CHEMISTRY

BOOKS - PATHFINDER CHEMISTRY (BENGALI ENGLISH)

CHEMICAL KINETICS

Question Bank

1. For the assumed reaction $X_2 + 2Y_2 \rightarrow 2XY_2$, write the rate equation in terms of the rate of disappearance of Y_2.

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2. The reaction $A + 2B \rightarrow C + D$ obeys the rate equation, Rate = $k[A]^x[B]^y$ what would be the order of the reaction?

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3. The rate of a reaction is $1.2 \times 10^{-3} Lmol^{-1}s^{-1}$, What is the order of the reaction?

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4. Why is it that the instantaneous rate of a reaction does not change when a part of the reacting solution is taken out?

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5. Give an example of pseudo first order reaction.

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6. In some chemical reactions, it is found that a large number of colliding molecules have energy more than

threshold energy value, yet the reactions are quite slow. Explain.

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7. Express the relation between the half-life period of a reaction and initial concentration for the reaction of the first order.

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8. A substance with initial concentration 'a' follows first order kinetics. In how much time, will the reaction go to completion ?

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9. How does the rate of a reaction depends on surface area of the reactant?

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10. Define order of reaction.

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11. Which of the following is a correct statement?

A. Molecularity of a reaction can be fractional

B. Zero order reaction never stops

C. A first order reaction must be homogeneous

D. The frequency factor 'A' an Arrhenius equation $\left(k = Ae^{-Ea/RT}\right)$ increases with inc. in temperature.

Answer: D

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12. The rate constant of the reaction ---

$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$ is $3 \times 10^{-3}\text{min}^{-1}$,

At what concentration of H_2O_2, the rate of reaction will be $2 \times 10^{-4}Ms^{-1}$?

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13. For a first-order reaction, the plot of $\log[A]_t$, versus t is linear with a $\rightarrow$

A. positive slope ε zero intercept

B. positive slope ε zero intercept

C. negative slope ε zero intercept

D. negative slope ε non-zero intercept

Answer: D

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14. For a reaction $A \rightarrow B$, the rate of reaction becomes twenty seven times when the concentration of A is increased three times. What is the order of the reaction?

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15. Differentiate between molecularity and order.

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16. Why is it that rates of most of the reactions increase when the temperature of the reaction mixture is increased?

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17. State the role of activated complex In a reaction and state its relation with activation energy.

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18. How is activation energy affected by the use of a catalyst.

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19. How is activation energy affected by a rise in temperature.

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20. The rate of formation of a dimer in a second order dimerisation reaction is $9.5 \times 10^{-5} mol^{-1} L \sec^{-1}$ at $0.01 mol L^{-1}$ monomer concentration. Calculate the rate constant.

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21. Following reaction takes place in single step.

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$.

How will the rate of the reaction change if the volume of the vessel is reduced to one third of its original volume? Will there be any change in the order of the reaction with the reduced volume?

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22. For a reaction, the rate law is, Rate = $[A][B]^{1/2}$. Can this reaction be an elementary reaction?

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23. Half life of a first order reaction is 10 mins what is the $\%$ of reaction completed in 100 mins?

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24. Give the unit of rate constant for a reaction having order 0, 5.

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25. For the first order reaction $A \rightarrow B$, deduce the integrated form of rate law.

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26. $60\,\%$ of a first order reaction was completed in 60 minutes. When was it half completed?

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27. The rate constant of a first order reaction becomes 6 times when the temperature is raised from 350 K to 410K. Calculate the energy of activation for the reaction.

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28. The rate constant for a first order decomposition of N_2O_5 at $25^\circ C$ is $3.0 \times 10^{-2} \text{min}^{-1}$. If the Initial concentration of N_2O_5 is $2.0 \times 10^{-3} molL^{-1}$, how tong will take for the concentration to drop to $5.0 \times 10^{-4} molL^{-1}$?

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29. The Reaction $SO_2Cl_2 \rightarrow SO_2 + Cl_2$, is a first order reaction with $k = 2.2 \times 10^{-5} s^{-1}$ at $320^\circ C$. Calculate the percentage of SO_2Cl_2 that is decomposed on heating this gas for 30 minutes.

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30. The half lives of 2 samples are 0.1 and 0.4 sec respectively. Their initial conc. are 200 ε 50 respectively. What is the order of the reaction?

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31. How does rate law differs from law of mass action?

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32. The rate constants of the reaction at 500k and 700k are $0.02s^{-1}$ and $0.07s^{-1}$ respectively. Calculate the values of E_a and A.

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33. A first order reaction takes 100 minutes for completion of $60\ \%$ of the reaction. Find the time when $90\ \%$ of reaction will be completed.

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34. Give 1 example each for the reactions of different order.

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35. In hypothetical reaction $A_2 + B_2 = 2AB$ follows the mechanism as given below:

$A_2 \Leftrightarrow A + A$ (fast reaction)

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

$A + B \rightarrow AB$ (fast reaction)

give the rate law and order of reaction.

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36. For the reaction R $\rightarrow$ P, the concentration of a reactant change from 0.03 M to 0.02 Min 25 minutes calculate the average rate of reaction using unit of time in minutes

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37. In a reaction, 2A $\rightarrow$ Products the concentration of A decreases from 0.5 mol $molL^{-1}$ $\min^{-1}$ in 10 minutes. Calculate the rate during this interval ?

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38. Calculate the overall order of a reaction

Identify the reaction order from the following rate constants.

$CHCl_3 + Cl_2 \rightarrow CCl_4 + HCl$ which has the rate expression

Rate =$K[CHCl_3][Cl_2]^{\frac{1}{2}}$

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39. Identify the reaction order from the following rate constants.

k=$2.3 \times 10^{-5} L mol^{-1} s^{-1}$

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40. Identify the reaction order from the following rate constants.

$k = 3 \times 10^{-4} s^{-1}$

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41. The conversion of molecules X is Y follows second order kinetics. if concentration of X is increased to three times how will it affect the rate of formation of Y ?

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42. A first order reaction has a rate constant $1.15 \times 10^{-3} s^{-1}$. How long will 5 g of this reactant take to reduce to 3g ?

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43. A First order reaction takes 40 min for $30\,\%$ decomposition. Calculate its rate constant

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44. The following data were obtained during the first thermal decomposition of SO_2Cl_2 at a constant volume, $SO_2Cl_2(g) \rightarrow SO_2(g) + Cl_2(g)$ Experiment Time/s Total pressure/ atm 1 0 0.5 2 100 0.6 Calculate the rate of the reaction when total pressure is 0.65 atm.

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45. A first order reaction is found to have a rate constant, k=$5.5 \times 10^{-14} s^{-1}$.Find the half-life of the reaction.

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46. Sucrose decomposes in acid solution into glucose and fructose according to the first order rate law with $\frac{t_1}{2} = 3.00$ hours. What fraction of the sample of sucrose remains after 8 hours?

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47. Show that in a first order reaction, time required for completion of $99.9\,\%$ is 10 times of half-life $\left(\frac{t_1}{2}\right)$ of the reaction

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48. The rate constant for the first order decomposition of H_2O_2 is given by the following by the equation log $k = 14.34 - 1.25 \times 10^4 \frac{K}{T}$

Calculate $E - a$ for this reaction and at what temperature will its half-period be 256 minutes /.

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49. The rate of the chemical reaction doubles for an increase of 10K in absolute temperature from 298K calculate E_a

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50. The activation energy for the reaction, $2HI(g) \rightarrow +I-2(g)$, is $209.5KJmol_{-1}$ at 581K, Calculate the fraction of molecules of reactants having energy equal to or greater than activation energy.

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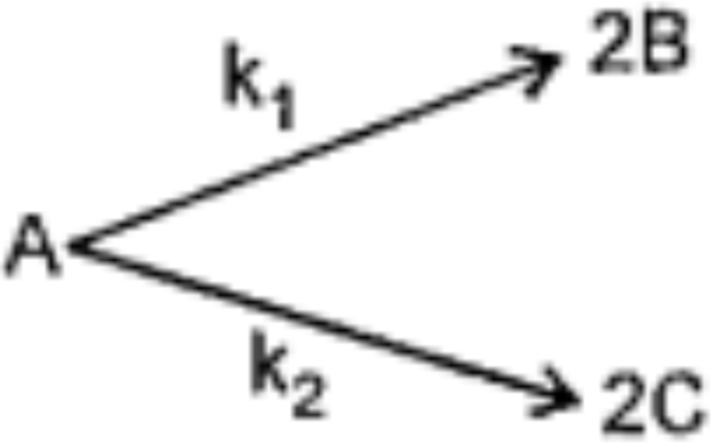
51. For the elementary reaction where $\frac{k_1}{k_2} = \frac{1}{2}$



Initially only 4 moles of A are present, What is the total number of moles of A, B andC at the end of $40\,\%$ reaction?

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52. For the sequently reaction $A \xrightarrow{K_A} B \xrightarrow{K_B} C$ rate constant K_A and K_B are 5×10^6 and $3 \times 10^6 s^{-1}$ respectively. Determine the time at which [B] is maximum

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53. If the atomic masses of lithium, helium and proton are 7.01823 amu, 4.00387 amu and 1.00815 amu respectively, calculate the energy that will be evolved in the reaction, $Li^7 + H^1 + 2He^4$+ energy

Given that 1 amu 931 MeV.

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54. Calculate the mass defect and binding energy per nucleon for $_{27}Co^{59}$. [The mass of $Co^{59} = 58,95$ amu, mass of hydrogen atom = 1.008742 amu and mass of neutron 1.008982 amu]

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55. Calculate the energy evolved (in joutes) per molecule of helium by the fusion of two deuterium nuclei. The mass of deuterium and helium nuclei are 2,014 amu and 4.00 amu respectively.

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56. Which of the following elements is non radioactive ?

A. Pu_{94}^{244}

B. Co_{27}^{59}

C. Rn_{86}^{222}

D. Fr_{87}^{223}

Answer: B

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57. Predict the most likely mode of decay and product of decay for the nuclides S^{35}, F^{17}

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58. Find out the total number of α and β particles emitted in the disintegration of Th^{232} to Pb^{208}.

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59. Ten gram atoms of an α-active radioisotope are disintegrating in a sealed container. In one hour the helium gas collected at STP is $11.2cm^3$. Calculate the half-life of the radioisotope.

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60. The half-life of Th^{232} is 1.4×10^{10} years and that of its daughter element Ra^{228} is 7 years. Calculate the mass of $radium^{228}$ in equilibrium with 1 g of Th^{232}.

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61. Which of the following nuclide is likely to be radioactive?

