CHEMICAL KINETICS

1) In the reaction BrO^-_3 (aq) + 5 Br^- (aq) + 6 $H^+ \longrightarrow$ 3 Br_2(I) + 3 H_2O (l), the rate of apperance of bromine (BHr_2) is related to the disapearance of bromide uions as follows :
(a) $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$ (b) $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$ (c) $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$ **(d)** $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$

2) Time required for 100 percent completion of a zero order reaction is
(a) $\frac{2k}{a}$ (b) $\frac{a}{2k}$ **(c)** $\frac{a}{k}$ (d) a k

3) For the reaction aA + bB $\longrightarrow$ cC, if -3 $\frac{d[A]}{dt} = +1.5\frac{d[C]}{dt}$, then a, b, and c respectively are
(a) 3, 1, 2 (b) 2, 1, 3 **(c) 1, 3, 2** (d) 6, 2, 3

4) The rate of a gaseous reaction is given by the expression k [A][B]. If the volume of the reaction vessel is suddenly reduced to 1/4 th of the initial volume, the reaction rate relating to original rate will be
(a) 1/10 (b) 1/8 (c) 8 **(d) 16**

5) In a reaction $\longrightarrow$ B, the rate of reaction increases two times on increasing the concentration of the reactant four times, then order of reaction is
(a) 0 (b) 2 **(c) 1/2** (d) 4

6) The rate of the reaction 2 NO + $CI_2 \rightarrow$ 2NOCI is given by the rate equation : rate = k $[NO]_2$ $[CI_2]$. The value of the rate constant can be increased by
(a) increasing the temperature (b) increasing the concentration of NO
(c) increasing the concentration of CI_2 (d) doing all of these

7) The unit of rate constant for a zero order reaction is
(a) mol L^{-1} s^{-1} (b) L mol^{-1} s^{-1} (c) L^2mol^{-1} s^{-1} (d) s^{-1}

8) A first order reaction has a half-life period of 34.65 seconds. Its rate constant is
(a) 2 $\times 10^{-2}$ sec^{-1} (b) 4 $\times 10^{-4}$ sec^{-1} (c) 20 sec^{-1} (d) 2 $\times 10^{-4}$ sec^{-1}

9) Rate constant of a reaction (k) is 175 $litre^2$ mol^{-2} sec^{-1}. What is the order of reaction?
(a) first (b) second **(c) third** (d) zero

10) The molecularity and order of the reaction 2 NO (g) + O_2 (g) $\rightarrow$2NO_2 (g) are respectively
(a) one and one (b) two and two **(c) three and three** (d) two and three

11) Consider the reaction : CI_2 (aq) + H_2S (aq) $\rightarrow$ S (s) + 2 H^+ (aq) +2 CI^- (aq) The rate equation for this reaction is rate k $[CI_2]$ $[H_2S]$ Which of these mechanisms is / are consistant with this rate equation ? A. CI_2+$H_2S \longrightarrow H^+$ + CI- + CI^+ HS^- (slow) ; CI+ $Hs^- \longrightarrow H^+$ + CI^- + S (fast) B. $H_2S \rightleftharpoons H^+$ + HS - (fast equilibrium) ; CI_2 + $HS^- \longrightarrow$ 2 CI^- + H^+ S (slow)
(a) Neither A nor B **(b) A only** (c) B only (d) Both A and B

12) For the reaction R $\longrightarrow$ P, a graph of [R] against time is found to be a straight line with negative slope. What is the order of reaction ?
(a) Second order (b) Third order (c) First order **(d) Zero order**

13) The reaction A $\longrightarrow$ B follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 hour. What is the time taken for conversion of 9.9 mole of A to produce 0.675 mole of B ?
(a) 1 hour (b) 0.5 hour (c) 0.25 hour (d) 2 hours

14) The rate of a chemical reaction doubles for every 10oC rise of temperature. If the temperature is raised by 50oC, the rate the reaction increses by about :
(a) 24 times **(b) 32 times** (c) 64 times (d) 10 times

15) 75% of the first order reaction was completed in 32 min. 50% of the reaction was completed in
(a) 24 min (b) 8 min **(c) 16 min** (d) 4 min

16) 1[A] vs time is a straight line. The order of the reaction is
(a) 1 (b) 2 **(c) 3** (d) 0

17) The rate constant, the activation energy and the Arrchenius parameter of a chemical reaction at 25°C are 3.0 $\times$ 10 $^{-4}$s^{-1} ,104.4 kJ mol^{-1}, and 6.0 $\times$ 10^{14} s^{-1} respectively. The value of the rate constant as T $\longrightarrow$ ∞ is
(a) 2.0 $\times 10^{18} s^{-1}$ **(b) 6.0** $\times 10^{14} s^{-1}$ (c) Infinity (d) 3.6$\times 10^{30} s^{-1}$

18) If a graph is plotted between In k ad 1/T for the first order reaction. the slope of the straight line so obtained is given by
(a) - $\frac{E_a}{R}$ **(b) -** $-\frac{E_a}{2.303R}$ (c) $-\frac{2.303}{E_a R}$ (d) $-\frac{E_a}{2.303}$

