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India's Number 1 Education App

CHEMISTRY

BOOKS - TARGET CHEMISTRY (HINGLISH)

CHEMICAL KINETICS

Classical Thinking

1. The study of the rate of chemical reaction and factors affcting its rate is known as ___

A. thermodynamics

B. electrochemisty

C. chemical kinetics

D. ionic equilibrium

Answer: C

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2. When a reaction progresses, _____.

A. the rate of the reaction goes on increasing

B. the concentration of the products goes on decreasing

C. the concentration of the reactants goes on decreasing

D. the reaction rate always reamins constant

Answer: C

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3. For the reaction $A + B + C \rightarrow$ products , the term $(-d[C]/dt)$ in rate equation refers to

A. the concentration of a reactant

B. the decrease in concentration of the reactant with time

C. the velocity constant of the reaction

D. the concentration of a product

Answer: B

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4. For a reaction . 2P $\rightarrow$ 3Q , the rate of reaction (r) can be represented as _____.

A. $r = -\frac{d[P]}{dt} = \frac{d[Q]}{dt}$

B. $r = -\frac{d[P]}{dt} = \frac{1}{3}\frac{d[Q]}{dt}$

C. $r = -\frac{1}{2}\frac{d[P]}{dt} = \frac{1}{3}\frac{d[Q]}{dt}$

D. $r = \frac{1}{2}\frac{d[P]}{dt} = -\frac{1}{3}\frac{d[Q]}{dt}$

Answer: C

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5. For the reaction ,$A + 2B \rightarrow C,$ the rate of reaction at a given instant can be represented by _____.

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

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

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

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

Answer: C

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6. The concentration of a reactant decreases from 0.2 M to 0.1 M in 10 minutes . The rate of the reaction is _____.

A. $0.01M$

B. $10^{-2}\ \min^{-1}\ mol^{-1}$

C. $0.01 moldm^{-3}\ \min^{-1}$

D. $1 mol dm^{-3} \min^{-1}$

Answer: C

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7. The rate of change in concentration of C in the reaction, $2A + B \rightarrow 2C + 3D$, was reported as 1.0 mol $litre^{-1} \sec^{-1}$. Calculate the reaction rate as well as rate of change of concentration of A, B and D.

A. $0.05 mol L^{-1} S^{-1}$

B. $0.01 mol L^{-1} S^{-1}$

C. $0.5 mol L^{-1} s^{-1}$

D. None of these

Answer: C

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8. At a particular moment during the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ in liquid bromine N_2O_5 disappears at a rate of 0.03 M/s . What is the rate of NO_2 formation ?

A. $0.01M/s$

B. $0.06M/s$

C. $0.04M/s$

D. $1M/s$

Answer: B

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9. The rate of reaction at unit concentation of reactants is called __.

A. average rate

B. rale law

C. instantaneous rate

D. rate constant

Answer: D

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10. During the course of a chemical reaction , the rate constant ___.

A. increases as the reaction proceeds

B. remains constant

C. decreases as the reaction proceeds

D. first decreases followed by an increase

Answer: B

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11. The rate law for the reaction

$A + 2B \rightarrow$ products is : rate $= K[A][B]^2$ Rate of the reaction at 30° C is found to be 0.125 M/s , when $[A] = 2.0$ M and [B]=0.4 M . The rate constant k at this temperature is _____ $M^{-2}S^{-1}$.

A. 3.9

B. 0.39

C. 0.15

D. 1.5

Answer: B

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12. The rate law for the reaction $2A \rightarrow$ products is given by :

rate $= 9.0 \times 10^{-5}$A mol $L^{-1}S^{-1}$. What is the decompostion rate when $A = 0.250$ mol / litre ?

A. $6.3 \times 10^{-5} mol / Ls$

B. $5.6 \times 10^{-6} mol / Ls$

C. $7 \times 10^{-4} mol / Ls$

D. $4 \times 10^{-7} mol / Ls$

Answer: B

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13. Which of the following statements is CORRECT about rate law ?

A. It is useful to predict the mechanism of a complex reaction .

B. It is used to estimate the amount of heat ecvolved .

C. It cannot predict the rate of reaction for any composition of reaction

D. It cannot predict the overall order of the reaction .

Answer: A

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14. The sum of the power to which the concentration of substance apears in the rate expression is known as _____.

A. rate of reaction

B. molecularity of reaction

C. order of reaction

D. reate constant

Answer: C

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15. Order of a reaction can have _____ values .

A. Positive

B. whole number

C. fractional

D. all of these

Answer: D

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16. If the surface area of the reactants increases , then order of the reaction _____.

A. increases

B. decreases

C. remains constant

D. sometimes increases and sometimes decreases

Answer: C

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

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

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

C. 0

D. -1

Answer: D

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18. The rate of reaction , $A + B + C \rightarrow$ product is given by : rate $= K[A]^{1/2}[B]^{1/3}$ [C] . The order of the reaction is _____.

A. 1

B. 3

C. $\frac{5}{6}$

D. $\frac{11}{6}$

Answer: D

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19. What is the order of a reaction whose rate $= K[C]_A^{3/2}[C]_B^{-1/2}$?

A. 2

B. 1

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

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

Answer: B

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20. The rate of the first-order reaction $X \rightarrow$ products is $7.5 \times 10^{-4} molL^{-1} \min^{-1}$. What will be value of rate constant when the concentration of X is $0.5 molL^{-1}$?

A. $3.75 \times 10^{-4} \min^{-1}$

B. $2.5 \times 10^{5} \min^{-1}$

C. $1.5 \times 10^{-3} \min^{-1}$

D. $8.0 \times 10^{-4} \min^{-1}$

Answer: C

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21. When the concentration of a reactant in reaction $A \rightarrow B$ is increased by 8 times but rate increases only 2 times, the order of the reaction would be

A. 2

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

C. 4

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

Answer: B

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22. If [A] is the concentration of A at any time t and $[A]_0$ is the concentration at t=0 , then for the 1^{st} order reaction , the rate equation can be written as _____.

A. $k = \frac{2.303}{t} \log_{10} \frac{[A]_t}{[A]_0}$

B. $kt = 2.303 \log_{10} \frac{[A]_0}{[A]_t}$

C. $k = \frac{2.303}{t} \log_{10} \frac{[A]_0}{[A]_0 - [A]_t}$

D. $k = \frac{2.303}{t} \log_{10} \frac{[A]_0 - [A]_t}{[A]_0}$

Answer: B

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23. The unit of first order rate constant is ..... .

A. $moldm^{-3}time^{-1}$

B. $dm^{-3}mol^{-1}time^{-1}$

C. time^{-1}

D. $moldm^{3}\text{time}^{-1}$

Answer: C

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24. The time required to concert half of the reactant into the product will equal _____.

A. one half life

B. two half lives

C. three half lives

D. four half lives

Answer: A

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25. Which of the following is correct for a first order reaction ?

