KJB SCIENCE SCHOOL

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TEST SERIES - {CHEMISTRY: XII } :- CHAPTER: - CHEMICAL KINETICS { MM = 60] [set-A]

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Q.1 A reaction is 50% complete in 2 h and 75% complete in 4 h. What is the order of the reaction?[1]

Q.2 In some chemical reactions , it is found that a large number of colliding molecules have energy more than threshold energy value , yet the reaction is quite slow. Why? [1]

Q.3 Identify the reaction order from each of the following rate constants:(i) k = 2.3 X 10^{-5} $Lmol^{-1}s^{-1}$ (ii) k = 3.0 X10^{-4} s^{-1}. [1]

Q.4 For a chemical reaction A → B, it was found that concentration of B increases by 0.5 mol L^{-1} in half an hour.What is the average rate of reaction. [1]

Q.5 Suggest an appropriate reason for the observation : "On increasing temperature of the reacting system by 10 degrees, the rate of reaction almost doubles .[1]

Q.6 The decomposition of NH_3 on platinum surface is a zero order reaction. What are the rates of production of N_2 and H_2 if K = 2.5 x 10^{-4} mol/ L/ s ?[2]

Q.7 Explain the terms (i) Rate determining step of a reaction (ii) elementary step in reaction? [2]

Q.8 What are pseudo first order reactions? Give one example of such reactions. [2]

Q.9 For a chemical reaction, what is the effect of a catalyst on (i) Activation energy (ii) Rate constant of the reaction. [2]

Q.10 A first order reaction is 20% complete in 5 min. Calculate time taken for the reaction to be 60% complete. [2]

Q.11 Compound A reacts by first order kinetics. At 25°C, the rate constant of the reaction is 0.45 sec^{-1}. What is the half life of A at 25°C. What is the time required to have 12.5% unreacted A . [2]

Q.12 Show that for a first order reaction, the time required for half the change (t ½) is independent of initial concentration.[2]

Q.13 Prove that the time required for the completion of ¾ of the first order is twice the time required for the completion of half of the reaction.[2]

Q.14 Differentiate between (a) Average rate &instantaneous rate (b) Rate of a reaction and specific rate of reaction.[2]

Q.15 A reaction is of second order with respect to a reactant. How is its rate affected if the concentration of the reactant is (i) tripled (ii) reduced to half?[2]

Q.16 The following values for the first order rate constant were obtained for a certain reaction . Calculate the activation energy 'E_A'. If at temp 25 ^{0} C & 35^0 C the rate constant is 50 & 100 resp. [3]

Q.17 The decomposition of phosphine proceeds according to following equation. $4PH_3$ (g) ------->P_4 (g) + $6H_2$ (g). It is found that reaction follow following rate equation Rate = k [PH_3] .The half-life of PH_3 is 37.95 at 120^0 C.
(i) How much time is required for ¾ th of PH_3 to decompose?
(ii) What fraction of the original sample of PH_3 remains behind after 1 min? [3]

Q.18 The thermal decomposition of HCOOH is a first order reaction with a rate constant of 2.4 x10^{-3} s^{-1}at a certain temp.. Calculate how long will it take for three fourth of initial quantity of HCOOH to decompose. (log 0.25 = - 0.6021)[3]

Q.19 (a) List four main differences between order and molecularity of a reaction.
(b) The half-life for decay of radioactive $_{14}C$ is 5730 yr. An archaeological artifact containing wood had only 80% of the $_{14}C$ found in a living tree. Estimate the age or the sample. [5]

Q.20 For the reaction, 2NO (g) + 2 Cl_2 (g) -------> 2NOCl (g) The following data were collected.

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 units.
(iii) What is the initial rate of disappearance of Cl_2 in experiment 4? [5]

Q.21 Nitrogen pentoxide decomposes according to equation: N_2O_5 (g) ------->$2NO_2$ (g) + O_2 (g)
This first order reaction was allowed to proceed at 40°C and the data below were collected:

Time (min)	**0.00**	**20.0**	**40.0**	**60.0**	**80.0**
[N_2O_5][M]	**0.400**	**0.289**	**0.209**	**0.151**	**0.109**

(i) Calculate the rate constant. Include units with your answer. (ii) Calculate initial rate of reaction.
(iii) After how many minutes will [N_2O_5] be equal to 0.350 M? [5]

Q.22(i) Define activation energy & collision frequency .
(ii)The rate of a reaction becomes triples when temperature change from 50°C to 100 C .Calculate the energy of activation of the reaction, assuming that it does not change with temperature. (R = 8.314 J/k/ mol) [5]

Q.23 The decomposition of phosphine, $4PH_3$ (g) ------->P_4 (g) + $6H_2$ (g). has the rate law rate = k [PH_3] The rate constant is 6.0×10^{-4}/ s at 300 K and activation energy is 3.05×10^5 J/mol. Calculate the value of rate constant at 310 K.[3]