RAVI MATHS TUITION & TEST PAPERS , WHATSAPP 8056206308

Chemical Kinetics PREVIOUSLY ASKED

12th Standard

Chemistry

Multiple Choice Question 4 x 1 = 4

1) The rate of a reaction increases sixteen times when the concentration of the reactant increases four times.The order of the reaction is

(a) 2.5 (b) 2.0 (c) 1.5 (d) 0.5

2) For the reaction A + 2B $\rightarrow$ C + D. The order of the reaction is

(a) 1 with respect to A (b) 2 with respect to B (c) can't be predicted as order is determined experimentally.

(d) 3

3) For the reaction 3A $\rightarrow$ 2B, rate of reaction is equal to d[B]/dt

(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) $\frac{+2d[A]}{dt}$

4) The rate of reaction A + B $\rightarrow$ Products, is given by the equation r = k[A] [B]. If Bis taken in large excess, the order of reaction would be

(a) 2 (b) 0 (c) 1 (d) Cannot be predicted

Assertion and reason 7 x 1 = 7

5) **Assertion (A)** The units of rate constant of a zero order reaction and the rate of reaction are the same.
Reason (R) In zero order reaction, the rate of reaction is independent of the concentration of reactants.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Asserton (A) is false, but Reason (R) is true.

6) **Assertion (A)** Inversion of configuration is observed in S_N2 reaction.
Reason (R) The reaction proceeds with the formation of carbocation.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Asserton (A) is false, but Reason (R) is true.

7) **Assertion (A)** Inversion of configuration is observed when 1-bromobutane is hydrolysed.
Reason (R) The reaction is S_N2 and proceeds with the formation of transition state.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true.

8) Assertion (A) : For a zero order reaction the unit of rate constant and rate of reaction are same.
Reason (R) : Rate of reaction for zero order reaction is independent of concentration of reactant.
(a) Both Assertion and Reason are correct, Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct, Reason is not the correct explanation of Assertion.
(c) Assertion is correct; Reason is incorrect.
(d) Assertion is incorrect; Reason is correct.

9) Assertion (A) : For complex reactions, molecularity and order are not same.
Reason (R) : Order of reaction may be zero.
(a) Both Assertion and Reason are correct, Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct, Reason is not the correct explanation of Assertion.
(c) Assertion is correct; Reason is incorrect.
(d) Assertion is incorrect; Reason is correct.

10) Assertion (A) : Order and molecularity of a reaction are always same.
Reason (R) : Complex reactions involve a sequence of elementary reactions and the slowest step is rate determining.
(a) Both Assertion and Reason are correct, Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct, Reason is not the correct explanation of Assertion.
(c) Assertion is correct; Reason is incorrect.
(d) Assertion is incorrect; Reason is correct.

11) Assertion (A) : Hydrolysis of an ester follows first order kinetics.
Reason (R) : Concentration of water remains nearly constant during the course of the reaction.
(a) Both Assertion and Reason are correct, Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct, Reason is not the correct explanation of Assertion.
(c) Assertion is correct; Reason is incorrect.
(d) Assertion is incorrect; Reason is correct.

2 Marks 54 x 2 = 108

12) A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is
(i) doubled?
(ii) reduced to half?

13) Mention the factors that affect the rate of chemical reaction.

14) A first order reaction takes 40 min for 30%. decomposition. Calculate $t_{1/2}$

15) Why does the rate of a reaction not remain constant throughout the reaction process?

16) Express the rate of the following reaction in terms of disappearance of hydrogen in the reaction: $3H_2$ (g) + N_2 (g) $\rightarrow$ 2 NH_3 (g).

17) A first order reactions has rate constant k = 5.5 $\times$ 10^{-14} s^{-1}. Find the half life of the reaction.

18) If half life period of first order reaction is 'X' and $\frac{3}{4}$ the life period of same reaction is 'Y', how are 'x' and 'y' are related to each other?

19) In some cases it is found that a large number of colliding molecules have energy more than threshold energy but yet the reaction is slow. Why?

20) With the help of diagram explain the role of activated complex in a reaction.

21) What is physical significance of energy of activation? Explain with diagram.

22) A reaction is of first order in reactant A and of second order in reactant B. How is the rate of this reaction affected when
(i) the concentration of B alone is increased to three times
(ii) the concentrations of A as well as B are doubled?