A. $t_{1/2} \propto C^{-1}$

B. $t_{1/2} \propto C$

C. $t_{1/2} \propto C^{0}$

D. $t_{1/2} \propto C^{1/2}$

Answer: C

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26. A first order reaction is 80% completed in 10 minutes .Find specific reaction rate constant second .

A. $0.510s^{-1}$

B. $0.0027s^{-1}$

C. $0.161s^{-1}$

D. $0.2S^{-1}$

Answer: B

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27. A substance $''A''$ decomposes in solution following the first order kinetics. Flask I contains $1L$ of $1M$ solution of A and falsk II contains $100mL$ of $0.6M$ solution. After $8hr$, the concentration, of A in flask I becomes $0.25M$. What will be the time for concentration of A in flask II to become $0.3M$?

A. 0.4 hrs

B. 2.4 hrs

C. 4.0 hrs

D. Unprdictable as the rate constant is not given

Answer: C

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28. A 1^{st} order reaction has specific rate constant of $2\ \min^{-1}$

The half - life of this reaction will be _____.

A. $1.653\ \min$

B. $0.347\ \min$

C. $2\ \min$

D. $0.5\ \min$

Answer: B

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29. For a first order reaction , $k = 0.693 hr^{-1}$. The half life of the reaction is ____.

A. 0.693hour

B. $\frac{1}{0.693}$ hour

C. 1 hour

D. 6.93 hour

Answer: C

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30. The half life of a first order reaction is 10 years . The time taken by 10 g of the reactant to reduce its half is _____.

A. 100 years

B. 50 years

C. 5 years

D. 10 years

Answer: D

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31. For a zero order reaction , _____.

A. the concentration of the reactant remains constant during the reaction

B. the concentration changes only when the termperature changes

C. the rate remains constant throughout the reaction

D. the rate of the reaction is proportional to the concentration of reactants

Answer: C

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32. If order of reaction $A + B \xrightarrow{hv} AB$ is zero. It means that

A. reaction is independent of temperature

B. formation of activated complex is zero

C. reaction is independent of the concentration of reacting species

D. decompostion of activated complex is zero

Answer: C

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33. For a zero order reaction of the type $A \rightarrow$ products, the integrated rate equation may be expressed as

A. $kt = \frac{[A]_t}{[A]_0}$

B. $kt = [A]_t - [A]_0$

C. $[A]_t = -kt + [A]_0$

D. $[A]_t = kt - [A]_0$

Answer: C

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34. The unit of rate constant in case of zero order reaction is ____.

A. concentration $\times$ time $^{-1}$

B. concentration $^{-1} \times$ time $^{-1}$

C. concentration $\times$ time ^{2}

D. concentration $^{-1} \times$ time

Answer: A

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35. For which of the following reactions, the units of rate constant and rate of reaction are same?

A. First order reaction

B. Second order reaction

C. Third order reaction

D. zero order reaction

Answer: D

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36. Catalytic decomposition of phoshine on hot tungsten at high pressure is _____ reaction .

A. pseudo 1^{st} order

B. 2^{nd} order

C. 1^{st} order

D. zero order

Answer: D

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37. An example of a pseudo first order reaction is _____.

A. dissociation of sulphur trioxide

B. hydrolysis of methyl acetate in dilute solution

C. dissociation of phosphorus pentachloride

D. decompostion of ammonia on hot Pt.

Answer: B

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38. Molecularity of an elementary reaction can be _____.

A. zero

B. natural number

C. fraction

D. negative

Answer: B

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39. For an elementary reaction, $2A + B \rightarrow C + D$ the molecularity is

A. 2

B. 0

C. 3

D. 1

Answer: C

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40. For an elementary process

A. is equal to its molecularity

B. cannot be predicted

C. depends on temperature

D. depends on experimental conditions

Answer: A

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41. The rate law for elecentary reaction $A + 2B \rightarrow C + 2D$ will be _.

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

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

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

D. Rate $= k\frac{[C][D]^2}{[A][B]^2}$

Answer: C

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42. For a reaction $2A + B \rightarrow C + D$, the active mass of B is kept constant but tht of A is tripled. The rate of reaction will

A. decrease by 3 times

B. increase by 9 times

C. increase by 3 times

D. unpredictable

Answer: B

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43. The overall rate of a reaction is governed by :

A. rate of the faster intermediate steps

B. sum of total of the reates of all intermediate steps

C. average of the rates of all the intermediate steps

D. rate of the slowest intermediate step

Answer: D

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44. A reaction $A_2 + B_2 \rightarrow 2AB$ occurs by the following mechanism:

$A_2 \rightarrow A + A$... (slow)

$A + B_2 \rightarrow AB + B$... (fast)

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

Its order would be

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

B. 1

C. 0

D. 2

Answer: B

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45. Accroding to collision theory of reaction rates :

A. every molecular collision leads to a chemical reaction

B. rate is directly proportial to the number offective collisions per second

C. gas phase reactions are always of zero order

D. rates of reactions are of the order of molecular speeds

Answer: B

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46. In order to react, a molecule at the time of collision, must posses a certain amount of energy known as :

A. reaction

B. collision

C. activation

D. threshold

Answer: D

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47. In a reaction, the threshold energy is equal to

A. activation energy

B. activation energy - energy possessed by reacting species .

C. activation energy + energy possessed by reacting species

D. energy possessed by reacting species

Answer: C

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48. The Activation energy for a chemical reaction mainly depends upon

A. nature of products

B. nature of reactants

C. number of collisions per unit time

D. concentratiion of reactants

Answer: B

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

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

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

B. $Lmol^{-1}S^{-1}$

C. S^{-1}

D. dimensionless

Answer: C

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

$C + D \rightarrow A + B$

A. 20 kcal

B. -20kcal

C. 18 kcal

D. 58 kcal

Answer: D

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51. The rate of reaction increases by the increase of temperature because

A. the velocity of collision incrases

B. the velocity of reactant molecules increases

C. more molecules attain activation energy

D. None of these

Answer: C

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52. Arrhenius equation is given by the the formula _____.

A. $\log \frac{K_2}{k_1} = \frac{E_a}{22.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$

B. $\log \frac{K_2}{K_1} = -\frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$

C. $\log \frac{K_1}{K_2} = -\frac{E_a}{2.303R}\left[\frac{T_1 - T_2}{T_1 T_2}\right]$

D. $\log \frac{K_1}{K_2} = \frac{E_a}{2.303R}\frac{T_2 - T_1}{T_1 T_2}\Bigg]$

Answer: A

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

A. rate incrases with the rise in temperature

B. rate decreases with rise in temperature

C. rate does not change with rise in temperature

D. none of the above

Answer: A

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54. 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. $K_2 = 4K_1$

B. $K_2 = 0.25K_1$

C. $K_2 = 2K_1$

D. $k_2 = 0.5K_1$

Answer: B

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55. Which of the following statement regarding catalyst is not true?

