life of a radio nuclide which decays by parallel path is

$A \xrightarrow{\lambda_1} B : \lambda_1 = 1.8 \times 10^{-2} \sec^{-1}$

$2A \xrightarrow{\lambda_2} B , \lambda_2 = 10^{-3} \sec^{-1}$

A. $52.63 \sec$

B. $500 \sec$

C. $50 \sec$

D. none of these

Answer: C

View Text Solution

20. The radioactive decay $._{83}^{211} Bi \rightarrow_{81}^{207} Ti$, takes place in 100L closed vessel at $27^{\circ} C$ Starting with 2 mols of $\_ (83)^{211} Bi \left(t_{1/2} = 130 \sec\right)$, the presuure development in the vessel after 520 sec will be:

A. 1.875 atm

B. $0.2155 atm$

C. 0.4618 atm

D. 4.618 atm

Answer: C

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21. A fresh radioactive mixture contians short lived sppecies A and B. Both emitting α-particles intially of 8000 α particles per minute. 20 minutes later, they emis at the rate of 3500 α -particles per minute. If the half-lives of the species A and B are 10 minutes and 500 hours respectively, then the ratio of activities of A: B the intial mixture was:

A. $4:6$

B. $6:4$

C. $3:4$

D. $3:1$

Answer: D

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22. In order to determine the volume of blood in an animal, a 1.0mL sample of solution of 10^3 dpm of $._1^3H$ is injected into the animal blood stream. After sufficient time for circulatory equilibrium to be established, 2mL of blood is found to have activity to 10 dpm. The volume of blood in animal is :

A. 199 mL

B. 198 mL

C. 200 mL

D. 20 mL

Answer: A

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Level 2 Q 33 To Q 35

1. Find the age of an ancient Egyptian wooden article (in years) from the given information.

(i) Activity of 1g of carbon obtained from ancient wooden article =7 counts/min/g

(ii) Activity of 1 g carbon obtained from fresh wooden sample =15.4 counts per min/g

(iii) Precentage increases in level of C^{14} due to nuclear explosions in past 100 years is 10%

(iv) $t_{1/2}$ of $._{6}^{14}C = 5770$ years

A. 5.770×10^{3}

B. 16.87×10^{3}

C. 2488

D. none of these

Answer: A

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2. The isotopes $.^{238}U$ and $.^{235}U$ occur in nature in the mass ratio 140 : 1. it is assumed that intially they were found in equal mass. If half life $(t_{1/2})$ of $.^{238}U = 4.5 \times 10^9$ and $t_{1/2}$ of $.^{235}U \times 10^8$ years respectively then the age of earth is $(\log 7 = 0.846, \log 2 = 0.3)$

A. 4.02×10^9 year

B. 2.01×10^9 year

C. 8.72×10^9 year

D. none of these

Answer: A

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Level 3 Passage

1. Two consecutive irreversible fierst order reactions can be represented by

$$A \xrightarrow{k_1} B \xrightarrow{k_2} C$$

The rate equation for A is readily interated to obtain

$[A]_t = [A]_0 . e^{-k_1 t}$, and $[B]_t = \frac{k_1[A]_0}{k_2 - k_1}\left[e^{-k_1^t} - e^{-k_2^t}\right]$

If k_1 and k_2 both are almost same then which graph is most suitable ?

A. graph A

B. graph B

C. graph C

D. graph D

Answer: A

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Level 3 One Or More Answers Are Correct

1. Select the correct statement(s) :

A. When $T \rightarrow \infty$ or $E_a \rightarrow O$ then K=A

B. A positive catalyst can change ΔH of the reaction

C. A mixture catalyst may be thermodynamically unstable by kinetically stable

D. A negative catalyst increases the activation energy of the reaction

Answer: A::C::D

View Text Solution

2. Consider a reaction $A + B \rightarrow C$, in which boht reactants are in the same phase, may be

A. unimolecular elementary reaction

B. Exothermic

C. Heterogeneous

D. Photochemical

Answer: B::C::D

View Text Solution

3. In the following gaseous phase first order reaction

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

initial pressure was found to be 400 mm of Hg and it changed to 1000 mm of Hg after 20min. Then