A. ${}_{17}^{37}W$

B. ${}_{82}^{206}X$

C. ${}_{15}^{30}Y$

D. ${}_{9}^{19}Z$

Answer: C

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62. A piece of wood was found to have $\frac{C^{14}}{C^{12}}$ ratio 0.7 times that in a living plant.Calculate the period when the plant died. Half-life of $C^{14} = 5760$ years

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63. In a sample of uranium ore the weight of Pb^{206} is $20.6\,\%$ of the weight of U^{238} present. If half life of uranium (238) is $4.5x10^{9}$ years, determine the age of mineral

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64. The rate of the elementary reaction $2NO + O_2 \rightarrow 2NO_2$ when the volume of reaction vessel is doubled,

A. will increase eight times of initial rate

B. reduce to one eighth of its initial rate

C. will grow four times of its initial rate

D. reduce to one fourth of its initial rate

Answer: B

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65. For a general chemical change 2A =3B to products, the rates with respect to A Isr_1 and r_2 are related as

A. $3r_1 = 2r_2$

B. $r_1 = r_2$

C. $2r_1 = 3r_2$

D. $r_1^2 = 2r_2^2$

Answer: A

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66. For the reaction $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$.

Given $-\frac{d[N_2O_5]}{dt} = k_3[N_2O_5]$, $\frac{d[NO_2]}{dt} K_2[N_2O_5]$, $\frac{d[O_2]}{dt} = K_3[N_2O_5]$ the relation between $K_1 K_2$ and K_3 is

A. $2K_1 = K_2 = 4K_3$

B. $K_1 = K - 2 = K_3$

C. $2K_1 = 4K - 2 = K_3$

D. $K_1 = 2K_2 = 4K_3$

Answer: A

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67. Which of the following statement is false

A. Radioactive decay follows first-order kinetics

B. $\frac{T_1}{2}$ for zero-order reaction is proportional to initial concentration a

C. The acid-catalysed hydrolysis of ester is second-order reaction

D. The unit of rate constant is $mol^1 - nL^n - 1s^1$

Answer: C

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68. if a is the initial concentration then time required to decompose hafe of the substance for n^th order is inversely proportional

A. a^n

B. a^{n-1}

C. a^{1-n}

D. a^{n-2}

Answer: B

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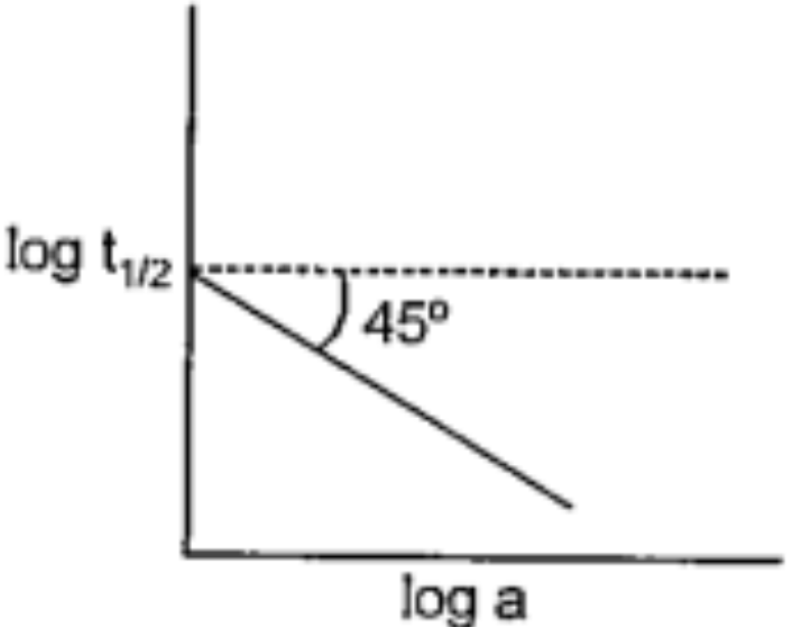
69. What will be the order of reaction for a chemical change having following graph of log $\frac{t_1}{2}$ versus log a?



(a = initial concentration of reaction: $\frac{t_1}{2}$ = half-life)

A. zero order

B. first order

C. second order

D. none of these

Answer: C

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70. The rate constant for the reaction,

$2N_2O_5 \rightarrow 4NO_2 + 3.0$xx 10^-5s^-1. if $thereactionrateis$2.4 xx 10^-5 Ms^-1 . $thentheconcentrationof$N_2O_5` in M is:

A. 1.4

B. 1.2

C. 0.04

D. 0.8

Answer: D

71. Which is correct relation between dc/dt,dn/dt and dp/dt, where c,n,p represents concentration, mole and pressure terms for gaseous phase?

Reaction A(g) to product ?

A. -dc/dt = -1 dn/V dt = - 1/RT dt

B. dc/dt = dn/dt = -dp/dt

C. dc/dt = RT dn/ V dt =- dp/dt

D. All of these

Answer: A

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72. For a first order reaction the ratio of times to complete 99.9% and half of the reaction is

A. 0

B. 1

C. 2

D. 3

Answer: A

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73. The decomposition of a hydrocarbon follows the equation $k = \left(4.5 \times 10^{11} s^{-1}\right) e^{-28000 \frac{K}{T}}$. Activation energy of the reaction is

A. $232.79 kjmol^{-1}$

B. $400 kjmol^{-1}$

C. $1.2 kjmol^{-1}$

D. $5 \times 10^{-2} kjmol^{-1}$

Answer: C

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74. A reaction (A) forms two products

$Ea_2 = 2Ea_1$ than K_1 and K_2 will be related as.

A. $k_2 = k_1 e^{Ea\frac{1}{R}T}$

B. $k_2 = k_1 e^{Ea\frac{2}{R}T}$

C. $k_1 = K_2 e^{Ea\frac{1}{R}T}$

D. k_-1 =2k_2e^Ea/RT

Answer: A

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75. The activation energy of a reaction is 12.89 kcal/mol. The increase in the rate constant when its temperature is increased from $27^{\circ} C$ to $37^{\circ} C$ is :

A. $100\ \%$

B. $63\ \%$

C. $75\ \%$

D. $127\ \%$

Answer:

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76. $A \rightarrow B$DeltaH $= -10KJmol$, $E_a = 50KJ/mol$ then activation energy of $B \rightarrow A$ would be

A. $-60KJmol^{-1}$

B. $50KJmol^{-1}$

C. -50KJmol^-1

D. 60KJmol^-1

Answer: D

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77. The rate constant, the activation energy and the arrameter parameter of a chemical reaction at $25^{\circ}C$

are $3.0 \times 10^{-4} s^{-1}$, $104.4 KJmol^{-1}$ and $6x \times 10^{14} s^{-1}$ respectively.The value of rate constant as $T \to \infty$, , is,

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

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

C. zero

D. 3.6 $\times$ 10^30s^-1

Answer: B

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78. For an exothermic chemical process occurring in two steps as:

(i)A+B $\rightarrow$ X(slow)

(ii) X $\rightarrow$ AB(fast)

The process of the reaction can be best described by:

A. 

B. 

C. 

D. 

Answer: D

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79. if activation energy of a reaction is zero

A. all collisions are effective

B. rate of reaction is proportional to collsion number of reaction molecules

C. reaction is complete

D. All

Answer: C

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80. For an exothermic reaction where Delta H represents the enthalpy of the reaction, the minimum value for the energy of activation will be

A. less than Delta H

B. zero

C. more than Delta H

D. equal to Delta H

Answer:

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81. The decomposition of phosphine (PH_3) an tungsten at low pressure is a first-order reaction. It is because the

A. rate of decomposition is very slow

B. rate is proportional to the surface coverage

C. rate is inversely proportional to the surface coverage

D. rate is independent of the surface coverage

Answer: B

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82. The rate of a first order reaction is 0 04 mol $L^{-1}s^{-1}$ at 10 seconds and 003 mol$L^{-1}s^{-1}$at 20 seconds after initiation of the reaction. The half life period of the reaction is

A. 44.1 s

B. 54.1 s

C. 24.1 s

D. 32.1 s

Answer: C

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83. The addition of a catalyst during a chemical reaction alters which of the following quantities

A. Enthalpy

B. Activation energy

C. Entropy

D. internal energy

Answer: B

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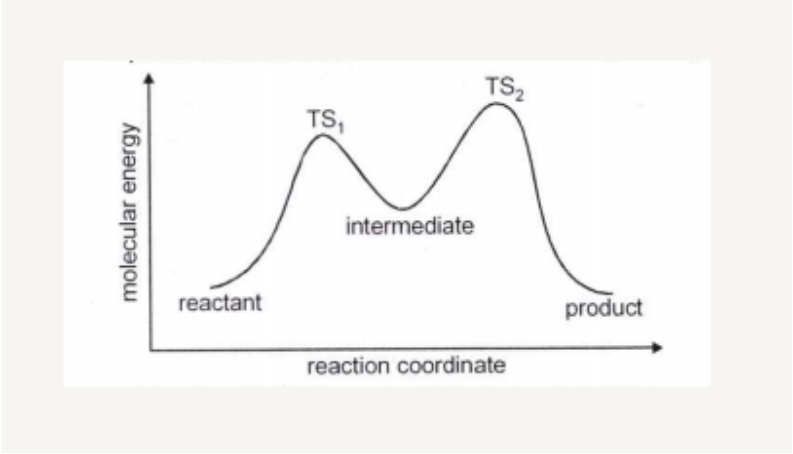
84. Which of the statements (1) - (4) about the reaction profile below is false?



A. The product is more stable than the reactant.

B. The second step is rate determining.

C. The reaction is exothermic.

D. The equilibrium constant is greater than 4 if the molar entropy change is negligible.

Answer: B

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85. $75\ \%$ of a first order reaction was completed in 32 min. When would $50\ \%$ of the reaction be completed?

A. 24 min

B. 16 min

C. 8 min

D. 64 min

Answer: B

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86. Higher order (>3) reactions are rare due to

A. increase in entropy and activation energy as more molecules are involved

B. shifting of equilibrium towards reactants due to elastic collisions

C. loss of active species on collision

D. low probability of simultaneous collision of all the reacting species

Answer: D

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87. For the reaction $A + 2B \rightarrow C$, the reaction rate is doubled if the concentration of A is doubled The rate is increased by four times when concentrations of bothA and B are increased by four times. The order of the reactions is

A. 3

B. 0

C. 1

D. 2

Answer: C

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88. The increase in rate constant of a chemical reaction with increasing temperature is(are) due to the fact(s) that

A. the number of collisions among the reactant molecules increases with increasing temperature.

B. the activation energy of the reaction decreases with increasing temperature.

C. the concentration of the reactant molecules increases with increasing temperature.

D. the number of reactant molecules acquiring the activation energy increases with increasing temperature.

Answer: A::B::D

89. The rate constant of the reaction $A \rightarrow B$ is $0.6x10^{-3}moL^{-1}s^{-1}$ If the concentration of A is 5 M then concentration of B after 20 minutes is

A. 1.08 M

B. 3.60 M

C. 0.36 M

D. 0.72 M

Answer: D

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90. For the elementary reaction $M \rightarrow N$, the rate of disappearance of M Increases by a factor of 8 upon doubling the concentration of M. The order of the reaction with respect to M is

A. 4

B. 3

C. 2

D. 1

Answer: B

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91. For the non - stoichometric reaction $2A + B \rightarrow C + D$, the following kinetic data were obtained in three separate experiments, all at 298K.