19) A chemical reaction was carried out at 300 K and 280 K the rate constants were found to be K1 and K2 respectively. Then
(a) $K_2 = 4K_1$ (b) $K_2 = 2K_1$ **(c) K_2 = 0.25 K** (d) $K_2 = 0.5\ K_1$

20) Collision Theory is applicable to
(a) First order reactions (b) Zero order reactions **(c) Bimolecular reactions**
(d) Intramolecular reactions

21) 10 g of a radioactive isotope is reduced to 1.25 g nin 12 years, therefore half-life period of the isotope is
(a) 24 years **(b) 4 years** (c) 3 years (d) 8 years

22) The half-life period of a radioactive element is 20 days. What will be the remaining mass of 100 g of it after 60 days?
(a) 25 g (b) 50 g **(c) 12.5 g** (d) 20 g

23) The chemical reactions in which the reactions require high amount of activation energy are generally
(a) slow (b) fast (c) instantaneous (d) none of these

24) If the activatiopn energy for the forward reaction is 150 kJ mol^{-1} and that of the reserve reaction is 260 kJ mol^{-1}, what is the enthalpy change for the reaction ?
(a) 410 kJ mol^{-1} **(b) -110 kJ mol^{-1}** (c) 110 kJ mol^{-1} (d) -410 kJ mol^{-1}

25) When ethyl acetate was hydrolysed in presence of 0.1 N HCI, the rate constant was found to be 5.40 $\times$ 10^{-5} s^{-1} . From these values we can say that
(a) H_2SO_4 is stronger than HCI (b) H_2SO_4 is weaker than HCI
(c) Both the acids have equal strength
(d) The data is insufficient to compare the strengths of HCI and H_2SO_4

26) The role of a catalyst is to change ..... .
(a) Gibbs energy of reaction (b) enthalpy of reaction **(c) activation energy of reaction**
(d) equilibrium constant

27) In the presence of a catalyst, the heat evolved or absorbed during the reaction ..... .
(a) increases (b) decreases **(c) remains unchanged** (d) may increase or decrease

28) Activation energy of a chemical reaction can be determined by ..... .

(a) determining the rate constant at standard temperature

(b) determining the rate constants at two temperatures

(c) determining probability of collision (d) using catalyst

29) Consider a first order gas phase decomposition reaction given below : A(g) $\longrightarrow$ B(g) + C(g) The initial pressure of the system before decomposition of A was pi . After lapse of time 't' , total pressure of the system increased by x the reaction is given as ..... .

(a) k = $\frac{2.303}{t} log \frac{p_i}{p_i - x}$ **(b) k =** $\frac{2.303}{t} log \frac{p_i}{2p_i - p_i}$ (c) k = $\frac{2.303}{t} log \frac{p_i}{2p_i + p_i}$ (d) k = $\frac{2.303}{t} log \frac{p_i}{p_i + x}$

30) Consider the Arrhenius equation given below and mark the correct option. $k = Ae^{-E_a/RT}$

(a) Rate constant increases exponentially with increasing activation energy and decreasing temperature

(b) Rate constant decreases exponentially with increasing activation energy and decreasing temperature

(c) Rate constant increases exponentially with decreasing activation energy and decreasing temperature

(d) Rate constant increases exponentially with decreasing activation energy and increasing temperature

31) Which of the following statements is not correct about order of a reaction ?

(a) The order of a reaction can be a fractional number

(b) Order of a reaction is experimentally determined quantity.

(c) The order of a reaction is always equal to the sum of the stoichiometric coeffecients of reactants in the balanced chemnical equation for reaction.

(d) The order of a reaction is the sum of the powers of molar concentration of the reaction in the rate law expression.

32) Consider the graph given in Fig. in Q.8. Which of the following options does not show instataneous rate of reaction at 40th second ?

(a) $\frac{V_5 - V_2}{50 - 30}$ **(b)** $\frac{V_4 - V_2}{50 - 30}$ (c) $\frac{V_5 - V_2}{40 - 30}$ (d) $\frac{V_3 - V_1}{40 - 20}$

33) Which of the following statements is correct ?

(a) The rate of a reaction decreases with passage of time as the concentration od reactants decreases

(b) The rate of a reaction is name at any time during the reation

(c) The rate of a reaction is independent of temperature change

(d) The rate of a reaction decreases with increase in concentration of reactant(s)

34) Which of the following expressions is correct for the rate of reaction given below ? $5Br^-$ (aq) + BrO^-_3 (aq) + $6H^+$ (aq) $\longrightarrow$ $3Br_2$ (aq) + $3H_2O$(I)

(a) $\frac{\triangle[Br^-]}{\triangle t} = 5\frac{\triangle[H^+]}{\triangle t}$ (b) $\frac{\triangle[Br^-]}{\triangle t} = \frac{6}{5}\frac{\triangle[H^+]}{\triangle t}$ **(c)** $\frac{\triangle[Br^-]}{\triangle t} = \frac{5}{6}\frac{\triangle[H^+]}{\triangle t}$ (d) $\frac{\triangle[Br^-]}{\triangle t} = 6\frac{\triangle[H^+]}{\triangle t}$

35) Rate law for the reaction A + 2B $\longrightarrow$ C is found to be Rate = k [A] [B] Concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, the value of the rate constant will be ..... .

(a) the same (b) doubled (c) quadrupled (d) halved