A. half life for A is 10 min

B. rate constant is 0.0693 min^{-1}

C. partial pressure of C at 30 min is 350 mm of Hg

D. total pressure after 30 min is 1100 mm of Hg

Answer: A::B::C::D

View Text Solution

4. Indentify the true statement(s)

A. A catalyst is chemically unchanged at the end of a reaction

B. A catalyst may appear in the kinetic rate equation of the reaction

C. A catalyst will not affect the composition of an equilibrium mixture

D. A catalyst cannot cause a non-spontaneous $(\Delta G > 0)$ reaction to proceed

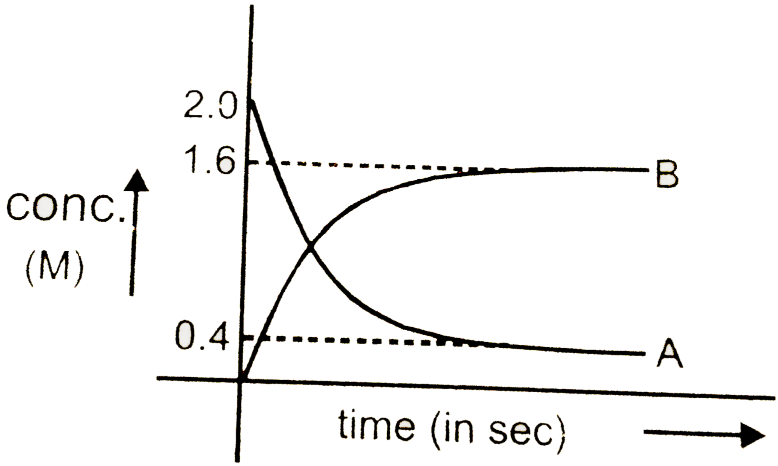
Answer: A::B::C::D

View Text Solution

5. For the reaction $A \underset{k_2 \sec^{-1}}{\overset{K_1 \sec^{-1}}{\Longleftrightarrow}} B$ following graph is given,

$k_1 = 4 \times 10^{-\circ} \sec^{-1}$. Which is/are correct statement (s) (In 2=0.7 , In 8/7

=0.14)



A. equilibrium constant is 4.0

B. Time taken for the completion fo 50% fo equilibrium conc. Of B is 14 sec.

C. Time taken for the completion of 10% of initial conc. Of A is 2.8 sec.

D. Rate constant of backward reaction is 10^{-2}sec^{-1}

Answer: A::B::C::D

View Text Solution

6. Select the correct statement(s) :

A. α-particles are simply helium atoms

B. γ-rays travel with higher speed as compared to α-particle and have higher ionization power as compare to β-particle

C. Loss of β-particles resuluts in the production of isobars

D. β-particle are considered as the best bombarding particles

Answer: C

View Text Solution

7. Select the correct statement(s) :

A. SI unit of radioactivity is becquerel (Bq)

B. $1Ci = 3.7 \times 10^{7}$ Bq

C. $._{3}^{7}Li +_{1}^{1} H \rightarrow_{2}^{4} He \text{is} (P, \alpha)$ type reaction

D. The half -time of a particular radioactive isotope is a characteristics constant of that isotope

Answer: A::C::D

View Text Solution

8. Select the correct statement(s) :

A. On bombarding $._7^{14}N$ nuclei with α -particle, the nuclie of the product formed after release of proton would be $._8^{17}O$

B. Decay constant does not depend upon temperature

C. Nuclide and its decay product after α-emission are called isodiaphers

D. Half-life of radium is 1580 years . Its average life will be 1097.22 years

Answer: A::B::C

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9. In electron capture (radioactive process):

A. a neutron is formed

B. a proton is consumed

C. γ -ray emission take place

D. X-ray emission takes place

Answer: A::B::D

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10. Select the correct statement(s) for positron emission by unstable nucleus.