Initial Concentration (A)	Initial Concentration (B)	Initial rate of formation of C ($mol\ L^{-}S^{-}$)
0.1M	0.1M	1.2×10^{-3}
0.1M	0.2M	1.2×10^{-3}
0.2M	0.1M	2.4×10^{-3}

The rate for the formation of C is:

A. $\frac{dc}{dt} = k[a][B]$

B. $\frac{dc}{dt} = k[A]^2[B]$

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

D. $\frac{dc}{dt} = k[A]$

Answer: D

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92. The rate of a certain reaction is given by, rate = $k\left[H^{+}\right]^{n}$. The rate increases 100 times when the pH changes from 3 to 1. The order (n) of the reaction is

A. 2

B. 0

C. 1

D. 1.5

Answer: C

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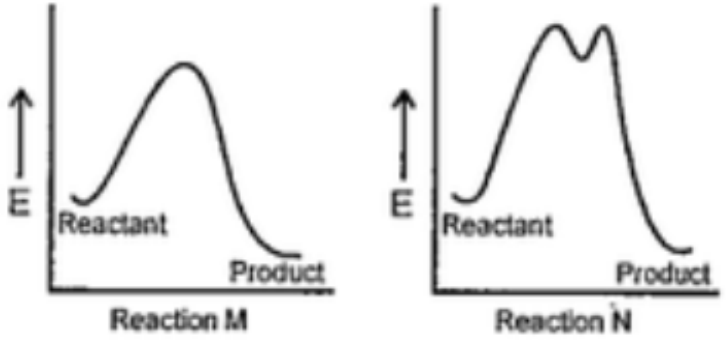
93. The correct statement regarding the following energy diagrams is



A. Reaction M is faster and less exothermic than Reaction N

B. Reaction M is slower and less exothermic than

C. Reaction M is faster and more exothermic than Reaction N

D. Reaction M is slower and more exothermic than Reaction N

Answer: C

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94. A piece of wood from an archaeological sample has 5.0 counts $\min^{-1}$ per gram of C-14, while a fresh sample of wood has a count of $15.0\ \min^{-1}\ gram^{-1}$. If half life of C-14 Is 5770 years, the age of the archaeological sample is

A. 8,500 years

B. 9,200 years

C. 10,000 years

D. 11,000 years

Answer: B

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95. During the emission of a positron from a nucleus, the mass number of the daughter element remains the same but the atomic number

A. is decreased by 1 unit

B. is decreased by 2 units

C. is increased by 1 unit

D. remains unchanged

Answer: A

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96. β emission is always accompanied by

A. formation of antineutrino and a particle

B. emission of a particle and γ-ray

C. formation of antineutrino and γ- ray

D. formation of antineutrino and positron

Answer: C

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97. ${}_{98}Cf^{246}$ was formed along with a neutron when an unknown radioactive substance was bombarded with ${}_{6}C^{12}$. The unknown substance was

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98. An atomic nucleus having low n/p ratio tries to find stability by

A. the emission of an α particle

B. the emission of a positron

C. capturing an orbital electron (K electron capture)

D. emission of a β particle

Answer: B

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99. A plot of 1/T vs Ink for a reaction gives the slope $-1 \times 10^4 K$. The energy of activation for the-reaction is (Given,R = $8.314 JK^{-1} mol^{-1}$)

A. $8314 Jmol^{-1}$

B. $1.202 kJmol^{-1}$

C. $12.02 Jmol^{-1}$

D. $191.47 kJmol^{-1}$

Answer: D

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100. $A(g) \xrightarrow{\Delta} P(q) + Q(g) + R(g),$ follows first order kinetics with a half life of 69.3 s at $500^\circ C$. Starting from the gas 'A' enclosed in a container at $500^\circ C$ and at a pressure of 0.4 atm, the total pressure of the system after 230 s will be

A. 1.15 atm

B. 1.32 atm

C. 1.22 atm

D. 1.12 atm

Answer: D

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101. The half life period for a first order reaction is .....

A. independent of concentration

B. proportional to concentration

C. inversely proportional to concentration

D. inversely proportional to the square of the concentration

Answer: A

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102. According to Arrhenius equation, the slope of log k vs 1/T plot is

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

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

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

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

Answer: A

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103. The value of rate constant for a first order reaction is $2.303 \times 10^{-2} \sec^{-1}$. What will be the time required to reduce the concentration to 1/(10)th of its initial concentration?

A. 100 s

B. 10 s

C. 2303 s

D. 230.3 s

Answer: A

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104. Rate law for the reaction $A + B \rightarrow$ product is rate= $k[A]^2\{B]$. What is the rate constant, if rate of reaction at a given temperature is 0.22 Ms^-1, when [A] =1M and (B]= 0.25 M?

A. $3.52M^{-2}s^{-1}$

B. $0.88m^{-2}s^{-1}$

C. $1.136M^{-2}s^{-1}$

D. $0.05M^{-2}s^{-1}$

Answer: B

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105. The rate of a reaction doubles when its temperature changes from 300 K to 310 K. Activation energy of such a reaction will be

($R = 8.314 JK^{-1}mol^{-1}$ and log2 = 0.301)

A. $53.6 kJmol^{-1}$

B. $48.6 kJmol^{-1}$

C. $58.5 kJmol^{-1}$

D. $60.5 kJmol^{-1}$

Answer: A

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106. The rate of reaction is doubled for every 10^0 rise in temperature. The increase in reaction rate as a result of temperature rise from $10^0 \rightarrow 100^0$ is

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107. The conversion of A to B follows second order kinetics, Doubling the concentration of A will increase the rate of formation of B by a factor of

A. 4

B. 2

C. 44287

D. 44228

Answer: A

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108. $75\,\%$ of a first order reaction is completed in 30 min. What ts the time required for $93.75\,\%$ completion of the reaction (in minutes) ?

A. 45

B. 120

C. 90

D. 60

Answer: D

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109. Order of reaction is decided by

A. molecularity

B. Pressure

C. temperature

D. mechanism of reaction as well as relative concentration of reactants

Answer: D

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110. A chemical reaction was carried out at 300 K and 280 K. The rate constants were found to be k_1 and k_2 respectively. Then

A. $k_2 \approx 0.25k_1$

B. $k_2 \approx 0.5k_1$

C. $k_2 \approx 4k_1$

D. $k_2 \approx 2k_1$

Answer: A

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111. The unit of second order reaction rate constant is

A. $L^{-1}mols^{-1}$

B. $L^2mol^{-2}s^{-1}$

C. $Lmol^{-1}s^{-1}$

D. s^{-1}

Answer: C

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112. The half-life of a reaction is halved as the initial concentration of the reactant is doubled. The order of reaction is:

A. 0.5

B. 1

C. 2

D. 0

Answer: C

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113. Decay of $99^{U}\ \hat{}\ (235)$order reaction.

A. zero

B. first

C. second

D. third

Answer: B

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114. The half life of two samples are 0.1 and 0.4 seconds. Their respective concentration are 200 and 50 respectively. What is the order of reaction

A. 0

B. 2

C. 1

D. 4

Answer: B

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115. Which is correct about zero order reaction?

A. Rate of reaction depends on decay constant

B. Rate of reaction is independent of concentration

C. Unit of rate constant is $concentration^{-1}$

D. Unit of rate constant is $concentration^{-1}time^{-1}$

Answer: B

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116. According to Arrhenius hypothesis, rate of a reaction increases with

A. rise in temperature

B. decrease in temperature

C. rise in pressure

D. decrease in pressure

Answer: A

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117. What is the activation energy for a reaction if its rate doubles when the temperature is raised from $20^\circ C$ to' $35^\circ C$? $\left(R = 8.3154 Jmol^{-1}K^{-1}\right)$

A. $342 kJmol^{-1}$

B. $269 kJmol^{-1}$

C. $34.7 kJmol^{-1}$

D. $15.1 kJmol^{-1}$

Answer: C

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118. A reaction having equal energies of activation for forward and reverse reactions has

A. $\triangle S = 0$

B. $\triangle = 0$

C. $\triangle H = 0$

D. $\triangle H = \triangle G = tr \in ag \leq S = 0$

Answer: C

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119. For a given reaction t_(1/2)= 1/Ka The order of the reaction is

A. 1

B. 0

C. 3

D. 2

Answer: D

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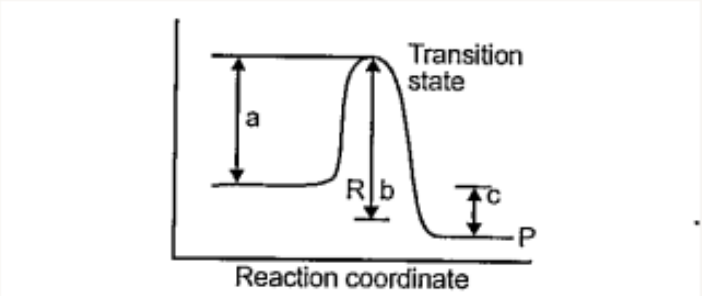
120. The potential energy diagram for a reaction $R \rightarrow P$ is given below



ΔH° of the reaction corresponds to the energy

A. a

B. b

C. c

D. a+b

Answer: C

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121. For a first order reaction, $(A) \rightarrow$ products, the concentration of Changes from 0.1 M of 0.025 M in 40 min. The rate of reaction wien the concentration of Ais 0.01 M is

A. $1.73 \times 10^{-5} \frac{M}{\min}$

B. $3.47 \times 10^{-4} \frac{M}{\min}$

C. $3.47 \times 10^{-5} \frac{M}{\min}$

D. $1.73 \times 10^{-4} \frac{M}{\min}$

Answer: B

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122. For the second order reaction,

$A + B \rightarrow$ Products

When a moles of A react with b moles of B, the rate equation is given by

$$k_2 t = \frac{1}{a-b} In \frac{b(a-x)}{a(b= -x)}$$

When a gt gt b, the rate expression becomes that of

A. first order

B. Zero order

C. unchanged, second order

D. third order

Answer: A

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123. For the reaction given below

$5Br^- + BrO_3^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$ .The rate of formation of Br. is related to rate of consumption of Br^- as the following relation

A. $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$

B. $\frac{d[Br_2]}{dt} = -\frac{d[Br^-]}{dt}$

C. $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$

D. $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$

Answer: D

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124. The initial rate, -(d[A])/dt at t = 0 was found to be $2.6 \times 10^2 molL^{-1}s^{-1}$ for the reaction $A + 2B \rightarrow$ Products The initial rate, (d[B])/dt, at $t \approx 0$ is

A. $0.10 molL^{-1}s^{-1}$

B. $2.6 \times 10^{-2} molL^{-1}s^{-1}$

C. $5.2 \times 10^{-2} molL^{-1}s^{-1}$

D. $6.5 \times 10^{-3} molL^{-1}s^{-1}$

Answer: C

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125. Which one of the following is wrong about molecularity of reaction ?