A. It is highly specific in its action

B. A catalyst in a chemical reaction

C. A catalyst does not change the state of equlibrium in a chemical reaction

D. The catalyst appears in the balanced chemical equation .

Answer: D

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56. A catalyst increases rate of reaction by

A. incrases the activation energy

B. decrease the energy barrier of reaction

C. decreases the collision diameter

D. increases the temperature coefficient

Answer: B

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57. Catalyst

(i) increases the average kinetic energy of the molecules .

(ii) decreases the activation energy

(iii) alters the reaction mechanism

(iv) incerases the surface area of the reactants

which of the following is CORRECT ?

A. (I) and (ii)

B. (ii) and (iii)

C. (I) and (iv)

D. (I) (ii) (iii) and (iv)

Answer: B

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Critical Thinking

1. which of the following aspect is NOT dealt by chemical kinetics ?

A. Mechanism of reaction .

B. Feasibility of reaction .

C. Reaction rates

D. Factors by which reactionn rates can be altered.

Answer: B

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2. In a chemical reactio $2AB \rightarrow C + D$ find the INCORRECT statement .

A. Rate of disppearance of $B =$ Rate of appearance of C = rate of appearance of D

B. $\frac{1}{2}$ rate of disppearance of A = rate of appearance of C or D

C. Twice the rate of disappearance of A = rate of disappearamce of B

D. Rate of disppearance of A = Twice the rate of appearance of C .

Answer: C

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3. for the reaction, $2A + B \rightarrow 3C + D$, which of the following does not express the reaction rate

A. $\frac{d[D]}{dt}$

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

C. $-\frac{d[C]}{3dt}$

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

Answer: C

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

$$+\frac{1}{2}\frac{d[C]}{dt} = -\frac{1}{5} - \frac{d[D]}{dt} = +\frac{1}{3}\frac{d[A]}{dt} = -\frac{d[B]}{dt}$$

the reaction is _____.

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

B. $B + 5D \rightarrow 3A + 2C$

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

D. $B + \frac{1}{2}D \rightarrow 4A + 2C$

Answer: B

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5. In the formation of sulphur trioxide by the contact process,

$2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

The rate of reaction is expressed as

$-\frac{d(O_2)}{dt} = 2.5 \times 10^{-4} molL^{-1}s^{-1}$

The rate of disappearance of (SO_2) will be

A. $5.0 \times 10^{-4} molL^{-1}s^{-1}$

B. $2.25 \times 10^{-4} molL^{-1}S^{-1}$

C. $3.75 \times 10^{-4} molL^{-1}s^{-1}$

D. $50.0 \times 10^{-4} molL^{-1}S^{-1}$

Answer: A

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6. In a catalytic reaction $N_2 + 3H_2 \rightarrow 2NH_3$ (all in gaseous state).

rate

$$= \frac{Detla[NH_3]}{\Delta t} = 4.0 \times 10^{-4} \times 10^{-4} mo \leq L^{-1} S^{-1}$$

The rate of reaction when expressed in terms of changes in concentration of (i) N_2 (ii) H_2 are respectively ___. (Assume that no side reactions have taken place .)

A. $2 \times 10^{-4}, 6 \times 10^{-4}$

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

C. $2 \times 10^{4}, 3 \times 10^{-4}$

D. $4 \times 10^{-4}, 3 \times 10^{-4}$

Answer: A

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7. The rate constant and rate of reaction have units that are ___.

A. quite independent of each other

B. independent on experimental conditions of the reaction

C. identical

D. related to each other through a definite expression depending upon the order of the reaction

Answer: D

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8. The rate law for the reaction

$RCl + NaOH(aq) \rightarrow ROH + NaCl$ is given by

Rate $= k[RCl]$. The rate of the reaction will be

A. doubled on doubling the concentration of NaOH

B. Halved on reducing the concentration of RCI to one half

C. decreased on increasing the temperature of the reaction

D. undffected by increasing the temperature of the reaction

Answer: B

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9. Diazonium salt decomposes as $C_6H_5N_2^+Cl^- \rightarrow C_6H_5Cl + N_2$. At $0^\circ C$, the evolution of N_2 becomes two times faster when the initial concentration of the salt is doubled. Therefore, it is

A. a first order reaction

B. a pseudo order reaction

C. independent of squre of initial concentration of reactant

D. a zero order reaction

Answer: A

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10. For a reactions $A + B \rightarrow$ product, it was found that rate of reaction increases four times if concentration of $'A'$ is doubled, but the rate of reaction remains unaffected. If concentration of $'B'$ is doubled. Hence, the rate law for the reaction is

A. rate $= K[A][B]$

B. rate $= K[A]^2$

C. rate $= K[A]^2[B]$

D. rate $= K[A]^2[B]^2$

Answer: B

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11. The conversion of $A \rightarrow B$ follows second-order kinetics. Doubling the concentration of A will increase the rate of formation of B by a factor

A. $\frac{1}{4}$

B. 2

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

D. 4

Answer: D

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12. In a reaction, the concentration of reactant is increased two times and three times than the increases in rate of

reaction were four times and nine times respectively, order of reaction is

A. 0

B. 1

C. 2

D. 3

Answer: C

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13. Conisder a reaction $aG + bH \rightarrow$ Products. When concentration of both the reactants G and H is doubled, the rate increases eight times. However, when the

concentration of G is doubled, keeping the concentration of H fixed, the rate is doubled. The overall order of reaction is

A. 0

B. 1

C. 2

D. 3

Answer: D

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14. The straifht line graph with negative slope for integrated rate equation , kt =$In[A]_0 - In[A]_t$ is obtained by plotting a graph of _____.

A. $In[A]_t vst$

B. $In[A]_0 vs \frac{1}{t}$

C. $In[A]_t vs \frac{1}{t}$

D. $In[A]_0 vst$

Answer: A

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15. For the order reaction , plot of $\log_{10}(a-x)$ against time t is a straight line with a negative slope equal to _____.

A. $-2.303K$

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

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

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

Answer: C

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16. A first order reaction with respect to the reactact A has a rate constant of $6s^{-1}$. If we start with $[A] = 0.5$ mol / litre, then in what time the concentration of A becomes 0.05 mol / litre

A. $0.384s$

B. 0.214s

C. 3.84s

D. 0.402s

Answer: A

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17. The reaction $A \rightarrow$ products is of first order . If volume of reaction vessel is reduced to 1/3 , the rate of reaction would be _____.

A. $\frac{1}{3}$ times

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

C. 2 times

D. 6 times

Answer: C

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18. A first order reaction requires 30 minutes for 50 % completion . The time required to complete the reaction by 75 % will be __.

