



**INDIAN SCHOOL MUSCAT**  
**SENIOR SECTION**  
**DEPARTMENT OF CHEMISTRY**  
**CLASS XII**  
**CHAPTER - CHEMICAL KINETICS**  
**WORKSHEET - 14**

1. Why does the rate of a reaction not remain constant throughout the reaction process? (2010)
2. The rate of a reaction is  $1.2 \times 10^{-3}$  L/mol/s. What is the order of the reaction?
3. Define the following terms :
  - a) Half-life of a reaction ( $t_{1/2}$ )
  - b) Rate constant (k) (2015)
4. A first order decomposition reaction takes 40 minutes for 30% decomposition. Calculate its  $t_{1/2}$  value. (2008)
5. Show that for a first order reaction, the time required for half the change is independent of initial concentration. (2010)
6. A reaction is first order in A and second order in B.
  - a) Write differential rate equation.
  - b) How is the rate affected when the concentration of A is tripled?  
How is the rate affected when the concentration of both A and B are doubled?
7. An artifact containing wood has only 80% of the  $C^{14}$  activity found in a living tree. Estimate the age of the artifact if  $t_{1/2}$  of  $C^{14}$  is 5730 years.
8. The time required for 10% completion of a first order reaction at 298 K is equal to that required for its 25% completion at 308K. if the value of A is  $4 \times 10^{10}$ /s, calculate k at 318K and  $E_a$
9. (a) For a reaction  $A + B \rightarrow P$ , the rate is given by  
$$\text{Rate} = k[A]^2[B]$$

- (i) How is the rate of reaction affected if the concentration of A is doubled?  
 (ii) What is the overall order of reaction if B is present in large excess?
- (b) A first order reaction takes 23.1 minutes for 50% completion. Calculate the time required for 75% completion of this reaction.  
 (Given :  $\log 2 = 0.301$ ,  $\log 3 = 0.4771$ ,  $\log 4 = 0.6021$ )

10 a) Explain the following terms:

- i) Order of reaction  
 ii) Molecularity of a reaction

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

11 Time required to decompose  $\text{SO}_2\text{Cl}_2$  to half of its initial amount is 60 minutes. If the decomposition is a first order reaction, calculate the rate constant of the reaction.

12 The following results have been obtained during the kinetic studies of the reaction:  $2\text{A} + \text{B} \rightarrow \text{C} + \text{D}$

Experiment	[A]/M	[B]/M	Initial rate of formation of D/ $\text{mol L}^{-1} \text{ min}^{-1}$
I	0.1	0.1	$6.0 \times 10^{-3}$
II	0.3	0.2	$7.2 \times 10^{-3}$
III	0.3	0.4	$2.88 \times 10^{-3}$
IV	0.4	0.1	$2.40 \times 10^{-3}$

Determine the rate law and rate constant for the reaction.

13 For the decomposition of azoisopropane into hexane and nitrogen at 543K, the following data were obtained. Calculate the rate constant.

T(sec)	P (mm of Hg)
0	35
360	54
720	63