23) What do you understand by the rate law and rate constant of a reaction? Identify the order of a reaction if the units of its rate constant are :
(i) L^{-1} mol s^{-1}
(ii) L mol^{-1} s^{-1}

24) Explain the terms:
(i) Rate determining step of a reaction
(ii) Molecularity of a reaction

25) In a first order reaction, the concentration of the reactant is reduced from 0.6 mol L^{-1} to 0.2 mol L^{-1} in 5 minutes. Calculate the rate constant of the reaction.

26) Calculate the rate constant of a reaction at 293 K, given that: E_α = 103 kJ $mol^{-1,}$ k = 7.87 $\times$ 10^{-7} s^{-1} at 273 K, R - 8.314 JK^{-1} $mol^{-1.}$

27) The rate constant for a reaction of zero order in A is 0.0030 mol L^{-1} s^{-1}. How long will it take for the initial concentration of A to fall from 0.10 M to 0.075 M?

28) Define:
(i) Elementary reaction in a process
(ii) Rate of a reaction

29) Show that for a first order reaction, the time required for half the change (half-life period) is independent of initial concentration.

30) A first order decomposition reaction takes 40 minutes for 30% decomposition. Calculates its $t_{1/2}$ value.

31) The rates of most reactions double when their temperature is raised from 298 K to 308 K. Calculate activation energy of such a reaction.
(R = 8.314 J $mol^{-1}K^{-1}$, log 2 = 0.3010)

32) Calculate the overall order of a reaction which has the raise expression
(a) Rate = k $[A]^{1/2}$ $[B]^{3/2}$
(b) Rate = k $[A]^{3/2}$ $[B]^{-1}$
(i) k = 2.3 $\times$ 10^{-s} L mol^{-1} s^{-1}
(ii) k = 3 $\times$ 10^{-4} s^{-1}

33) A reaction is second order with respect to a reactant, How is the rate of reaction affected if the concentration of bthe reactant is (i) doubled (ii) reduced to 1/2?

34) Give any four differences between order of a reaction and its molecularity ?

35) Identify the reaction order from the following rate constant :
k = 2.3 $\times 10^{-5}$ litre $mol^{-1}sec^{-1}$

36) For a reaction A $\longrightarrow$ B, the rate of reaction becomes twenty seven times when the concentration of A is increased three ttimes. what is the order of the reaction?

37) Define the following:
(i) Elementary step in a reaction
(ii) Rate of reaction

38) A reaction of second order with respect to a reactant. How is its rate affected if the concentration of the reactants is
(i) doubled
(ii) reduced to half?

39) Write two difference between 'order of reaction' and molecularity of reaction

40) Define rate constant(k).

41) Define rate of reaction

42) What is meant by rate of a reaction? Differentiate between average rate and instantaneous rate of a reaction.

43) If the rate constant of a reaction $k = 3 \times 10^{-4} s^{-1}$ is then identify the order of the reaction.

44) Define the following terms:
(i) Pseudo first order reaction
(ii) Half-life period of a reaction$(t_{1/2})$

45) Write units of rate constants for zero order and for the second order reactions if the concentration is expressed $molL^{-1}$ in and time in second.

46) On increasing temperature, activation energy of a reaction decreases, why?

47) For a reaction R $\rightarrow$ P, half-life ($t_{1/2}$) IS observed to be independent of the initial concentration of reactants. What is the order of reaction?

48) Define rate of reaction. Write two factors that affact the rate of reaction.

49) Discuss any four factors which affect the rate of a chemical reaction.

50) List the factors on which the rate of a chemical reaction depends.

51) Explain the term order of reaction. Derive the unit for first order rate constant.

52) Define the following terms.
(i) Half-life of a reaction ($t_{1/2}$)
(ii) Rate constant (k)

53) Define half-life of a reaction. Write the expression of half-life for
(i) zero order reaction
(ii) first order reaction

54) What are pseudo first order reactions? Give one example of such reactions

55) What is the effect of adding a catalyst on
(a) Activation energy (Ea) and
(b) Gibbs energy (ΔG) of a reaction?

56) Define activation energy.

57) How does a change in temperature affect the rate of a reaction? How can this effect on the rate constant of a reaction be represented quantitatively?

58) The rate of a reaction becomes four times when the temperature changes from 300 K to 320 K. Calculate the energy of activation of the reaction, assuming that it does not change with temperature. ($R = 8.314\ J\ K^{-1}mol^{-1}$)

59) (i) Distinguish between order and molecularity.
(ii) Why is the probability of reaction with molecularity higher than three, is very rare?