A. 45 timutes

B. 15 minutes

C. 60 minutes

D. None of these

Answer: C

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19. For a first order reaction, the ratio of time for the completion of $99.9\ \%$ and half of the reaction is

A. 9

B. 8

C. 10

D. 12

Answer: C

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20. The thermal decomposition of a compound is of first order. If $50\ \%$ of a sample of the compound is decomposed

in 120 minutes, how long it take for $90\ \%$ of the compounds to decompose.

A. About 240 minutes

B. About 560 minutes

C. About 45 minutes

D. About 400 minutes

Answer: D

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21. 75 % of first order reaction is complete in 30 minutes. What is the time required for 93.75 % of the reaction (in minutes) ?

A. 45

B. 120

C. 90

D. 60

Answer: D

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22. After how many seconds will the concentration of the reactant in a first order reaction be halved if the rate constant is $1.155 \times 10^{-3} s^{-1}$?

A. $100 s$

B. $200 s$

C. $400s$

D. $600s$

Answer: D

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23. which of the following represents the expression for $3/4$ th life of first order reaction?

A. $\frac{K}{2.303} \times \log_{10} \frac{4}{3}$

B. $\frac{2.303}{K} \times \log_{10} \frac{3}{4}$

C. $\frac{2.303}{k} \times \log_{10} 4$

D. $\frac{2.303}{k} \times \log_{10} 3$

Answer: C

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24. The half life of a first order reaction having rate constant $k = 1.7 \times 10^{-5} \sec^{-1}$ is :

A. 1200 s

B. 0.33S

C. 600 s

D. 1s

Answer: C

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25. The rate for the 1^{st} order reaction is $0.69 \times 10^{-2} molL^{-1}\ \min^{-1}$ and the initial concentration is 0.2 mol L^{-1}. The half life period is ____.

A. 1200 s

B. $0.33s$

C. 600s

D. 1s

Answer: A

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26. Half-life perood for a first order reaction is 10 min. How much time is needed to change the concentration of the

reactant from 0.08 M to 0.01 M ?

A. 20 min

B. 30 min

C. 40 min

D. 50 min

Answer: B

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27. Hydrolysis of cane sugar in presence of acid is a first order reaction with half life time of 4 hours what fraction of sucrose undergoes hydrolysis in 11 hrs ?

A. 0.9345

B. 0.6122

C. 0.8511

D. 0.412

Answer: C

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28. For a zero order reaction, the plot of concentration of a reactant vs time is (intercept refers to concentration axis)

A. positive slope and zero intercept

B. positive slope and zero intercept

C. negative slope and zero intercept

D. negative slope and non zero intercept

Answer: D

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

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

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

C. $\frac{x}{t}$

D. infinity

Answer: A

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30. which of the following statements is FALSE ?

A. a fast reaction has a larger rate constant and short half - life as compared to slow reaction

B. for a first order reaction , successive half lives are equal

C. for a zero order reaction , the half life depends on initial concentration

D. the half life of a reaction is half the time required for the required for the reaction for completion

Answer: D

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31. Which of the following statements is INCORRECT about about life period

A. It is proportional to initial concentration for zero order reaction

B. for a first order reaction , the product of half life period and rate constant is equal to 0.693 .

C. Time of 75% completion of a reaction is thrice of half life period for first order .

D. 99.9% reaction takes place in 100 minutes for the case when rate constant is 0.0693 per minute .

Answer: C

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32. For a chemical reaction _____ can never be a fraction .

A. order

B. half -life

C. molecularity

D. rate constant

Answer: C

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33. Which of the following statements is INCORRECT ?

A. Molecularity of a reaction is the number of molecules of the reactant present in the balanced elementary equation .

B. All first order reactions are not unimoleularity elementary processes .

C. Molecularity is always a natural number

D. there is no difference between order and molecularity of a reaction .

Answer: D

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34. The reaction between NO and Cl_2 written as $2NO + Cl_2 \Leftrightarrow 2NOCl$ is found to follow third order kinetics .Its molecularity is _____.

A. 1

B. 2

C. 3

D. 1.5

Answer: C

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35. Collision theory is applicable to

A. first order

B. zero order

C. bimolecular

D. intra molecular

Answer: C

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36. If x is the fraction of molecules having energy greater than E_a relation between the two will be given by _____.

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

B. $Inx = -\frac{E_a}{RT}$

C. $x = e^{\frac{E_a}{RT}}$

D. $x = e^{\frac{RT}{E_a}}$

Answer: B

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37. Energy of activation of an exothermic reaction reaction is _____.

A. zero

B. negative

C. positive

D. can't be predicted

Answer: C

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38. If the activation enery for the forward reaction is 150kJ mol^{-1} and that of the reverse reaction is 260kJ mol^{-1}. What is the ethalpy change for the reaction ?

A. 410 $KJmol^{-1}$

B. $-110KJ\text{mol}^{-1}$

C. $110KJmol^{-1}$

D. $-410KJmol^{-1}$

Answer: B

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39. Which of the following plot is in accordance with the Arrhenius equation ?

A. 

B. 

C. 

D. 

Answer: A

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40. The rate constant (K') of one reaction is double of the rate constant (K") of another reaction. Then the relationship

between the corresponding activation energies of the two reactions $\left(E_a' \text{and} E_a''\right)$ will be

A. $E_a' > E_a''$

B. $E_a' < E_a''$

C. $E_a' = E_a''$

D. $E_a' > 4E_a''$

Answer: B

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41. What happens when the temperature of a solution is increased from $25^\circ C$ to $52^\circ C$?

A. The rate of reaction remains unchanged and rate constant increases

B. The rate of reaction increases and the rate constant decreases.

C. the rate of reaction decreases so that so that reate constant increases

D. Both rate and rate constant of the reaction increases.

Answer: D

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42. In Arrhenius equation $k = A\exp\left(-\frac{E_a}{RT}\right)$. A may be termed as the rate constant at

A. very low temperature

B. zero activation energy

C. the boiling temperature to reaction mixture

D. All of the above

Answer: B

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43. The rate constant is given by the equation $k = P.\ Ze^{-E/RT}$. 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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44. The rate constant at $27^\circ C$ and $67^\circ C$ for the dissociation of N_2O_5 are 3.45×10^{-5} and 6.90×10^{-3} respectively . What is the activation energy for the dissociation of N_2O_5?

A. $112.3KJ$

B. $225KJ$

C. $448KJ$

D. $199.2KJ$

Answer: A

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45. Which of the following is NOT the function of catalyst ?

A. To increase the rate constant

B. To influencr the forward and backward reactions to the same extent

C. To reduce the time required for reachiing the equilibrium state .

D. To alter the Gibbs energy change (ΔG) of the reaction .

Answer: D

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46. Which of the following reaction characteristics change on addition of a catalyst to a reaction at constant temperature ?