A. it may be whole number or fractional

B. It is calculated from reaction mechanism

C. It is the number of molecules of the reactants taking part in a single step chemical reaction

D. It is always equal to the order of elementary reaction

Answer: A

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126. Reactions which can go farthest for completion should have

A. K = 100

B. K =1

C. K = 0.1

D. K = 10^{-2}

Answer: D

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127. For a first order reaction the ratio of times to complete $99.9\ \%$ and half of the reaction is

A. 8

B. 9

C. 10

D. 12

Answer: C

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128. A first order reaction is 60% complete in 20 min. How long will the reaction take to be 84% complete ?

A. 68 min

B. 40 min

C. 76 min

D. 54 min

Answer: B

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129. A given sample of milk turns sour at room temperature $(27^\circ C)$ in 5 h. In a refrigerator at $-3^\circ C$, it can be stored 10 times longer. The energy of activation for the souring of milk is

A. $2.303 \times 5RkJmol^{-1}$

B. $2.303 \times 3RkJmol^{-1}$

C. $2.303 \times 2.7RkJmol^{-1}$

D. $2.303 \times 10RkJmol^{-1}$

Answer: C

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130. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH,(g)$ + 22 kcal

The activation energy for the forward reaction is 50 kcal. What is the activation energy for the backward reaction ?

A. 72 kcal

B. 28 kcal

C. -72 kcal

D. -28 kcal

Answer: A

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131. $2N_2O_5 \Leftrightarrow 4NO_2 + O_2$

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

A. 1.4

B. 1.2

C. 0.04

D. 0.8

Answer: D

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132. In a reaction, $A + B \rightarrow$ product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled. Rate law for the reaction can be written as

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

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

C. Rate = k[A][B]

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

Answer: D

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133. The rate of reaction is doubled for every 10^0 rise in temperature. The increase in reaction rate as a result of temperature rise from $10^0 \rightarrow 100^0$ is

A. 256 times

B. 512 times

C. 64 times

D. 128 times

Answer: B

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134. Activation energy (E_a) and rate constants (k_1 and k_2) of a chemical reaction at two different temperature (T_1 and T_2) are related by

A. $In\frac{k_2}{k_1} = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

B. $In\frac{k_2}{k_1} = \frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$

C. $In\frac{k_2}{k_1} = \frac{E_a}{R}\left(\frac{1}{T_2} + \frac{1}{T_1}\right)$

D. $In\frac{k_1}{k_2} = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

Answer: B

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135. For a reaction, $A + B \rightarrow$ products, the rate of the reaction at various concentrations are given below ,

Exp. no	[A]	[B]	Rate (mol $dm^{-3}s^{-1}$)
1	0.2	0.2	2
2	0.2	0.4	4
3	0.6	0.4	36

The rate law for the above reaction is [KCET]

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

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

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

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

Answer: D

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136. For the first order reaction, rate constant depends upon

A. temperature

B. reactant's initial concentration

C. time

D. extent of reaction

Answer: A

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137. Units of specific reaction rate for second order reaction is

A. s^{-1}

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

C. $L^2mol^{-2}s^{-1}$

D. $Lmol^{-1}s^{-1}$

Answer: D

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

A. 5

B. 2

C. 4

D. 3

Answer: C

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139. Assertion : The order of reaction may be defined as the sum of the powers to which the concentration terms are raised in order to determine the rate of reaction gives the total order of reaction.

Reason : The number of molecules whose concentrations determine the rate of reaction at a given temperature is called order of reaction.

A. Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.

C. Assertion is true but Reason is true

D. Both Assertion and Reason are false.

Answer: C

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140. Assertion : Acid catalysed hydrolysis of ethyl acetate is a first order reaction.

Reason : Water does not take part in the reaction

A. Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.

C. Assertion Is true but Reason is false.

D. Both Assertion and Reason are false.

Answer: C

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141. For which order half life period is independent of initial concentration?

A. zero

B. First

C. Second

D. Third

Answer: B

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142. For a reaction 1/2A $\rightarrow$ 2B, rate of disappearance of 'A' is related to the rate of appearance of B by the expression

A. $-\frac{d[A]}{dt} = \frac{1}{2}\frac{d[B]}{dt}$

B. $-\frac{d[A]}{dt} = \frac{1}{4}\frac{d[B]}{dt}$

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

D. $-\frac{d[A]}{dt} = 4\frac{d[B]}{dt}$

Answer: B

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143. For a chemical reaction, aA=bB $\rightarrow$ cC=dD. The ratio of rate of disappearance of A to that of appearance of C is

A. a/b

B. b/c

C. c/a

D. a/c

Answer: D

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144. A drop of solution (volume=0.05 ml) contains 6 x 10^{-7} mol of H^+. If the rate of disappearance of H^+ is 6.0×10^5 mol $L^{-1}s^{-1}$, how long will it take for the H^+ in the drop to disappear?

A. $8.0 \times 10^{-8}s$

B. $2.0 \times 10^{-8}s$

C. $6.0 \times 10^{-6}s$

D. $2.0 \times 10^{-2} s$

Answer: B

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145. In a reversible chemical reaction,

$$2NO_2 \underset{k_2}{\overset{k_1}{\rightleftharpoons}} N_2O_4$$

the rate of disappearance of NO_2 is equal to

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

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

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

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

Answer: B

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146. In a second order reaction, first order in each reactant A and B, which one of the following reactant mixtures will provide the highest initial rate?

A. 0.1 mol of A and 0.1 mol of B in 0.1 litre solvent

B. 0.2 mol of A and 0.2 mol of B in 0.1 litre solvent

C. 1.0 mol of A and 1.0 mol of B in 1.0 litre solvent

D. 0.1 mol of A and 0.1 mol of B in 0.2 litre solvent

Answer: B

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147. The rate constant for the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ is $3 \times 10^{-5}\,\text{sec}^{-1}$,if the rate is $2.4 \times 10^{-5} molL^{-1}s^{-1}$ the concentration of N_2O_5 (Mole/lit) will be

A. 1.4

B. 1.2

C. 0.04

D. 0.8

Answer: D

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148. Consider a gaseous reaction, the rate of which is given by k[A][B], the volume of the reaction vessel containing these gases is suddenly reduced to $\frac{1}{4}th$ of the initial volume. The rate of reaction relative to the original rate would be

A. 44212

B. $\frac{1}{16}$

C. $\frac{8}{1}$

D. $\frac{1}{8}$

Answer: A

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149. For the reaction $2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$

$$-\frac{d[NH_3]}{dt} = k_1[NH_3]; \frac{d[N_2]}{dt}; = k_2[NH_3];$$

$$\frac{d[H_2]}{dt} = k_3[NH_3]$$

The relation between k_1, k_2 and k_3 may be given as:

A. $1.5k_1=3k_2=k_3$

B. $2k_1=k_2=3k_3$

C. $k_1=k_2=k_3$

D. $k_1=3k_2=2k_3$

Answer: A

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150. For a reversible reaction of type $mA \Leftrightarrow nB$, it was found that the concentration of A and B are the same at equilibrium. k_f and k_b are the rate constants of the forward and backward reaction at a given temperature. Which of the following relation is correct?

A. $k_f > k_b$

B. $k_f < k_b$

C. $k_f = k_b$

D. can not be predicted

Answer: D

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151. What is the unit of rate constant of n^{th} order reaction?

A. temperature of the reaction

B. concentration of reactant

C. activation energy of the reaction

D. molecularity of the reaction

Answer: D

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152. For a reaction A+B $\rightarrow$ C consider the following data:

	[A] mol L^{-1}	[B] mol L^{-1}	Rate mol L^{-1} min^{-1}
(i)	0.01	0.01	0.005
(ii)	0.02	0.01	0.010
(iii)	0.01	0.02	0.005

Find the order of the reaction is :

A. 1

B. 2

C. 0

D. 3

Answer: A

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153. The decomposition of ozone proceeds as

$O_3 \rightleftharpoons O_2 + O$ fast

$O + O_3 \rightarrow 2O_2$ slow

The rate expression should be

A. Rate=$k[O_3]^2$

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

C. Rate=$k[O_3][O_2]$

D. Rate $= k[O_3][O_2]^{-1}$

Answer: B

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154. For a reaction A $\rightarrow$ Product. It is found that the rate of reaction increases by a factor of 6.25 when the concentration of A is increased by a factor of 2.5. The order of reaction with respect of A is

A. 2

B. 2.5

C. 0.5

D. 1

Answer: A

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155. Half of a substance is consumed in 40 minutes. When the quantity of the substance is decreased to half, the half-life of the change is 20 minute. The order of the reaction is:

A. zero

B. 1

C. 1.5

D. 2.5

Answer: A

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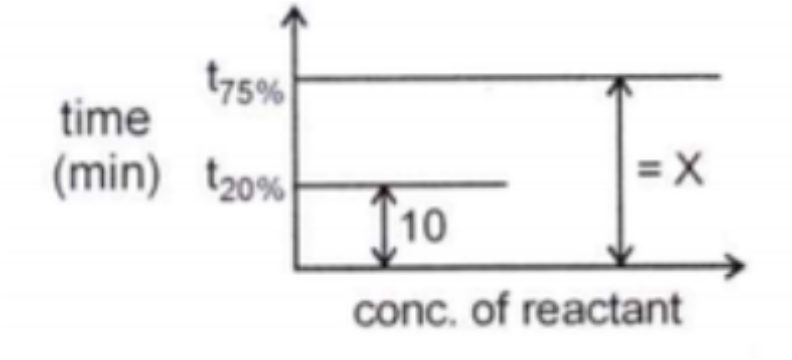
156. For a first order reaction, consider the graph below.