60) Derive integrated rate equation for rate constant of a first order reaction.

61) (i) Explain why H_2 and O_2 do not react at room temperature.
(ii) Write the rate equation for the reaction, $A_2 + 3B_2 \rightarrow 2C$, if the overall order of the reaction is zero.

62) Calculate the overall order of a reaction which has the rate expression
(a) Rate = $k\ [A]^{1/2}\ [B]^{3/2}$
(b) Rate = $k\ [A]^{3/2}\ [B]^{-1}$

63) For which type of reactions, order and molecularity have same value?

64) (i) If half life period of a first order reaction is x and $\frac{3}{4}$ th life period of same reaction is y, how are x and y related to each other?
(ii) In some cases, it is found that a large number of colliding molecules have energy more than threshold energy but yet the reaction is slow. Why?

65) Show that in case of a first order reaction, the time taken for completion of 99% reaction is twice the time required for 90% completion of the reaction. (log 10 = 1)

3 Marks 39 x 3 = 117

66) For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction

67) The rate of the chemical reaction doubles for an Increase of 10 K from 298 K. Calculate E_a.

68) The rate constant for a first order reaction is 60 s^{-1}. How much time will it take to reduce the concentration of the reactant to $1/10^{th}$ of its initial value?

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

70) In general it is observed that the rate of chemical reaction doubles with every 10^o rise in temperature. If the generalization holds good for the reaction in the temperature range 295 K to 305 K, what would be the value of activation energy for the this reaction?
($R = 8.314\ J\ mol^{-1}\ K^{-1}$)

71) The reaction,

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

Contributes to air pollution whenever a fuel is burnt in air at a high temperature. At 1500 K, equilibrium constant K for it is 1.0×10^{-5}. Suppose in a case $[N_2] = 0.80$ mol $L^{-1}$and $[O_2] = 0.20$ mol L^{-1} before any reaction occurs. Calculate the equilibrium concentration of the reactants and the product after the mixture has been heated to 1500 K.

72) For a decomposition reaction the values of rate constant, k at two different temperatures are given below:

$k_1 = 2.15 \times 10^{-8}$ L mol^{-1} s^{-1} at 650 K

$k_2 = 2.39 \times 10^{-7}$ L mol^{-1} s^{-1} at 700 K

Calculate the value of activation energy for this reaction. ($R = 8.314$ J K^{-1} mol^{-1})

73) For a reaction,$A + B \longrightarrow$product, the rate law is given by,$r = k[A]^{1/2}[B]^2$. What is the order of the reaction?

74) A reaction is of second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is reduced to that half? What is the unit of rate constant of such a reaction?

75) What are the units of rate constant for zero order and first order reaction?

76) The thermal decomposition of a compound is of first order.If 50% of the compound is decomposed in 120 minutes,how long will it take for 9% of the compound to decompose?

77) The following data were obtained during the first thermal decomposition of SO_2Cl_2 at a constant volume

$SO_2Cl_2(g) \longrightarrow SO_2 + Cl_2(g)$

Experiment	Time/s	Total Pressure/atm
1	0	0.4
2	100	0.7

Calculate the rate constant.(Given: log 4 = 0.6021, log 2 = 0.3010).

78) For a reaction:

$2NH_3(g) \longrightarrow N_2(g) + 3H_2(g) \quad Rate = k$

(i) Write the order and molecularity of this reaction.

(ii) Write the unit of k.

79) For the first order thermal decomposition reaction, the following data were obtained:

$C_2H_5Cl_{(g)} \rightarrow C_2H_4(g) + HCl(g)$

Time/sec	Total pressure/atm
0	0.30
300	0.50

Calculate the rate constant.

(Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)

80) Rate constant k for a first order reaction has been found to be 2.54 x 10, sec^{-1}. Calculate its 3/4th $^{-3}$, sec $^{-1}$ Calculate its 3/4 th life. (log 4 = 0.6020)

81) A first order gas phase reaction:

$A_2B_{2(g)} \rightarrow 2A_{(g)} + 2B_{(g)}$ at the temperature 400°C has the rate constant $k = 2.0 \times 10^{-4} sec^{-1}$. What percentage of A_2B_2 is decomposed on heating for 900 seconds ?