(i) Activation energy ltbr. (ii) Equilibrium constant

(iii) Gibbs enregy change

(iv) enthylpy change of reaction

A. (i) only

B. (iii) only

C. (i) and (ii) only

D. All of these

Answer: A

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47. As temperature increases , $T_{1/2}$ will _____.

A. increase

B. decrease

C. remain same

D. unpredictable

Answer: B

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48. In a hypothetical reaction $X \rightarrow Y$, the activation energy for the forward and backward reactions is 15 and $9kJmol^{-1}$, respectively. The potential energy of X is $10kJmol^{-1}$. Then Plot $t_{1/2}$ vs. concentration

A. The threshold energy of the reaction is 25Kj

B. the potential energy of Y is 16KJ

C. heat of reaction is 6 KJ

D. all the above are correct

Answer: D

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49. Which of the following statement is FALSE in relation to enzyme ?

A. pH affects their functioning

B. Temperature affects their functioning

C. they always increase activation energy

D. their reactions are specific.

Answer: C

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Competitive Thinking

1. Average rate of reaction for the following reaction, $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$ is written as

A. $\frac{\Delta[SO_2]}{\Delta t}$

B. $-\frac{\Delta[O_2]}{\Delta t}$

C. $\frac{1}{2}\frac{\Delta[SO_2]}{\Delta t}$

D. $\frac{\Delta[SO_3]}{\Delta t}$

Answer: B

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2. The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is

A. $+\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$

B. $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

C. $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$

D. $+\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$

Answer: D

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3. If $3A \rightarrow 2B$, then the rate of reaction of $+\frac{dB}{dt}$ is equal to

A. $-\frac{3}{2}\frac{d[A]}{dt}$

B. $-\frac{2}{3}\frac{d[A]}{dt}$

C. $-\frac{1}{3}\frac{d[A]}{dt}$

D. $+2\frac{d[A]}{dt}$

Answer: B

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4. $2N_2O_5 \rightarrow 4NO_2 + O_2$

If $\frac{-d[N_2O_5]}{dt} = k_1[N_2O_5]$

$\frac{d[NO_2]}{dt} = k_2[N_2O_5]$

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

What is the relation between k_1, k_2, and k_3?

A. $k' = 2K : K'' = 2K$

B. $k' = K : K'' = K$

C. $K' = 2K : k'' = K$

D. $k' = 2k : k'' = k/2$

Answer: D

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5. A gaseous hypothetical chemical equation $2A \Leftrightarrow 4B + C$ is carries out in a closed vessel. The concentration of B is found to increase by $5 \times 10^{-3} molL^{-1}$ in 10 second. The rate of appearance of B is

A. $5 \times 10^{-4} molL^{-1}S^{-1}$

B. $5 \times 10^{-5} molL^{-1}S^{-1}$

C. $6 \times 10^{-5} molL^{-1}S^{-1}$

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

Answer: A

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6. Consider the reaction

$2N_2O_{5(g)} \rightarrow 4NO_{2(g)} + O_{2(g)}$ in liquid bromine If $- - \frac{d[N_2O_5]}{dt} = 0.02Ms^{-1}$ then NO_2 is formed at _____.

A. $0.01M/s$

B. $0.02M/s$

C. $0.04M/s$

D. $0.08M/s$

Answer: C

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7. In the synthesis of ammonia from nitrogen and hydrogen gases , if 6×10^{-2} mole of hydrogen disppears in 10 minutes , the number of moles of ammonia formed in 0.3 minutes is _____.

A. 1.8×10^{-2}

B. 1.2×10^{-3}

C. 4×10^{-2}

D. 3.6×10^{-2}

Answer: B

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8. For the reaction $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$, the rate of disappearance of N_2O_5 is $6.25 \times 10^{-3} \text{mol L}^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 will be respectively.

A.

$1.25 \times 10^{-2} molL^{-1}S^{-1}$ and $6.25 \times 10^{-3} molL^{-1}S^{-1}$

B.

$6.25 \times 10^{-3} molL^{-1}S^{-1}$ and $3.125 \times 10^{-3} molL^{-1}s^{-1}$

C.

$6.25 \times 10^{-3} molL^{-1}S^{-1}$ and $3.125 \times 10^{-3} MolL^{-1}S^{-1}$

D.

$6.25 \times 10^{-3} MolL^{-1}S^{-1}$ and $3.125 \times 10^{-3} molL^{-1}s^{-1}$

Answer: C

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9. for the reaction ,

$5Br_{(aq)}^{-} + brO_{3(ag)}^{-} + 6H_{(ag)}^{+} \rightarrow 3Br_{2(aq)} + 3H_2O_{(l)}$

If $-\frac{\delta[Br^-]}{\Delta t} = 0.05 molL^{-1}\ \overset{-1}{\min}$, $-\frac{\Delta\left[BrO_3^-\right]}{\Delta t}$ in $MolL^{-1}\ \overset{-1}{\min}$ is _____.

A. 0.005

B. 0.05

C. 0.5

D. 0.01

Answer: D

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10. Assertion : The rate law of a reaction cannot be predicated from its balanced chemical equation , but must be determined experimentally only

Reason : The order of reaction is always an iteger like 0,1,2 and 3

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

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

C. Assertion is true ,Reason is False

D. Assertion is False , Reason in ture

Answer: C

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11. Which of the following statements is correct regarding order of reaction

A. Order can be determined experimentally

B. Order of reaction of concentration terms in different rate law .

C. It is not affected with the stoichiometricoefficient of the reactants

D. Order can't be fractional .

Answer: D

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12. Higher order (>3) reaction are rare due to :

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

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

C. Shifting of equilibrium towards reactants due to elastic colloisions

D. loss of active species on collision

Answer: A

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13. Total order of reaction $X + Y \rightarrow XY$ is 3. the order of reaction with respect to X is 2. State the different rate equation for the reaction .

A. $-\frac{d[x]}{dt} = k[X]^3[y]^0$

B. $-\frac{d[X]}{dt} = k[x]^0[y]^3$

C. $-\frac{d[X]}{dt} = k[x]^2[Y]$

D. $-\frac{d[x]}{dt} = k[x][y]^2$

Answer: C

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14. Rate law for the reaction $A + B \rightarrow$ product is rate $= K[A]^2[B]$. What is the rate of reaction at a given

temperature is $0.22Ms^{-1}$, when [A]=1 M 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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15. The rate constant of a first order reaction is 3×10^{-6} per second. If the initial concentration is $0.10M$, the initial rate of reaction is

A. $3 \times 10^{-5}Ms^{-1}$

B. $3 \times 10^{-6} Ms^{-1}$

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

D. $3 \times 10^{-7} Ms^{-1}$

Answer: D

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16. The reaction

N_2O_5 (in CCl_4 solution) $\rightarrow 2NO_2$ (solution) $+\frac{1}{2}O_2(g)$ is of first order in N_2O_5 with rate constant $6.2 \times 10^{-1} s^{-1}$. What is the value of rate of reaction when $[N_2O_5] = 1.25$ mole ?