A. 62.7 min

B. 40 min

C. 80 min

D. 90 min

Answer: A

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157. The following data are for the decomposition of ammonium nitrite in aqueous solution

Volume of N_2 in c.c.	6.25	9.5	11.42	13.65	35.05
Time (minutes)	10	15	20	25	∞

The order of reaction is

A. zero

B. one

C. two

D. three

Answer: B

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158. The half life period of a first order chemical reaction is 6.93 minutes. The time required for the completion of 99% of the chemical reaction will be (log 2=0.301)

A. 23.03 minutes

B. 46.06 minutes

C. 460.6 minutes

D. 230.3 minutes

Answer: B

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159. The inversion of cane sugar proceeds with half-life of 500 minutes at pH=5 for any concentration of sugar. However if pH=6 the half life changes to 50 minutes. The rate law expression for the sugar inversion can be written as

A. $r=k[Sugar]^2[H]^6$

B. $r=k[Sugar]^1[H]^0$

C. $r=k[Sugar]^1[H^+]^1$

D. $r=k[Sugar]^0[H^+]^1$

Answer: B

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160. Two first order reactions proceed at $25^\circ C$, at the same rate. The temperature coefficient of the rate of first reaction is 2 and that of the second reaction is 3.find the ratio of rates of these reactions at $75^\circ C$

A. 7.6

B. 9.5

C. 10.4

D. 12.6

Answer: A

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161. Rate of a reaction can be expressed by Arrhenius equation as : $k = (Ae)^{\frac{E}{R}T}$ In this equation. E represents

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

B. the energy below which colliding molecules will not react

C. the total energy of the reacting molecules at a temperature,T

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

Answer: B

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162. The temperature coefficient for the saponification of ethyl acetate by NaOH is 1.75. The activation energy is (log 1.75=0.243)

A. 10.2 kcal mol^{-1}

B. 15.4 kcal mol^{-1}

C. 30 kcal mol^{-1}

D. 40 kcal mol^{-1}

Answer: A

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163. A catalyst lowers the activation energy of a reaction from 20 kJ/mole to 10 kJ$mo \leq^{-1}$. The temperature at which the reaction will have the same rate as that in presence of the catalyst at $27^\circ C$ is

A. $-123^\circ C$

B. $327^\circ C$

C. $337^\circ C$

D. $+23^\circ C$

Answer: B

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164. The activation energy for the reaction $2HI \rightarrow H_2 + I_2$ is 184 kJ/ mole. How many times greater is the rate constant for this reaction at $520^\circ C$ than at $500^\circ C$ (R=8.31 J/mole) ?

A. 0.5

B. 0.18

C. 5.5

D. 2

Answer: D

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165. The energies of activation for forward and reverse reaction for $A_2 + B_2 \Leftrightarrow 2AB$ are 180 and $200 kJ mol^{-1}$ respectively. The presence of catalyst lowers the activation energy of both forward and reverse reactions by $100 kJ mol^{-1}$. The enthalpy change of the reaction ($A_2 + B_2 \Rightarrow 2AB$ in the presence of catalyst will be (in $kJ mol^{-1}$))

A. 300

B. 120

C. 280

D. -20

Answer: D

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166. Consider an endothermic reaction X $\rightarrow$ Y with the activation energies E_b and E_f for the backward and forward reactions, respectively. In general

A. $E_b < E_f$

B. $E_b > E_f$

C. $E_b = E_f$

D. There is no definite relation between E_b and E_f

Answer: A

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167. For an endothermic reaction, where ΔH represents the enthalpy of the reaction in kJ/mole. The minimum value for the energy of activation would be

A. less than ΔH

B. equal to ΔH

C. more than ΔH

D. zero

Answer: C

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168. If a reaction $A+B \rightarrow C$ is exothermic to the extent of 30 kJ/mol and the forward reaction has an activation energy 70 kJ/mole. The activation energy for the reverse reaction is

A. 30 kJ/mol

B. 40 kJ/mole

C. 70 kJ/mole

D. 100 kJ/mole

Answer: D

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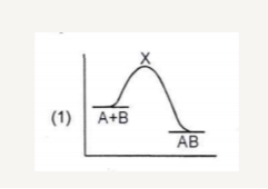
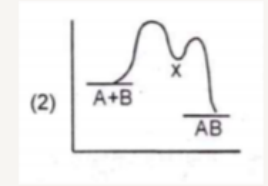
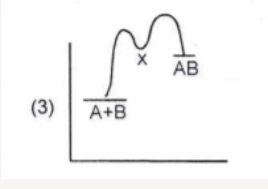
169. In a reaction, $A + B \rightarrow$ product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled. Rate law for the reaction can be written as

A. 

B. 

C. 

D. All of these

Answer:

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170. The rate of change of concentration of (A) for reaction:

A $\rightarrow$ B is given by $\frac{-d[A]}{dt} = k\frac{[A]^1}{3}$

The half-life period of the reaction will be:

A. $\frac{3[A_0]^{2/3}\left[(2)^{2/3}-1\right]^2}{(2)^{5/3}k}$

B. $\frac{\frac{3}{2}[A_0]^{2/3}\left[(2)^{2/3}-1\right]}{k}$

C. $\frac{3[A_0]^{2/3}\left[(2)^{2/3}-1\right]}{(2)^{5/3}k}$

D. $\frac{\frac{2}{3}[A_0]^{3/2}\left[(2)^{2/3}-1\right]}{k}$

Answer: C

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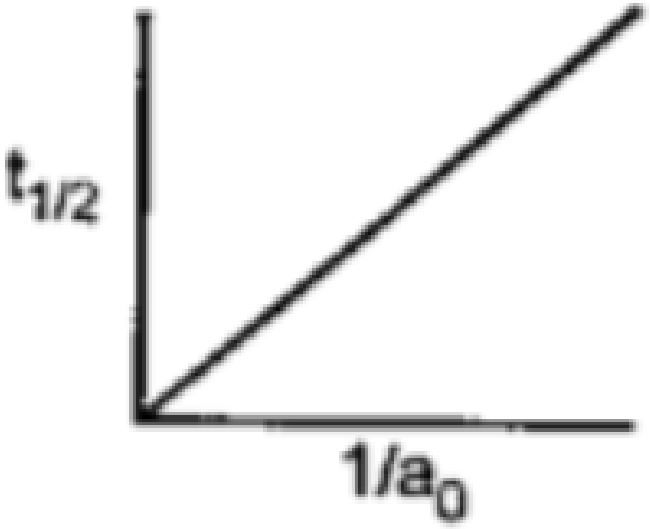
171. The following graph shows low $t_{\frac{1}{2}}$ (half-life) of a reactant R changes with the initial reactant concentration a_0



The order of the reaction will be:

A. 0

B. 1

C. 2

D. 3

Answer: C

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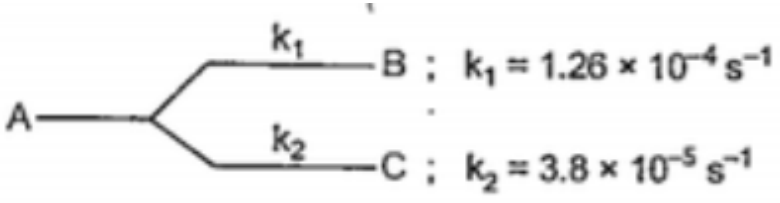
172. Consider the following first order reaction:



The percentage of 'B' in the mixture of B and C is likely to be:

A. $80\ \%$

B. $76.83\ \%$

C. $92\ \%$

D. $68\ \%$

Answer: B

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173. Complete the following reaction

The rate of the reaction $N_2(g)+3H_2(g)\rightarrow 2NH_3(g)$ was measured as $\frac{d}{dt}[NH_3]=2\times10^{-4}molL^{-1}sec^{-1}$. The rate of the reaction expressed in terms of N_2 and H_2 are

Rates in terms of N_2 ($mol\ L^{-1}\ sec^{-1}$)	Rate in terms of H_2 ($mol\ L^{-1}\ sec^{-1}$)

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174. The reaction, $N_2O_5(\text{in}\mathbb{C}l_4) \rightarrow 2NO_2+\frac{1}{2}O_2(g)$ is first order in N_2O_5 with rate constant $6.2\times10^{-4}s^{-1}$. What is the value of rate of reaction when $[N_2O_5]=1.25molL^{-1}$?

A. $7.75\times10^{-4}molL^{-1}s^{-1}$

B. $6.35\times10^{-3}molL^{-1}s^{-1}$

C. $5.15 \times 10^{-5} molL^{-1}s^{-1}$

D. $3.85 \times 10^{-4} molL^{-1}s^{-1}$

Answer: A

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175. For $xA + yB \Rightarrow zC, \ -\frac{d[A]}{dt} = \frac{d[B]}{dt} = 1.5\frac{d[C]}{dt}$ then x,y and z are respectively.

A. 1,1,1

B. 3,2,3

C. 3,3,2

D. 2,2,3

Answer: C

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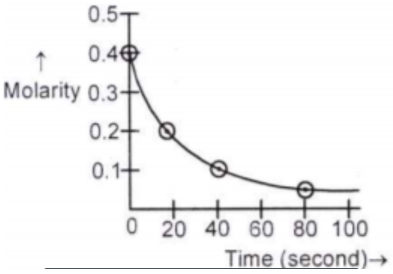
176. A reaction follows the given concentration-time graph The rate for this reaction at 20 s will be



A. $4 \times 10^{-3} Ms^{-1}$

B. $8 \times 10^{-3} Ms^{-1}$

C. $2 \times 10^{-2} Ms^{-1}$

D. $1 \times 10^{-2} Ms^{-1}$

Answer: D

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177. The decomposition of NO_2 at 400K proceeds at a rate of $5.4 \times 10^{-5} molL^{-1}s^{-1}$ when $[NO_2] = 0.01 molL^{-1}$.

$2NO_2(g) \Rightarrow 2NO(g) + O_2(g)$

What is the rate law when observed rate is $1.35 \times 10^{-5} molL^{-1}s^{-1}$ at $[NO_2] = 0.005 molL^{-1}$?

A. K$[NO_2]$

B. $K[NO_2]^2$

C. $K[NO_2]^3$

D. $K[NO_2]^0$

Answer: B

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178. Convert Aniline to m-Bromonitrobenzene.

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179. Which of these factors will affect the specific reaction rate of the given gaseous phase reaction?

R(g) $\rightarrow$ P(g) Factor I. Concentration Factor II. Pressure Factor III. Temperature

A. I,II &III

B. I&III

C. II&III

D. only III

Answer: D

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180. Consider that the first order decomposition reaction of N_2O_5 written as

$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g) : rate = k[N_2O_5]$

$N_2o_5(g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g) : rate = k'[N_2O_5]$

Which among the following one is correct?

