



CLASS 12 BATCH

FOR CHEMISTRY

LECTURE - 05

CHEMICAL KINETICS



Today's Goal



n^{th} order reaction

Zero order

2nd Order

Pseudo 1st order reaction



1st Order Reaction in terms of Pressure





For the first order homogenous gaseous $A \rightarrow 2B + C$. the initial pressure was P_i while total pressure of the time 't' was P_t . then write expression for the rate constant k in terms of P_i , P_t , & t .



$$k = \frac{2.303}{t} \log \left(\frac{2P_i}{3P_i - P_t} \right)$$



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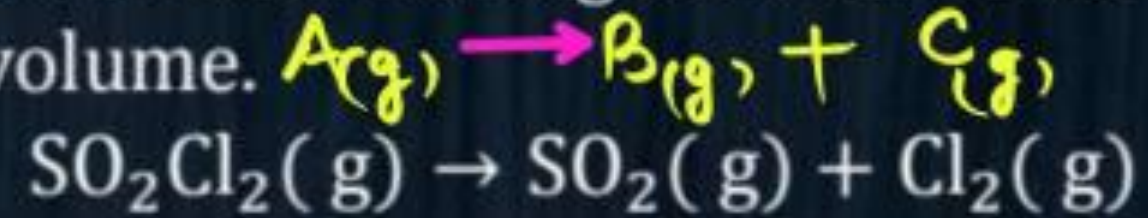


None of these



Q

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



Experiment	Time(s)	Total pressure/atm
1	0	0.5 P_i
2	100	0.6 P_t

Calculate the rate of the reaction when total pressure is 0.65 atm.





For the decomposition of azoisopropane to hexane and nitrogen at 543 K, the following data are obtained.


t(sec)	P(mm of Hg)
0	35.0 P_i
360	54.0 P_t
720	63.0

Calculate the rate constant.





For a homogeneous gaseous reaction $A \rightarrow 3B$, if pressure after time t was P_T and after completion of reaction, pressure was P_∞ then select correct relation

 **A** $k = \frac{1}{t} \ln \left(\frac{P_\infty}{3(P_\infty - P_t)} \right)$



B $k = \frac{1}{t} \ln \left(\frac{2P_\infty}{3(P_\infty - P_T)} \right)$



C $k = \frac{1}{t} \ln \left(\frac{3P_\infty}{2P_\infty - P_t} \right)$



D $k = \frac{1}{t} \ln \left(\frac{2P_\infty}{3P_\infty - P_T} \right)$





At 100°C , the gaseous reaction $\text{A} \rightarrow 2\text{B} + \text{C}$ is found to be of first order. Starting with pure A, if at the end of 10 min, the total pressure of the system is 176 mm and the end of reaction, it is 270 mm, the partial pressure of A at the end of 10 min is:



94 mm



43 mm



47 mm



176 mm





At 300 K, a gaseous reaction: $A \rightarrow B + C$ was found to follow first order kinetics. Starting with pure A , the total pressure at the end of 20 minutes was 100 mm of Hg. The total pressure after the completion of the reaction is 180 mm of Hg. The partial pressure of A (in mm of Hg) is

94 mm


43 mm

176 mm



N^{th} order Reaction





Half-Life





If a is the initial concentration of reaction, then the half-life period of a reaction of n^{th} order is directly proportional to:



$$a^n$$



$$a^{1-n}$$



$$a^{n-1}$$



$$a^{n+1}$$





The half-life period for a reaction at initial concentration of 0.5 and 1.0 moles litre⁻¹ are 200 sec and 100 sec respectively. The order of the reaction is–

 A 0

 C 2

 B 1

 D 3



Zero Order Reaction



Half-Life





$t_{75\%}$



Time for completion



Graphs



Q Half life period of a zero order reaction is:



- A** Independent of concentration
- B** Directly proportional to initial concentration
- C** Inversely proportional to concentration
- D** Directly proportional to the square of the concentration



2nd Order Reaction



Half-Life





$t_{75\%}$



Graphs





When initial concentration of the reactant is doubled, the half-life period of a zero order reaction
[NEET (UG) - 2012]



Is tripled



Is doubled



Is halved



Remains Unchanged





$t_{1/2}$ V/s $1/a^2$ is a straight line graph then determine the order of reaction:

[AIIMS- 2012]



Zero order



First order



Second order



Third order





The rate constant for a second order reaction $8.0 \times 10^{-4} \text{ litre mol}^{-1} \text{ min}^{-1}$. How long will it take a 0.5 M solution to be reduced to 0.25 M in reactant



$8.665 \times 10^2 \text{ min}$



$2.50 \times 10^3 \text{ min}$



$8.0 \times 10^{-4} \text{ min}$



$4.0 \times 10^{-4} \text{ min}$





For a second order reaction, if the conc. Of a reactant decreases from 0.08 M to 0.04 M in ten minutes, what would be the time taken for the conc. To decrease to 0.01 M –



20 minutes



30 minutes



50 minutes



70 minutes



Q Wrong data for the first order reaction is :



$t_{0.5} = 100 \text{ s}, t_{0.75} = 200 \text{ s}$



$t_{0.5} = 16 \text{ min}, t_{0.75} = 32 \text{ min}$



Both the above



$t_{0.5} = 100 \text{ s}, t_{0.75} = 150 \text{ s}$



Q Which of the following statement is false :



- A** A fast reaction has a larger rate constant and short half life
- B** For a first order reaction, successive half lives are equal
- C** For a first order reaction, the half-life is independent of concentration
- D** The half life of a reaction is half the time required for the reaction to go to completion



Q Write the expression of DOD for 1st order reaction





THANK YOU !!

Homework

REVISE FORMULA OF LAST CHAPTER
DPP Of this Lecture