A. $7.75 \times 10^{-1} mo \leq L^{-1} s^{-1}$

B. $6.35 \times 10^{-3} mo \leq L^{-1} S^{-1}$

C. $5.15 \times 10^{-5} mo \leq L^{-1} S^{-1}$

D. $3.85 \times 10^{-1} mo \leq L^{-1} S^{-1}$

Answer: A

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17. For the reaction $A + B \rightarrow C$, it is found that doubling the concentration of A increases the rate by 4 times, and doubling the concentration of B doubles the reaction rate. What is the overall order of the reaction ?

A. 4

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

C. 3

D. 1

Answer: C

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18. The rate of the reaction $A \rightarrow$ products, at the initial concentration of $3.24 \times 10^{-2} M$ is nine times its rate at another initial concentration of $1.2 \times 10^{-3} M$. The order of reaction is

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

B. $\frac{3}{4}$

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

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

Answer: D

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19. 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 both A and B are increased by four times . The order of the reaction is _____.

A. 3

B. 0

C. 1

D. 2

Answer: C

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20. For the reaction system $2NO(g) + O_2(g) \rightarrow 2NO(g)$ volume is suddenly produced to half its value by increasing the pressure on it. If the reaction is of first order with respect to O_2 and second order with respect to NO. The rate of reaction will

A. Diminsh to one fourth of its initial valume

B. diminish to one eighth of its initial value

C. increase to eight times of its initial value

D. increase to four times of its initial value

Answer: C

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21. The reaction $X \rightarrow Y$ (Product) follows first order kinetics. In 40 minutes, the concentration of X changes from 0.1M to 0.025 M , then rate of reaction when concentration of X is 0.01M is :

A. $1.73 \times 10^{-4} M \text{ min}^{-1}$

B. $3.47 \times 10^{-5} M \text{ min}^{-1}$

C. $3.47 \times 10^{-4} M \text{ min}^{-1}$

D. $1.73 \times 10^{-5} M \text{ min}^{-1}$

Answer: C

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

A. 10 seconds

B. 100 seconds

C. 2303 seconds

D. 230.3 seconds

Answer: B

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23. In a first order reaction, the concentration of the reactant, decreases from 0.8 M to 0.4 M in 15 minutes. The time taken for the concentration to change form 0.1 M to 0.025 M is :

A. 7.5 minutes

B. 15 minutes

C. 30 minutes

D. 60 minutes

Answer: C

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24. A first order reaction has a specific reaction rate of $10^{-2}\,\mathrm{sec}^{-1}$. How much time will it take for $20g$ of the reactant to reduce to $5g$?

A. $138.6s$

B. $346.5s$

C. $639.0s$

D. $238.6s$

Answer: A

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25. For a reaction, the unit of rate constants is s^{-1}. What is the order of reaction?

A. 0

B. 1

C. 2

D. 3

Answer: B

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26. Consider a reaction, $2A + B \rightarrow$ Products

When concentration of B alone was doubled, the half-life did not change. When the concentration of A alone was doubled, the rate increased by two times. The unit of rate constant for this reaction is :

A. $Lmol^{-1}S^{-1}$

B. no unit

C. $molL^{-1}S^{-1}$

D. s^{-1}

Answer: A

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27. The half-life period of any first order reaction:

A. proportional to concentration

B. independent of concentration

C. inversely proportional to concentration

D. inversely proportional to the square of the concentration

Answer: B

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28. The rate constant and half - life of a first order reaction are related to each other as _____.

A. $t_{1/2} = \frac{0.693}{k}$

B. $t_{1/2} = 0.693K$

C. $k = 0.693t_{1/2}$

D. $kt_{1/2} = \frac{1}{0.693}$

Answer: A

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29. When initial concentration of a reactant is doubled in a reaction, its half-life period is not affected. The order of the reaction is

A. zero

B. first

C. second

D. more than zero but less than first

Answer: B

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30. Half life period of a first order reaction $A \rightarrow$ product is 6.93 hour . What is the value of rate constant ?

A. $1.596h^{-1}$

B. $0.1h^{-1}$

C. $4.802h^{-1}$

D. $10h^{-1}$

Answer: B

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31. Half-life period of a first-order reaction is 1386 seconds. The specific rate constant of the reaction is

A. $5.0 \times 10^{-3} s^{-1}$

B. $0.5 \times 10^{-2} s^{-1}$

C. $0.5 \times 10^{-3} s^{-1}$

D. $5.0 \times 10^{-2} s^{-1}$

Answer: C

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32. The rate constant for a first order reaction is $7.0 \times 10^{-4} s^{-1}$. If initial concentration of reactant is 0.080 M, what is the half life of reaction ?

A. 990 s

B. 79.2 s

C. 12375 S

D. 10.10×10^{-4}s`

Answer: A

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33. If 60 % of a first order reaction was completed in 60 minutes, 50 % of the same reaction would be completed in approximately

[log = 4 = 0.60, log 5 = 0.69].

A. 50 minutes

B. 45 minutes

C. 60 minutes

D. 40 minutes

Answer: B

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

A. 230.3 minutes

B. 23.03 minutes

C. 46.06 mintutes

D. 460.6 minutes

Answer: C

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35. The half life of a substance in a certain enzyme catalyzed reaction is 138s. The time required for the concentration of the substance to fall from $1.28 mg L^{-1} \rightarrow 0.04 mg L^{-1}$:

A. 690s

B. 276s

C. 414s

D. 552s

Answer: A

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36. In a first order reaction , the concentration of the reactant is reduced to 12.5% in one hour when was is reduced to 12.5 % in one hour . When was it half completed ?

A. 3 h

B. 20 min

C. 30 min

D. 15 min

Answer: B

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37. The rate of a first-order reaction is $0.04 \text{mol L}^{-1} s^{-1}$ at 10 seconds and $0.03 \text{mol L}^{-1} s^{-1}$ at 20 seconds after initiation

of the reaction. The hlaf-life period of the reaction is :

A. $44.1s$

B. $54.1s$

C. $24.1s$

D. $34.1S$

Answer: C

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38. $t_{1/4}$ can be taken as the time taken for concentration of reactant to drop to $.^{3}/_{4}$ of its initial value. If the rate constant for a first order reaction is K, then $t_{1/4}$ can be written as:

A. $0.10 / K$

B. $0.29 / K$

C. $0.69 / K$

D. $0.75 / K$

Answer: B

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39. For first order reaction, the time taken to reduce tha initial concentration by a factor of $\frac{1}{4}$ is 20 minutes. The time required to reduce initial concentration by a factor of $1 / 16$ is.