A. k=k'

B. $k < k'$

C. k=2k'

D. k'=2k

Answer: D

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181. Which of the following statements is incorrect

A. Order of a reaction is always determined experimentally

B. It is sum of the powers of concentration terms in the differential rate law of a reaction

C. Order of a reaction can never be equal to zero or fractional value

D. It is equal to molecularity of an elementary reaction.

Answer: C

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182. The rate law for a reaction between the substances A and B is given by Rate $=k[A]^m[B]^n$ On doubling the concentration of A and having the concentration of B, the ratio of the new rate to the earlier rate of the reaction will be as:

A. 2^{m+n}

B. 2^{n-m}

C. 2^{m-n}

D. $2^{-(m+n)}$

Answer: C

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183. The following data are for the reaction, A+B $\rightarrow$ products

concentration of A (M)	concentration of B (M)	initial rate (Ms^{-1})
0.1	0.1	4.0×10^{-4}
0.2	0.2	1.6×10^{-3}
0.5	0.1	1.0×10^{-2}
0.5	0.5	1.0×10^{-2}

The overall order of the reaction is :

A. 0

B. 1

C. 2

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

Answer: C

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184. For the reaction: $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$ the experimental data suggests,

Rate = k, $[H_2][Br_2]^{\frac{1}{2}}$

The order and molecularity of the reaction are, respectively

A. 2 and 2

B. 3/2 and 2

C. 3/2 and 3/2

D. 3/2 and cannot be predicted

Answer: D

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185. A hypothetical reaction $A_2 + B_2 \rightarrow 2AB$ follows the following given mechanism :

$A_2 \Leftrightarrow A + A$(fast)

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

$A + B \rightarrow AB$(fast)

The order of the overall reaction will be :

A. 2

B. 1

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

D. zero

Answer: C

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186. The unit of rate of reaction and rate constant are identical for a

A. fractional order reaction

B. zero-order reaction

C. first-order reaction

D. second-order reaction

Answer: B

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187. For a zero order reaction, the plot of $[A]_t$ versus t for the reaction A $\rightarrow$ B is linear with a

A. positive slope and zero intercept

B. positive slope and non-zero intercept

C. negative slope and zero intercept

D. negative slope and non-zero intercept

Answer: D

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188. For A $\rightarrow$ B (zero order reaction), the $t_{\frac{1}{2}}$ is 10 s. find out the concentration of B after 40 s. [Given initial concentration of A is 0.4(M)]

A. 0.2 (M)

B. 0.4 (M)

C. 0.8 (M)

D. 1.2 (M)

Answer: B

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189. The rate constant for a 1st order reaction is 6.909 $\min^{-1}$. Therefore the time required in minute for the completion of $75\ \%$ of the reaction is

A. 2/3 log2

B. 2/3 log4

C. 3/2 log2

D. 3/2 log4

Answer: A

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190. Two substance A and B are present such that [A]=4[B} and half life of A is 5 minutes and of B is 15 minutes. If they start decaying at the same time following first order, how much time later will the concentration of both of them would be the same?

A. 5 minutes

B. 10 minutes

C. 12 minutes

D. 15 minutes

Answer: D

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191. The reaction $2NO(g) + H_2(g) = N_2O(g) + H_2O(g)$ follows the rate law $\frac{dP_{N_2O}}{dt} = K.(P_{NO})^2.P_{H\_2}$

If the reaction is initiated with $P_{NO} = 10000mmHg$ and $P_{H_2} = 10mmHg$. the reaction may be considered to follow

A. first order kinetics

B. second order kinetics

C. zero order kinetics

D. third order kinetics

Answer: A

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192.

$$CH_3COOC_2H_5 + H_2O \overset{H^+}{\Longleftrightarrow} CH_3COOH + C_2H_5OH$$

in an example of ..... order.

A. zero

B. second

C. third

D. pseudo first order

Answer: D

Watch Video Solution

193. The gas phase decomposition of dimethyl ether follows first order kinetics. $CH_3 - O_C H_3(g) \rightarrow CH_4(g) + CO(g) + H_2O(g)$ The reaction is carried out in a constant volume container at $500^\circ C$, and has a half of life of 14.5 minutes. Initially, only dimethyl ether is present at a pressure of 0.40 atm. Assuming ideal gas behavior, the total pressure of the system after 12 minutes will be.

A. 1 atm

B. 0.75 atm

C. 0.50 atm

D. 0.25 atm

Answer: B

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194. Consider the following 1st order competing reactions $X \xrightarrow{k_1} A + B$ and $Y \xrightarrow{k_2} C + D$

If $50\,\%$ of the reaction of X was completed when $96\,\%$ of the reaction of Y was completed, the ratio of their rate constants $\left(\frac{k_1}{k_2}\right)$ is [log 5 = 0.698]

A. 4.06

B. 0.215

C. 1.1

D. 4.65

Answer: B

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195. The rate of reaction is doubled for every 10^0 rise in temperature. The increase in reaction rate as a result of temperature rise from $10^0 \rightarrow 100^0$ is

A. 112

B. 512

C. 400

D. 1024

Answer: B

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196. The rate constant, the activation energy and the arrameter parameter of a chemical reaction at $25^{\circ}C$ are $3.0 \times 10^{-4}s^{-1}$, $104.4KJmol^{-1}$ and $6x \times 10^{14}s^{-1}$ respectively.The value of rate constant as $T \to \infty$, , is,

A. $2 \times 10^{-18}s^{-1}$

B. $6 \times 10^{14}s^{-1}$

C. infinity

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

Answer: B

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197. The rate of particular reaction quadruples when the temperature changes from 293 K to 313 k. the energy of activation of the reaction in kJ/mole is approximately

A. 33

B. 43

C. 53

D. 63

Answer: C

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198. For several reactions due to increase in temperature from 300 K to 310 K the rate percentage increases approximately by

A. $3.3\ \%$

B. $10\ \%$

C. $100\ \%$

D. $1000\ \%$

Answer: C

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199. The temperature coefficient of a 1st order reaction is 2. Find out rate of reaction at 340 K. [Given at 300 K, rate is $2 \times 10^2 ML^{-1}s^{-1}$]

A. $0.16 \times 10^2 ML^{-1}s^{-1}$

B. $3.2 \times 10^3 ML^{-1}s^{-1}$

C. $1.6 \times 10^3 ML^{-1}s^{-1}$

D. $0.8 \times 10^2 ML^{-1}s^{-1}$

Answer: B

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200. The rate constant is given by equation $k = P.Ze^{-\frac{E_a}{RT}}$. Which factor should register a decrease for the reaction to proceed more rapidly?

A. T

B. Z

C. E_a

D. P

Answer: C

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201. The activation energy of a reaction is 9 kcal/mole. The increase in the rate constant when is temperature is raised from 295 K to 300 K is approximately

A. $10\ \%$

B. $50\ \%$

C. $100\ \%$

D. $29.\ \%$

Answer: D

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202. How will be the graph plotted between log k vs 1/T for calculating activation energy?

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203. The activation energies of two reactions are E_a& E'_a respectively, where $E_a < E_a$. If the temperature of the reaction mixture is raised from T_1 to T_2. Then find out the relation between the rate constants at lower temperature T_1(k_1 and k_2) & higher temperature.

A. $k_1 > k_2$

B. $k'_1 > k'_2$

C. $k_1 < k_2$ and $k'_1 < k'_2$

D. relation can not be determined

Answer: A

204. For a first order reaction A $\rightarrow$ P, the temperature (T) dependent rate constant (k) was found to follow the equation

log k=(2000)/T +6.0

The pre-exponential factor A and the activation energy E_a, respectively, are

A. $1.0 \times 10^6 s^{-1}$ and 9.2 kJ mol^{-1}

B. $6.0 s^{-1}$ and 16.6 kJ mol^{-1}

C. $1.0 \times 10^6 s^{-1}$ and 16.6 kJ mol^{-1}

D. $1.0 \times 10^6 s^{-1}$ and 38.3 kJ mol^{-1}

Answer: D

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205. In Group 15 (Nitrogen Family), find out non-metal, metalloid, metal.

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206. Which of the following statements is incorrect?

A. Activation energy for the forward reaction equals activation energy for the reverse reaction.

B. For a reversible reaction, an increase in temperature increases the reaction rate for both the forward and the backward reaction.

C. The larger the initial reactant concentration for a second order reaction, the shorter its half-life

D. When ΔT is infinitesimally small, the average rate equals the instantaneous rate.

Answer: A

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207. If a reaction A+B $\rightarrow$ C is exothermic to the extent of 30 kJ/mol and the forward reaction has an activation energy 70 kJ/mole. The activation energy for the reverse reaction is

A. 30 kJ/mole

B. 40 kJ/mol

C. 70 kJ/mole

D. 100 kJ/mole

Answer: D

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208. Give the stability order of Black, Red, White Phosphorus.

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209. The rate constant k, of a second order reaction A $\rightarrow$ products is given by $k = \frac{1}{t}\left\{\frac{x}{a(a-x)}\right\}$.The ratio $\frac{t_{\frac{3}{4}}}{t_{\frac{1}{2}}}$ is equal to:

A. $\frac{1}{5}$

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

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

D. $\frac{5}{1}$

Answer: C

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210. Initial concentration of reactant for nth order reaction is 'a' which of the following relations is correct about half life of the reaction?

A. In $t_{\frac{1}{2}}$=In (constant)-(n-1) log $_{-} ea$

B. In $t_{\frac{1}{2}}$=In n + In (constant)- In a

C. In $t_{\frac{1}{2}} Inn$=In constant +In a_0

D. In $t_{\frac{1}{2}}$=n in a_0

Answer: A

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211. The half-life of a reaction is halved as the initial concentration of the reactant is doubled. The order of reaction is:

A. 0.5

B. 1

C. 2

D. 0

Answer: C

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212. From different sets of data of $t_{\frac{1}{2}}$ at different initial concentration (say,a) for given reaction, the product (`t_(1/2)xa) is found to be constant. The order of the reaction is:

A. zero

B. one

C. two

D. three

Answer: C

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213. Consider the reaction,

$Cl_2(aq) + H_2S(aq) \rightarrow S(s) + 2H^+(aq) + 2Cl^{-}{}^{(aq)}$

The rate equation for this reaction is, rate = $k[Cl_2][H_2S]$

Which of these mechanisms is/are consistent with this rate equation?