[Antilog 0.0781 = 1.197]

82) The rate of a reaction becomes four times when the temperature changes from 293 K to 313 K. Calculate the energy of activation (E_a) of the reaction assuming that it does not change with temperature.

[$R = 8.314$ JK^{-1} mol^{-1}, log 4 = 0.6021]

83) The rate of most reactions becomes double when their temperature is raised from 298 K to 308 K. Calculate their activation energy.

84) For the reaction,

$2NO(g)+Cl_2(g) \rightarrow 2NOCl(g)$

The following data were collected. All the measurements were taken at 263 K.

Exp. No.	Initial [NO] (M)	Initial $[Cl_2]$(M)	Initial rate of disappearance of Cl_2 (M/min)
1.	0.15	0.15	0.60
2.	0.15	0.30	1.20
3.	0.30	0.15	2.40
4.	0.25	0.25	?

(i) Write the expression for rate law.

(ii) Calculate the value of rate constant and specify its unit.

(iii) What is the initial rate of disappearance of Cl_2 in experiment 4?

85) A first order reaction takes 20 minutes for 25% decomposition. Calculate the time when 75% of the reaction will be completed.

Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021

86) Following data are obtained for the reaction:

$N_2O_5 \rightarrow 2NO_2+1/2O_2$

t/s	0	300	600
$[N_2O_5]/moL^{-1}$	1.6×10^{-2}	0.8×10^{-2}	0.4×10^{-2}

Show that it follows first order reaction.

(b) Calculate the half-life. (Given: log 2= 0.3010 ,log 4= 0.6021)

87) The half-life for a first order reaction is 5×10^4s. What percentage of the initial reactant will react in 2 h?

88) A first order reaction is 20% completed in 5 min. Calculate the time taken for the reaction to be 60% complete.

89) Rate constant 'k' of a reaction varies with temperature 'T' according to the equation $logk = logA - \frac{E_a}{2.303R}\left(\frac{1}{T}\right)$ where E_a is the activation energy. When a graph is plotted for log k vs, 1/T, a straight line with a slope of - 4250 K is obtained. Calculate 'E_a' for the reaction. (R = 8.314 $K^{-1}mol^{-1}$).

90) The decomposition of phosphine,

$4PH_3(g) \rightarrow P_4(g)+6H_2(g)$

has the rate law, rate = k $[PH_3]$

The rate constant is 6.0×10^{-4} s^{-1} at 300 K and activation energy is 3.05×10^5 J mol^{-1} Calculate the value of rate constant at 310 K

(Given, R = 8.314 $JK^{-1}mol^{-1}$).

91) The decomposition of NH_3 on platinum surface is zero order reaction. If rate constant (k) is 4×10^{-3} Ms^{-1} , how long will it take to reduce the initial concentration of NH_3 from 0.1 M to 0.064 M.

92) Calculate the rate constant at 400 K for the following reaction:

$2N_2O_5 \rightleftharpoons 4NO_2 + O_2$

Arrhenius factor is 4.3×10^{10} S^{-1} and activation energy is 103.344 kJ mol^{-1}.

93) The rate constant of a reaction quadruples when the temperature changes from 300 K to 320 K. Calculate the activation energy for this reaction.

[log 2 = 0.30, log 4 = 0.60, $2.303 \times R = 19.15$ JK^{-1} mol^{-1}]

94) A first order reaction takes 40 min for 75% decomposition. Calculate rate constant. [Given: log 2 =0.30, log 4 =0.60]

95) The rate constant of a reaction quadruples when the temperature changes from 700 K to 720 K. Calculate the activation energy for this reaction. [log 2 =0.30, log 4 = 0.60, 2.303 R = 19.15 JK^{-1} mol^{-1}]

96) For a reaction the rate law expression is represented as follows: Rate = k[A][B]/2

(i) Interpret whether the reaction is elementary or complex. Give reason to support your answer.

(ii) Write the units of rate constant for this reaction, if concentration of A and B is expressed in moles/L.2021

97) The following results have been obtained during kinetic studies of the reaction, $2A + B \longrightarrow C + D$

Experiment	[A]/mol	[B]/mol	Initial rate of fornmation of D/mol L^{-1} min^{-1}
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.4×10^{-2}

Determine rate law and the rate constant for the reaction.