A. 20 min

B. 5 min

C. 80 min

D. 40 min

Answer: D

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40. The half-life period of a first order reaction is 10 minutes. Starting with initial concentration 12 M, the rate after 20 minutes is

A. $0.0693M\ \min^{-1}$

B. $0.693 \times 3M\ \min^{-1}$

C. $0.0693 \times 3M\ \min^{-1}$

D. $0.0693 \times 4M \text{ min}^{-1}$

Answer: C

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41. Decompsition of H_2O_2 follows a frist order reactions. In 50 min the concentrations of H_2O_2 decreases from 0.5 to 0.125 M in one such decomposition . When the concentration of H_2O_2 reaches 0.05 M, the rate of fromation of O_2 will be

A. $6.93 \times 10^{-2} M \text{ min}^{-1}$

B. $6.93 \times 10^{-4} M \text{ min}^{-1}$

C. $2.66 L \text{ min}^{-1} \, at STP$

D. $1.34 \times 10^{-2} M \ \min^{-1}$

Answer: B

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42. The decomposition of phosphine $[PH_3]$ on tungsten at low pressure is a first-order reaction. It is because the

A. rate of decompostion 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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43. The plote between concentration versus time for a zero order reaction is represented by :

A. 

B. 

C. 

D. 

Answer: B

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44. The relationship between rate constant and half life period of zero order reaction is given by _____.

A. $t_{\frac{1}{2}} = [A]_0 2K$

B. $t_{\frac{1}{2}} = \frac{0.693}{k}$

C. $t_{\frac{1}{2}} = \frac{[A]_0}{2K}$

D. $t_{\frac{1}{2}} = \frac{2[A]_0}{k}$

Answer: C

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45. The time for half-life period of a certain reaction, $A \rightarrow$ products is $1h$. When the initial concentration of the reactant $'A'$ is $2.0 \text{mol} L^{-1}$, how much time does it take for

its concentration to come from 0.50 to $0.25 \text{mol} L^{-1}$, if it is zero order reaction ?

A. 1 h

B. 4h

C. $0.5H$

D. $0.25h$

Answer: D

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46. Under the same reaction conditions, the intial concentration of $1.386 moldm^{-3}$ of a substance becomes half in $40s$ and $20s$ theough first order and zero order kinetics, respectively.

The ratio (k_1/k_0) of the rate constants for first order (k_1) and zero order (k_0) of the reaction is

A. $0.5mol^{-1}dm^3$

B. $1.0moldm^{-3}$

C. $1.5moldm^{-3}$

D. $2.0mol^{-1}sm^{-1}$

Answer: A

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47. Units of rate constant of first and zero order reactions in terms of molarity M are respectively:

A. s^{-1}, Ms^{-1}

B. s^{-1}, M

C. Ms^{-1}, s^{-1}

D. M, S^{-1}

Answer: A

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48. Certain bimolecular reactions which follow the first order kinetics are called ____.

A. First order reaction

B. unimolecular reactions

C. bimolecular reactions

D. pseudo unimolecular reactions

Answer: D

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49. Give one example of pseudo first order reaction.

A. Inversion of cane sugar

B. Decompostion of H_2O_2

C. Conversion of cyclopropane to propene

D. Decomposition of N_2O_5

Answer: A

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50. Number of reactant molecules participating in a chemical reaction is called _____.

A. Decay constant

B. molecularity

C. rate law

D. order

Answer: B

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51. For the reaction $O_{3(g)} + O_{(g)} \rightarrow 2O_{2(g)}$, if the rate law expression is , rate $= k[O_3][O]$ the molecularity and order of the reaction are respectively _____.

A. 2 and 2

B. 2 and 1.33

C. 2 and 1

D. 1 and 2

Answer: A

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52. A certain reaction ocuurs in two steps as

(I) $2SO_{2(g)} + 2NO_{2(g)} \rightarrow 2SO_{3(g)} + 2NO_{(g)}$

$(ii) 2NO_{(g)} + O_2(g) \rightarrow 2NO_{2(g)}$

In the reaction ,_____.

A. $NO_{2(g)}$ is intermediate

B. $NO_{(g)}$ is intermediate

C. $NO_{(g)}$ is catalyst

D. $O_{2(g)}$ is intermediate

Answer: B

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53. The reaction takes place in two steps as

$(i) NO_2Cl_{(g)} \xrightarrow{K_1} NO_{2(g)} + Cl_{(g)}$

$(ii) NO_2Cl_{(g)} + Cl_{(g)} \xrightarrow{K_2} NO_{2(g)} + Cl_{2(g)}$

Identify the reaction intermediate .

A. $NO_2Cl_{(g)}$

B. $NO_{2(g)}$

C. $Cl_{2(g)}$

D. $Cl_{(g)}$

Answer: D

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54. Reaction : - $3ClO^- \rightarrow ClO_3^- + 2Cl^-$ occurs in following two steps

$(i) 2ClO^- \rightarrow ClO_2^- + Cl^-$ (slow step)

$(ii) ClO_2^- + ClO^- \xrightarrow{K_2} ClO_3^- + Cl^-$ (fast step)

then the rate of given reaction - _____.

A. $K_1\left[ClO^-\right]^2$

B. $K_1\left[ClO^-\right]$

C. $K_2\left[ClO_2^-\right]\left[ClO^-\right]$

D. $K_2\left[ClO^-\right]^3$

Answer: A

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55. Consider the endothermic reaction $X \to Y$ with the activation energies E_b and E_f for backward and forward reaction 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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56. A reaction having equal energies of activation for forward and reverse reactions has

A. $\Delta H = 0$

B. $\Delta s = 0$

C. zero order

D. none of these

Answer: A

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57. For an endothermic reaction energy of activation is E_a and enthlpy of reaction is ΔH (both in $kJ\text{mol}^{-1}$). Minimum value of E_a will be

A. Equal to zero

B. Less than ΔH

C. Equal to ΔH

D. More than ΔH

Answer: D

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58. In respect of the equation $k = Ae^{-Ea/RT}$ in chemical kinetics, which one of the following statements is correct?

A. K is equilibrium constant

B. A is adsorption factor .

C. E_a is energy of activation .

D. R is Rydberg's constant

Answer: C

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59. Arrhenius equation is

A. $K = Ae^{Ea/RT}$

B. $k = A.\, e^{RT/Ea}$

C. $k = \dfrac{A}{e^{Ea/RT}}$

D. $K = \dfrac{A}{e^{RT/Ea}}$

Answer: C

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60. Plots showing the variation of the rate constant (k) with temperature (T) are given below. The plot that follows the Arrhenius equation is

A. 

B. 

C. 

D. 

Answer: A

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61. The activation energy of a reaction can be determined from the slope of which of the following graphs ?