(A) $Cl_2 + H_2S \rightarrow H^+Cl^- + Cl^+ + HS^-$ (slow)

$Cl^+ + HS^- \rightarrow H^+ + Cl^- + S$ (fast)

(B) $H_2S \Leftrightarrow H^+ + HS^-$ (fast equilibrium)

$Cl_2 + HS^- \rightarrow 2Cl^- + H^+ + S$ (slow)

A. B only

B. Both (A) and (B)

C. Neither (A) nor (B)

D. (A) only

Answer: D

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214. The burning of coal represented by the equation, $C(s)+O_2(g) \rightarrow CO_2(g)$. The rate of this reaction is increased by:

A. decrease in the concentration of oxygen

B. powdering of lump of coal

C. decreasing the temperature

D. providing inert atmosphere

Answer: B

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215. If concentration of reactants is increased by 'x' ,then rate constant K becomes:

A. In k/x

B. k/x

C. k+x

D. k

Answer: D

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216. According to the Arrhenius equation,

A. a high activation energy usually implies a fast reaction

B. rate constant increases with increase in temperature. This is due to a greater number of collisions whose energy exceeds the activation energy

C. higher the magnitude of activation energy, stronger is the temperature dependence of the rate constant

D. the pre-exponential factor is a measure of the rate at which collisions occur, irrespective of their energy

Answer:

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217. A closed vessel with rigid walls contains 1 mol of $^{238}_{92}U$ and 1 mol of air at 298 K. Considering complete decay of $^{238}_{92}U$ to $^{206}_{82}Pb$, the ratio of the final pressure to the initial pressure of the system at 298 K is

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218. In dilute aqueous H_2SO_4, the complex diaquodioxalatoferrate (II) is oxidized by MnO_4^- . For this reaction, the ratio of the rate of change of $\left[H^+\right]$ to the rate of change of $\left[MnO_4^-\right]$ is

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219. Which of the following statement(s) is//are correct ?

A. The rate of a reaction is always proportional to the concentrations of reactants.

B. The order of an elementary chemical reaction step can be determined by examining its stoichiometry.

C. The first-order reactions follow an exponential time course.

D. The degree of dissociation for first order reaction is $1 - e^{-kt}$

Answer:

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220. Which of the following are true for the first order reaction?

A. $t_{\frac{3}{4}} = 2t_{\frac{1}{2}}$

B. $t_{\frac{15}{16}} = 4t_{\frac{1}{2}}$

C. $t_{\frac{15}{16}} = 3\frac{t_3}{4}$

D. $\frac{t_7}{8} = 2\frac{t_3}{4}$

Answer:

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221. Which of the following statements are correct about the reaction in presence catalyst ?

A. Catalyst does not alter the heat of reaction

B. Catalyst alters the equilibrium constant of the reaction

C. catalyst does not alter the ΔG^0 of the reaction

D. Catalyst changes the rate constant of forward and backward reaction to the same extent

Answer:

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222. Select the correct statement (s) among following

A. Increase in concentration of reactant increases the rate of a zero order reaction

B. Rate constant k is equal to collision frequency A, if

$E_a = 0$

C. Rate constant k is equal to collision frequency A, if

$E_a = \infty$

D. $\log_{10} k$ vs 1/T is a straight line

Answer:

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223. In the Arrhenius equation, $k = Ae^{\frac{E_a}{R}T}$, the rate constant (k) becomes equal to Arrhenius constant (A) when:

A. the temperature becomes infinite

B. the $100\ \%$ reactants are converted to product

C. the fraction of molecules crossing over the energy barrier is unity

D. the temperature of the reaction mixture is very low

Answer:

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224. Amides may be converted into amines by a reaction named after::

A. (A) Hoffmann

B. (B) Claisen

C. (C) Perkin

D. (D) Kekule

Answer:

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225. Match the Column-I with Column-II

	Column-I		Column-II
(A)	A process carried out infinitesimally slowly	(P)	Adiabatic
(B)	A process in which no heat enters or leaves the system	(Q)	$\Delta E = 0$
(C)	A process carried out at constant temperature	(R)	Reversible
(D)	Cyclic process	(S)	Isothermal
(E)	Isochoric process	(T)	$q_v = \Delta E$

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226. Match the Column-I with Column-II

	Column-I		Column-II
(A)	A process carried out infinitesimally slowly	(P)	Adiabatic
(B)	A process in which no heat enters or leaves the system	(Q)	$\Delta E = 0$
(C)	A process carried out at constant temperature	(R)	Reversible
(D)	Cyclic process	(S)	Isothermal
(E)	Isochoric process	(T)	$q_v = \Delta E$

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227. Match the Column-I with Column-II

	Column-I		Column-II
(A)	A process carried out infinitesimally slowly	(P)	Adiabatic
(B)	A process in which no heat enters or leaves the system	(Q)	$\Delta E = 0$
(C)	A process carried out at constant temperature	(R)	Reversible
(D)	Cyclic process	(S)	Isothermal
(E)	Isochoric process	(T)	$q_v = \Delta E$

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228. Why addition of electrolyte is commonly used for destruction of colloid?

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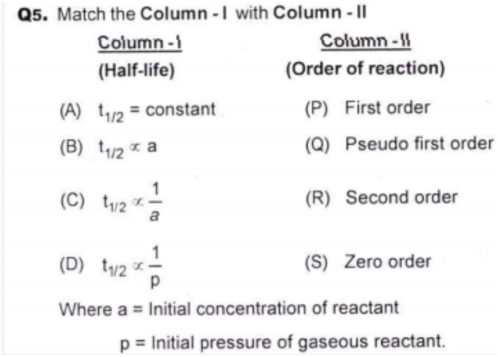
229. Match the Column-I with Column-II



Q5. Match the **Column - I** with **Column - II**

Column - I (Half-life)	Column - II (Order of reaction)
(A) $t_{1/2}$ = constant	(P) First order
(B) $t_{1/2} \propto a$	(Q) Pseudo first order
(C) $t_{1/2} \propto \frac{1}{a}$	(R) Second order
(D) $t_{1/2} \propto \frac{1}{p}$	(S) Zero order

Where a = Initial concentration of reactant

p = Initial pressure of gaseous reactant.

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230. The half-life of decomposition of PH, for different initial pressures are given below

The order of the reaction will be

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231. A reaction $X_2(g) \rightarrow Z(g) + \frac{1}{2}Y(g)$ exhibits an increase in pressure from 150 mm to 170 mm in 10 min. The rate of disappearance of X_2, in mm per min is .....

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232. Aqueous solution of ammonia consists of:

A. (A) H^+

B. (B) OH^-

C. (C) NH_{4+}

D. (D) NH^{4+}

and OH-

Answer:

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233. If the rate of reaction is $2.6 \times 10^{-3} molL^{-1}s^{-1}$ at $50^{\circ}C$ and $7.02 \times 10^{-2} molL^{-1}s^{-1}$ at $80^{\circ}C$: then what will be the temperature coefficient of the reaction ?

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234. Half of a substance ts consumed tn 40 min. When the quantity of substance ts decreased to half, the half-life of the change is 80 min. The order of reaction is...

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235. The following data are for the reaction, $A+B \rightarrow$ products

concentration of A (M)	concentration of B (M)	initial rate (Ms^{-1})
0.1	0.1	4.0×10^{-4}
0.2	0.2	1.6×10^{-3}
0.5	0.1	1.0×10^{-2}
0.5	0.5	1.0×10^{-2}

The overall order of the reaction is :

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concentration of A (M)	concentration of B (M)	initial rate (Ms^{-1})
0.1	0.1	4.0×10^{-4}
0.2	0.2	1.6×10^{-3}
0.5	0.1	1.0×10^{-2}
0.5	0.5	1.0×10^{-2}

The overall order of the reaction is :

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

The rate of disappearance of B is 1×10^{-2} mol lit^-1 sec^-1` What will be the rate of reaction

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

The rate of disappearance of B is 1×10^{-2} mole lit^-1 sec^-1` What will be the Rate of change in concentration of A and C?

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239. A second order reaction in which both the reactants have same concentration is $20\,\%$ completed in 500 seconds. How much time It will take for $60\,\%$ completion ?

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240. Half fife of a first order reaction is 60 min. How long will it take to consume $90\ \%$ of the reaction'?

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241. A general reaction A(g)+B(g) $\rightarrow$ C(g) +D(I) proceed in a container of volume V at temperature T. Which of the following is/are correct?

A. $-\frac{d[A]}{dt} = \frac{1}{V}\frac{dn_c}{dt}$

B. $-\frac{1}{V}\frac{dn_B}{dt} = V\frac{dn_C}{dt}$

C. $-\frac{1}{V}\frac{dn_B}{dt} = \frac{1}{RT}\frac{dP_A}{dt}$

D. $\frac{d[C]}{dt} = \frac{1}{RT}\frac{dP_B}{dt}$

Answer: A::C

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242. A two litre vessel contains 4 moles of N_2O_5. On heating to $100^\circ C$, N_2O_5 undergoes complete dissociation to NO_2 and O_2. Mark out the correct inference (s) if rate constant for decomposition of N_2O_5 is $5.2 \times 10^{-4}\,\text{sec}^{-1}$

A. Half life of N_2O_5 is 1117.7 sec and is independent of temperature

B. the mole ratio of N_2O_5 before and after 40% of dissociation is 4:2

C. the time required to dissociate 40% of reaction is 824 Sec

D. If volume of container is doubled. The rate of decomposition becomes half of the initial rate

Answer: A::B::C

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243. The reaction of acidified, aqueous potassium iodide with aqueous hydrogen peroxide

$2I^{-(aq)} + H_2O_2(aq) + 2H^+(aq) \rightarrow I_2(aq) + 2H_2O\Big)(I)$

is thought to involve the following steps :

$H_2O_2 + I^- \rightarrow H_2O + OI^-$ (slow)

$OI^- + H^+ \rightarrow HOI$ (fast)

$HOI + H^+ + I^- \rightarrow I_2 + H_2O$ (fast)

Which one of the following conclusions can be drawn from this information?

A. The iodide ion is oxidised by the hydrogen peroxide

B. The acid acts as a catalyst

C. The rate determining step is

$H_2O_2 + I^- \rightarrow$ H_2 O+ OI^-`

D. The rate equation for the reaction is rate=

$$k[H_2O_2][I^-]$$

Answer: A::C::D

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244. which of the following is/are correct for reactions of first order?

