

B.Sc 2nd year
Assignment

- 1) a) what is the difference between order of a reaction and molecularity?
b) what is meant by the terms rate law and rate constant?

2) Derive the expression for the rate constant of a second order reaction of the type
 $A + B \rightarrow \text{product}$.

3) Derive an expression for the half life of an n th order reaction where $n > 2$

$$t_{1/2} = \frac{2^{n-1} - 1}{k_n(n-1)[A]_0^{n-1}}$$

4) Write the methods for determining the order of a reaction. Explain briefly one method.

5) State and explain the following

- a) consecutive rxⁿs.
b) parallel reactions
c) collision theory

6) Give two examples of

- i) zero order rxⁿ
ii) 1st order rxⁿ
iii) 2nd order rxⁿ
iv) 3rd order rxⁿ

F) a) Explain Arrhenius equation and derive

$$\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left[\frac{1}{T_1} - \frac{1}{T_2} \right]$$

b) write the failure of collision theory.

8) The rate constant of a second order reaction is $5.70 \times 10^5 \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ at 25°C and $1.64 \times 10^{-4} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ at 40°C . Calculate the activation energy and Arrhenius pre-exponential factor.

9) Show that in case of 1st order reaction, the time required for 99.9% of the reaction to take place is about 10 times than that required for half life reactions.

10) A first order reaction is 40% complete in 50 minutes. Calculate the value of the rate constant. In what time will the reaction be 80% complete?