98) The following results have been obtained during the kinetic studies of the reaction

$P + 2Q \longrightarrow R + 2S$

Experiment	Initial P [A]/mol	Initial Q [B]/mol	Initial rate of fornmation of R (M min^{-1}
I	0.10	0.10	3.0×10^{-4}
II	0.30	0.30	9.0×10^{-4}
III	0.10	0.30	3.0×10^{-4}
IV	0.20	0.30	6.0×10^{-4}

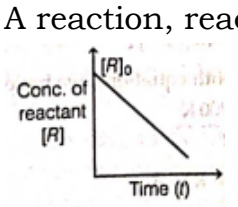
Determine the rate law expression for the reaction.

99) Write the slope value obtained in the plot of log $[R_o]/R$ vstime for a first order reaction.

100) (i) The conversion of molecule A to B followed second order kinetics. If concentration of A increased to three times, how will it affect the rate of formation of B?

(ii) Define Pseudo first order reaction with an example.

101) A reaction, reactant productis represented by (the graph)



(i) Predict the order of the reaction in this case.

(ii) What does the slope of the graph represent?

Write the unit of the represented quantity.

102) The C-14 content of an ancient piece of wood was found to have three tenths of that in living trees. How old is that piece of wood?

(log3 = 0.4771, log7 = 0.8540, half-life of C-14 = 5730 years)

103) The following data were obtained during the first order thermal decomposition of C_2H_5Cl at a constant volume.

$C_2H_5Cl_{(g)} \rightarrow C_2H_4(g) + HCl(g)$

Time/sec	Total pressure/atm
0	0.4
100	0.6

Calculate the rate constant.

(Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)

104) When the temperature changes from 27°C to 37°C, the rate of the chemical reactions isn doubles. Calculate the energy of activation for the reaction.

(Given, R = 8.314 JK^{-1} mol^{-1} log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)

5 Marks 18 x 5 = 90

105) The half-life for decay of radioactive ^{14}C is 5730 years. An archaeological artefact containing wood had only 80% of ^{14} C activity as found in a living tree. Calculate the age of the artefact

106) (a) what is meant by rate of a reaction.

(b) In a pseudo first order hydrolysis of ester in water, the following results are obtained:

t in seconds	0	30	60	90
[Ester] M	0.55	0.31	0.17	0.085

(i) Calculate the average rate of reaction between the time interval 30 to 60 seconds.

(ii) Calculate the pseudo first order rate constant for the hydrolysis of ester.

107) (a) Express clearly what you understand by 'rate expression' and 'rate constant' of a reaction.

(b) Nitrogen pentoxide decomposes according to the equation

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

This first order reaction was allowed to proceed at 40°C and the data given below were collected:

$[N_2O_5]$ (M)	**Time (min)**
0.400	0.00
0.289	20.00
0.209	40.00
0.151	60.00
0.109	80.00

(i) Calculate the rate constant for the reaction. Include units with you answer.

(ii) Calculate the initial rate of reaction.

(iii) After how many minutes will $[N_2O_5]$ be equal to 0.350 M?

108) (a) Define the following:

(i) Order of a reaction

(ii) Elementary step in a reaction

(b) A first order reaction has a rate constant value of 0.00510 min^{-1}. If we begin with 0.10 M concentration of the reactant, how much of the reactant will remain after 3.0 hours?

109) (a) Explain the following terms:

(i) Rate of a reaction

(ii) Activation energy of a reaction

(b) The decomposition of phosphine (PH_3) proceeds according to the following equation:

$4PH_3(g) \rightarrow P_4\ (g) + 6H_2\ (g)$

It is found that the reaction follows the following rate equation:

Rate = k $[PH_3]$

The half-life of PH_3 is 37.9 s at 120 °C.

(i) How much time is required for $3/4^{th}$ of PH_3 to decompose?

(ii) What fraction of the original sample of PH_3 remains behind after 1 minutes?

110) (a) Explain the following terms:

(i) Order of a reaction

(ii) Molecularity of a reaction

(b) The rate of a reaction increases four times when the temperature changes from 300 k to 320 K. Calculate the energy of activation of the reaction, assuming that it does not change with temperature.

($R = 8.314\ J\ K^{-1}\ mol^{-1}$)

111) (a) Distinguish between molecularity an order of a reaction.

(b) The activation energy for the reaction

$2HI(g) \rightarrow H_2\ (g) + I_2(g)$

is 209.5 kJ mol^{-1} at 581 K. Calculate the fraction of molecules having energy equal to or greater than activation energy.