A. $k=\frac{1}{t}\ln\left(\frac{C_0}{C_1}\right)$

B. $t=2.303/k \log\left(\frac{a}{a-x}\right)$

C. $A_0 = [A]e^{-kt}$

D. $t_{\frac{1}{2}} = \ln 2/k$

Answer: A::B::D

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245. Consider the order of a reaction, choose the incorrect statements

A. Order of a reaction may be zero,integer or fractional

B. For an elementary process order of the reaction is never fractional

C. The order of an elementary step is always equal to its molecularity

D. For the chemical equation $N_2 + 3H_2 \rightarrow 2NH_3$

the order of reaction is 4

Answer: D

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246. `A+B = C+D, DeltaH = -217 kJ/mole

Mark out the incorrect statements regarding the reaction

A. The rate of disappearance of B increases on increase the concentration of A

B. The rate formation of D increases on increasing temperature

C. The rate of formation of C increases on increasing temperature

D. The use of catalyst does not affect the rate of formation of B or C

Answer: B::C::D

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247. The decomposition of N_2O into N_2 and O_2 follows second order kinetics with k =

$\left(5.0 \times 10^{11} L \text{mol}^{-1} s^{-1}\right) e^{-\frac{41570}{T}}$, it suggests that

A. $E_a = \frac{29000K}{R} T$

B. $E_a = (29000KR)$

C. $E_a = \frac{29000}{R}$

D. $E_a = 5.0 \times 10^{11} L \text{mol}^{-1} s^{-1}$

Answer:

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248. In the atmosphere, carbon dioxide is found in two forms, i.e., $\hat{}\ 12CO_2$ and $\hat{}\ 14CO_2$. Plants absord CO_2 during photosynthesis in presence of chlorophyll,

plants synthesise glucose $6CO_2$+6H_2Orarr$C_6H_{12}O_6$+ $6O_2\uparrow$

Half life of $\hat{}\ 14CO_2$ is 5760 years. The analysis of wooden artifacts for $\hat{}\ 14C$ and $\hat{}\ 12C$ gives useful information for determination of its age.

All living organisms, because of their constant exchange of Carbon dioxide with the surroundings have the same ratio of C-14 to C-12, i.e. 1.3×10^{-12}. When an organism dies, the C-14 in it keeps on decaying as follows:

$6^{14}C \rightarrow 7^{14}N + (-1)^{0}e$+Energy

Thus, the ratio of C-14 and C-12 decreases with the passage of time. We can measure the proportion of C-14 in the remains of dead organism and determine how long ago it died. The method of carbon dating can be

used to date anything made or organic matter, e.g., bone, skeleton, wood, etc. Using carbon dating, materials have been dated to about 50,000 years with accuracy.

C-14 exists in atmosphere due to:

A. conversion of C-12 to C-14

B. combustion of fossil fuel

C. bombardment of atmospheric nitrogen by cosmic ray neutrons.

D. none of above

Answer: C

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All living organisms, because of their constant exchange of Carbon dioxide with the surroundings have the same ratio of C-14 to C-12, i.e. 1.3×10^{-12}. When an organism dies, the C-14 in it keeps on decaying as follows:

$6^{14}C \rightarrow 7^{14}N + (-1)^{0}e$+Energy

Thus, the ratio of C-14 and C-12 decreases with the passage of time. We can measure the proportion of C-14 in the remains of dead organism and determine how long ago it died. The method of carbon dating can be used to date anything made or organic matter, e.g., bone, skeleton, wood, etc. Using carbon dating, materials have been dated to about 50,000 years with accuracy.

A piece of wood from an archeological source shows a C-14 activity which is 60% of the activity found in fresh wood today. The age of archeological sample will be:

A. 4246 yrs

B. 4624 yrs

C. 4628 yrs

D. 6248 yrs

Answer: A

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250. In has been estimated that the total energy radiated by the sun is 3.8×10^{26} J per second. The source of energy of stars is a thermonuclear reaction called nuclear fusion. Fusion reactions are not controlled. It is presumed that the energy of stars is due to two processes called proton-proton cycle and carbon nitrogen cycle. Fusion cannot take place at ordinary temperature. This, hydrogen bomb uses a small fission bomb, which on explosion causes the

temperature to rise very high about 10^7 K. We have yet to see how a hydrogen bomb can be used for peaceful life-sustaining purpose. Energy released in the process of fusion is due to mass defect. It is also called Q-value.

Q $= \Delta mc^2, \Delta m =$ mass defect

Answer the following questions based on above passage:

Fusion reaction takes place at about:

A. 3×10^2K

B. 3×10^3K

C. 3×10^4K

D. 3×10^6K

Answer: D

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251. 

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253. 

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254. 

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255. For a chemical reaction $xP \rightarrow yQ$

$$\text{In}\left[-\frac{d[P]}{dt}\right] = In\left[\frac{d[Q]}{dt}\right] + 6.909$$

The ratio of x to y is approximately 10^n, n = ?

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256. A definite volume of H_2O_2 undergoing decomposition required 22.8 mL of standard $KMnO_4$

solution for titration. After 10 and 20 min, the volume of permanganate required were 13.8 and 8.25 mL respectively. Find out the order of the reaction.

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257. For the first order reaction, the rate constant is $7.7 \times 10^{-2}\ \text{sec}^{-1}$. Calculate the time required for the initial concentration 1.5 mole of the reactant to be reduced to 0.75 mole.

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258. $A_2(g) \rightarrow B(g) + \frac{1}{2}C(g)$, the increases in pressure from 100mm to 120 mm is 5 min. The rate of disappearance of A_2 in mm/min is

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259. The following reaction was studied in a closed vessel.

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

It was found that concentration of NO_2 increase by 2.0×10^{-2} mol/lit in five seconds. Calculate

The rate of reaction

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260. The following reaction was studied in a closed vessel.

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

It was found that concentration of NO_2 increase by 2.0×10^{-2} mol/lit in five seconds. Calculate

The rate of change of concentration of N_2O_5

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261. Express the rate of following reaction in terms of different reactants and products of

$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

If the rate of formation of NO is 3.6×10^{-3} mole/lit

$\sec^{-1}$ Calculate:

The rate of disappearance of NH_3

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262. Express the rate of following reaction in terms of different reactants and products of

$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

If the rate of formation of NO is 3.6×10^{-3} mole/lit $\sec^{-1}$ Calculate:

The rate formation of H_2O

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263. For the reaction

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

the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction ,

$2NO(g) + O_2(g) \rightleftharpoons 2NO_2$ (g).

What is K for the reaction,

$NO_2(g) \rightleftharpoons \frac{1}{2}N_2(g) + O_2(g)$-

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264. The rate constant for an isomerisation reaction A $\rightarrow$ B is 4.5×10^{-3} $(\min)^{-1}$. If the initial concentration of A is 1 M. Calculate the rate of reaction after 1 hr.

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265. The equilibrium constant at 298 K for a reaction, `A+B⇌C+D is 100. If the initial concentration of all the four species were 1 M each, then equilibrium concentration of D (in mol L −1) will be:

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266. 0.50 g sample of rock was found to have $2.5 \times 10^{-6} mol$ of $K_{19}^{40}\left(t_{\frac{1}{2}} = 1.3 \times 10^{9} Yr\right)$ and $7.6 \times 10^{-6} mol$ of Ca_{20}^{40}. How old is the rock?

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267. In order to determine the volume of blood in an animal a 1.0 mL of sample of solution of 10^3 dpm of H^3, is infected 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. Calculate the volume of blood in the animal.

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268. 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. Calculate the Ea (activation energy) of the reaction.

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269. A reaction takes place in three steps will activation energy $Ea_1 = 180$ kJ/mol, $Ea_2 = 80$kJ/mol$\&Ea_3 =$ 50kJ/mol respectively.Overall rate constant of the reaction is $k = \left[\frac{k_1 k_2}{k_3}\right]^{\frac{2}{3}}$

Calculate activation energy of the reaction.

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270. Which of the following is a peroxide?

A. (A) KO_2

B. (B) BaO_2

C. (C) MnO_2

D. (D) NO_2

Answer: C

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271. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Half life of a reactant following first order kinetics is independent of concentration.

Statement-II: The time required to complete any

definite fraction of the first order reaction is independent of the initial concentration.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: B

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272. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

$2H_2O_2 \rightarrow 2H_2O + O_2$ the order of the reaction is 1.

Statement-II The given reaction is not an elementary reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of

Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: B

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273. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I The acid-catalysed hydrolysis of an ester is a pseudo-unimolecular reaction.

Statement-II: Hydrolysis of ester proceeds at constant concentration of H^+.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: A

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274. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : The rate of inversion of sucrose is monitored with the help of polarimetry (determination of optical rotation at different interval of time)

Statement-II: the inversion of sucrose follows the first order kinetics.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: B

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275. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement I: The molecularity of the reaction

$H_2 + Br_2 \rightarrow 2HBr$ is 2

Statement-II: The order of this reaction is 3/2.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: D

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276. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : If the activation energy of a reaction is zero, the rate constant becomes independent of the temperature.

Statement-II : Lower the activation energy, faster is the reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: B

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277. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I: A complex reaction has molecularity equal

to the order of that reaction.

Molecularity has no meaning for a complex reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: D

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278. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : Alkaline hydrolysis of esters is called saponification.

Statement-II : Alkaline hydrolysis of esters is a second order reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: B

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279. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : in a multi-step reaction, the molecularity

of overall reaction has no significance.

Statement-II : Molecularity refers to the order of rate determining step.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: C

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280. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : Every collision among reactant molecules is not responsible for the formation of products.

Statement-II: An active molecule can give rise to the formation of products.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: A

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281. The action of nitrous acid on an aliphatic primary amine gives:

A. (A) Secondary amine

B. (B) Nitro Alkane

C. (C) Alcohol

D. (D) Alkyl Nitrite

Answer: A

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282. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : Half-life of a first order reaction does not depend on the initial concentration of the reactant.

Statement-II $t_{\frac{1}{2}} = \frac{2.303 \log_{10} 2}{k}$

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: A

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283. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I :Hydrolysis of ethyl acetate in acid medium is pseudo first order reaction.

Statement-II :

$$CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$$

Water does not take part in this reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: C

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284. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : Instantaneous rate of reaction is given as

$\lim_{\Delta T \to 0} \frac{\Delta x}{\Delta t} \to \frac{dx}{dt}$

Statement-II : Rate of reaction in the appreciable interval of time is called the instantaneous rate of the reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: C

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285. The bleaching action of chlorine is due to:

A. (A) Reduction

B. (B) Hydrogenation

C. (c) Chlorination

D. (D) Oxidation.

Answer: A

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286. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : Molecularity of reaction may be fractional like that of order of reaction.

Statement -II : Number of molecules of same or different species that must contact simultaneously in a single step for the reaction to occur is equal to the molecularity of the reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: D

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287. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : Fraction of total molecules having energy

equal to or greater than activation energy = $k = Ae^{\frac{-E_a}{R}T}$

Statement-II : Activation energy of a chemical reaction is always constant at a given temperature.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: C

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288. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : Activated complex is an intermediate.

Statement-II: Activated complexes have high vibrational energy and they are highly unstable.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: B

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289. This question has Statement I and Statement II. Of four choices given after the Statements choose the one that best describes two statements

Statement-I : The rate of the reaction is the rate of

change of concentration of reactant or product.

Statement-II: Rate of reaction remains constant during the course of reaction.

A. Statement-I is true, Statement-II is true, Statement II is a correct explanation of Statement -I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

Answer: C

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