A. X-ray emission takes place

B. a neutron is formed

C. $\frac{n}{p}$ of daughter nucleus increases

D. A neutron is consumed

Answer: B::C

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11. Select the correct statement(s)

A. Mass number remains constant when positron emission takes place

B. One neutron converts into proton in $\beta\left(.^{0}_{-1}e\right)$ emission process

C. Activity of a radioactive substance double when temp. increases from 300 K to 310 K

D. Isodiaphers formed when one alpha particle emitted and isotopes formed when 2 beta particles emitted

Answer: A::B

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Column-I Linear plots (with non zero slope)	Column-II (Order)
(A) $\ln\left[-\frac{d[A]}{dt}\right]$ vs. $\ln[A]$	(P) 2
(B) $\log_e k$ vs. $\frac{1}{T}$	(Q) $\frac{1}{2}$
(C) $\log t_{1/2}$ vs. $\log[A]_0$	(R) 0
(D) $\frac{-d[A]}{dt}$ vs. $[A]^2$	(S) 1

12.

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Column-I	Column-II
(A) α-emission	(P) Change in mass no.
(B) β-emission	(Q) No change in atomic no. and mass no.
(C) γ-emission	(R) Atomic no. decreases
(D) β^+ (Positron) emission	(S) Atomic no. increases

13.

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Level 3 Assertion Reason Type Questions

1. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENTS-1: Acid catalysed hydrolysis of esters is pseudo first order reaction.

STATEMETNT-2:Water is present in excess in given reaction.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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2. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: For each $10^{\circ} C$ rise of temperature the k is nearly double.

STATEMENT -2: Energy wise distribution of molecules in a gas sample is an exponential function of temperature so $e^{-E_a/RT}$ is doubled.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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3. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2 (Reason).

Examine the statements carefully and mark the correct answer according to the instructions given below:

STATEMENT-1: Nuclide $\_(13)^{30}Al$ is less stable than $\_(20)^{40}Ca$.

STATEMENT-2: Nuclide having odd number of protons and neutrons are generally unstable.

A. If both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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Level 3 Subjective Problems

1. $5A \rightarrow$ Product

In above reaction, half-life period is directly proportional to initial concentration of reactant. The initial rate of reaction is 400 mol $lit^{-1} \ \min^{-1}$.

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2. For a reaction, $A \Leftrightarrow B$ equilibrium constant is 1.66 and $k_{\text{forward}} = 0.166 hr^{-1}$.

Calculate the time (in hour) when concentration of B is 80% of its equilibrium concentration. (Given : In 25=3.20)

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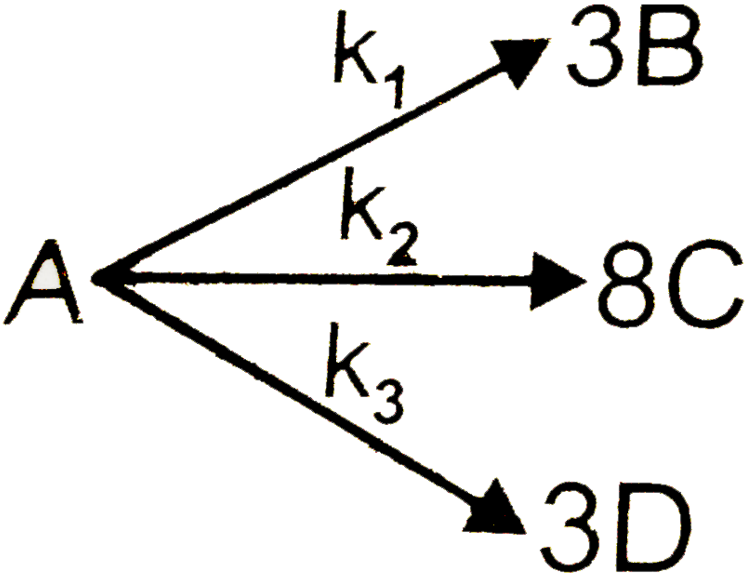
3. 

, At time t=0, intial mole of A is 1.

Overall half time of the reaction is 15 days. Then calculate the number of mole of C after 45 days if the raio of $k_1 : k_2 : k_3$ is $4 : 2 : 1$

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