A. In K versus T

B. $\frac{InK}{T}\text{versus}T$

C. In K versus $\frac{1}{T}$

D. $\frac{T}{InK}\text{versus}\ \frac{1}{T}$

Answer: C

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

A. $-E_a$

B. $-2.303E_a/R$

C. $-E_a/2.303R$

D. $-E_aR$

Answer: C

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63. Activation energy of a chemical reaction can be determined by

A. Changing concentration of reactants

B. ev aluating rate constant at standard temperatures

C. Evalutaing rate constants at two different temperatures

D. Evaluating velocites of reaction at two different temperatures

Answer: C

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64. The rate of a chemical reaction doubles for every $10^{\circ}C$ rise of temperature. If the temperature is raised by $50^{\circ}C$, the rate of the reaction increases by about

A. 10 times

B. 24 times

C. 32 times

D. 64 times

Answer: C

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65. The rate constant, the activation energy, and the Arrhenius parameter of a chemical reaction at $25^{\circ}C$ are $3.0 \times 10^{-4}S^{-1}$, $104.4KJmol^{-1}$, and $6.0 \times 10^{14}S^{-1}$, respectively. The value of the rate constant as $T \to \infty$ is

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

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

C. Infinity

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

Answer: B

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66. Two reactions R_2 and R_2 have identical pre - exponential factors. Activations enery of R_1 exceeds that of R_2 by 10 kJ mol_{-1} . If k_1 and k_2 are rate constants for rate constants for reactions R_1 and R_2 respectively at 300k , then In $\left(\frac{k_2}{k_1}\right)$ is equal to $\left(R = 8.314 Jmol^{-1} K^{-1}\right)$

A. 4

B. 6

C. 8

D. 12

Answer: A

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67. The rate constant k_1 and k_2 for two different reactions are $10^{16}e^{-2000/T}$ and $10^{15}e^{-1000/T}$, respectively. The temperature at which $k_1 = k_2$ is

A. 2000K

B. $\frac{100}{2.303}K$

C. $1000K$

D. $\frac{2000}{2.303}K$

Answer: B

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68. For a chemical reaction at $27^\circ C$, the activation energy is 600 R. The ratio of the rate constants at $327^\circ C$ to that of at $27^\circ C$ will be _____.

A. 2

B. 40

C. e

D. e^2

Answer: C

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69. The rate constant is doubled when temperature increases from $27^{\circ} C$ to $37^{\circ} C$. Activation energy in kJ is

A. 34

B. 54

C. 100

D. 50

Answer: B

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

equation $\log k = -2000(1/T) + 6.0$. The pre-exponential factor A and the activation energy E_a, respective, are

A. $1.0 \times 10^6 S^{-1}$ and $9.2 KJ \text{mol}^{-1}$

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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71. When a catalyst increases the rate of chemical reaction the rate constant :-

A. remains constant

B. increases

C. decreases

D. may increase or decrease depending on the order of reaction

Answer: B

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72. The rate of a certain reaction is given by , rate $= K[H^+]^n$. 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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73. According to the adsorption theory of catalysis the speed of the reaction increases because

A. adsorption produces heat which increases the speed of the reaction

B. adsorption lowers the activation energy of the reaction

C. the concentration of reactant molecules at the active centres of the catalyst becomes high due to adsorption

D. in the process of adsorption , the activation energy of the molecules becomes large

Answer: B

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Evaluation Test

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

A. 1.1

B. 2.2

C. 3.3

D. 4.4

Answer: C

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2. A first-order reaction was started with a decimolar solution of the reactant, 8 minutes and 20seconds later its concentration was found to $M/100$. So the rate constant of the reaction is

A. $2.303 \times 10^{-5} s^{-1}$

B. $2.303 \times 10^{-4} s^{-1}$

C. $4.606 \times 10^{-3} s^{-1}$

D. $2.606 \times 10^{-5} s^{-1}$

Answer: C

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3. The rate of reaction that does not involve gases, is not depend on :

A. pressure

B. temperature

C. concentration

D. catalyst

Answer: A

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4. In a reaction $2A + B \rightarrow A_2B$, the reactant A will disappear at

A. half the rate that B will decrease

B. the same rate that B will decrease

C. twice the rate that B will decrease

D. the same rate that A_2B will form

Answer: C

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5. The rate law for the reaction

Sucrose + Water $\xrightarrow{[H^+]}$ Glucose + Fructose is given by

A. Rate =k [sucrose][Water]

B. Rate $= [\text{sucrose }][\text{water}]^0$

C. Rate =K [sucrose $]^0$ [water]

D. Rate =k [Sucrose $]^{1/2}$ [Water $]^{1/2}$

Answer: B

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6. In a first-order reaction $A \to B$, if K is the rate constant and initial concentration of the reactant is $0.5M$, then half-life is

A. $\frac{0.693}{0.5K}$

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

C. $\frac{\log 2}{k\sqrt{0.5}}$

D. $\frac{In2}{K}$

Answer: D

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7. Which of the following statements about zero order reaction is not true

A. the unit of rate constant is $\sec^{-1}$

B. the graph between log (reactant) versus rate of reaction is a stright line .

C. The rate of reaction increases with the increase in temperature .

D. Rate of reaction is independet of concentration of reactants .

Answer: A

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8. The rate law for a reaction between the substances A and B is given by

Rate = $k[A]^n[B]^m$

On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of the reaction will be as:

A. $\frac{1}{2^{(m+n)}}$

B. $(m+n)$

C. $(n-m)$

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

Answer: D

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9. An exothermic reaction $A \rightarrow B$ has an activation energy of $17kJ$ per mole of A. The heat of the reaction is $40kJ$. Calculate the activation energy for the reverse reaction $B \rightarrow A$.

A. $60KJ$

B. $57KJ$

C. $75KJ$

D. $90KJ$

Answer: B

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10. Which of the following stands TURE for molecularity of a reaction ?

A. It is the sum of exponents of the molar concentration of the reactants in the rate equation

B. It may have a fractional value

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

D. It is determined experimentally .

Answer: C

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11. The half life period of a radioctive element is 140 days. Afte 560 days, one gram of the element will reduced to : a) $\frac{1}{2}g$ b) $\frac{1}{4}$g c) $\frac{1}{8}$g d) $\frac{1}{16}$g

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

B. $\frac{1}{4}g$

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

D. $\frac{1}{16}g$

Answer: D

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12. Which is the INCORRECT statement about rate of reaction ?

A. rate of reaction depends on surface area of reactants

B. Rate of reaction can't be negative

C. Average rate and instantaneous rate can never be equal

D. By dividing change in concentration of a reactant by the time taken , the rate of reaction can be calculated

Answer: C

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13. For the reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$, uneder certain conditions of temperature and pressure of the reactants, the rate of formation, of ammonia is $0.001kghr^{-1}$. The rate of consumption of hydrogen under the same conditions is ..... kg hr^{-1}

A. $1.82 \times 10^{-4} kg/hr$

B. $0.0015kg/hr$

C. $1.52 \times 10^{4} kg/hr$

D. $1.82 \times 10^{-14} kg/hr$

Answer: B

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