[$R = 8.314\ JK^{-1}\ mol^{-1}$]

112) Hydrogen peroxide, $H_2O_2(aq)$ decomposes to $H_2O(l)$ and $O_2(g)$ in a reaction that is of first order in H_2O_2 and has a rate constant, $k = 1.06 \times 10^{-3}\ min^{-1}$.

(i) How long will it take 15% of a sample of H_2O_2 to decompose?

(ii) How long will it take 85% of a simple of H_2O_2 to decompose?

113) (a) What is the rate of reaction? Write two factors that affect the rate of reaction

(b) The rate constant of a first-order reaction increase from 4×10^{-2} *to* $8 \times 10^{-2}$when the temperature changes from 27°C to 37°C. Calculate the energy of activation (E_α) .

$log\ 2 = 0.301,\ log\ 3 = 0.477,\ log\ 4 = 0.6021$

or

(a) For a reaction A+B$\longrightarrow$, the rate is given by

$Rate\ =\ k\,[A]\,[B]_2$

(i) How is the rate of reaction affected if the concentrated of B is doubled?

(ii) What is the overall order of reaction if A is present in large excess?

(c) A first order reaction takes 23.1 minutes for 50% completion. calculate the time required for 75% completion of this reaction.

$log\ 2 = 0.301,\ log\ 3 = 0.477,\ log\ 4 = 0.6021$

114) Swati was having a party for her friends in the evening. She was preparing Lemonade. While dissolving a large amount of sugar in water. As it was taking a long time, her mother suggested warming the mixture.

(i) What will happen on heating?

(ii) What is the effect of temperature on the rate of chemical reaction?

(iii) Why does the rate of reaction doubles on 10'C rise in temperature?

(iv) What are the values associated with Sonia's mother?

115) (i) Write the rate law for a first order reaction. Justify the statement that half life for a first order reaction is independent of the initial concentration of the reactant.

(ii) For a first order reaction, show that the time required for 99% completion of a first order reaction is twice the time required for the completion of 90%.

116) (i) For the reaction A→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?

(ii) The activation energy of a reaction is 75.2 kJ mol^{-1} in the absence of a catalyst and it lowers to 50.14 kJ mol^{-1} with a catalyst. How many times will the rate of reaction grow in the presence of a catalyst if the reaction proceeds at 25°C?

117) For the hydrolysis of methyl acetate in aqueous solution, the following results were obtained:

t/s	0	30	60
$[CH^3COOCH^3]$/mol L^{-1}	0.60	0.30	0.15

(i) Show that It follows pseudo first order reaction, as the concentration of water remains constant.

(ii) Calculate the average rate of reaction between the time interval 30 to 60 seconds. [Given log 2 = 0.3010, log 4 = 0.6021]

118) (a) For a reaction A + B→P, the rate is given by Rate = k[A] $[B]^2$

(i) How is the rate of reaction affected if the concentration of B is doubled?

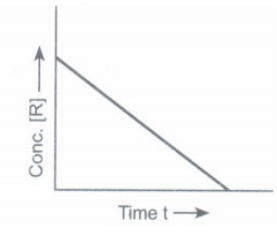
(ii) What is the overall order of reaction if A is present in large excess?

(b) A first order reaction takes 30 minutes for 50% completion. Calculate the time required for 90% completion of this reactions. (log 2 = 0.3010)

119) (a) A first order reaction is 50% complete in 25 minutes. Calculate the time of80% completion of the reaction.

(b) A first order reaction takes 10 minutes for 25% decomposition. Calculate $t_{1/2}$ for the reaction. (Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)

120) (a) Consider the reaction R → P for which the change in concentration of R with time is shown by the following graph:



(i) Predict the order of the reaction.

(ii) What does the slope of the curve indicate?

(b) The rate of reaction quadruples when temperature changes from 293 K to 313 K. Calculate E_a assuming that it does not change with time. [R = 8.314 JK^{-1} mol^{-1})

121) (a) Draw the plot of in k vs 1/T for a chemical reaction. What does the intercept represent? What is the relation between slope and E_a?

(b) A first order reaction takes 30 minutes for 20% decomposition. Calculate $t_{1/2}$ [log 2 = 0.3010J]

122) (a) Define:

(i) Temperature coefficient

(ii) Activated complex

(iii) Collision frequency

(b) Give reasons:

(i) Pulverised wood burns faster than log of wood.

(ii) Silver nitrate(s) does not react with sodium chloridets) whereas their aqueous solution react very fast.

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