CLASS 12 BATCH

FOR CHEMISTRY

LECTURE - 04

CHEMICAL KINETICS

Today's Goal

1^{st} order reaction in terms of pressure

Pseudo 1^{st} order reaction &

Practice

From Lec-03

1^{st} order reaction Question

Q

For a first order reaction, $t_{0.75}$ is 1386 seconds. Therefore, the specific rate constant is:

A) $10^{-1}\ s^{-1}$

B) $10^{-3}\ s^{-1}$

C) $10^{-2}\ s^{-1}$

D) $10^{-4}\ s^{-1}$

$t_{1/2}$ of first order reaction is given by 0.693/k , $t_{3/4}$ would be equal to:

A $\frac{0.693}{k}$

B $\frac{0.346}{k}$

C $\frac{1.386}{k}$

D $\frac{0.924}{k}$

The $t_{1/2}$ of a first order reaction is found to be 2 minutes. The percentage of the reactant left after 360 seconds is:

A. 12.5

B. 25

C. 15

D. 7.5

Various Time

$$t_{75\%} = 2\,t_{50\%}$$

$$t_{87.5\%} = 3t_{50\%}$$

$$t_{93.75\%} = 4t_{50\%}$$

$$t_{90\%} = 3.33t_{50\%}$$

$$t_{99\%} = 6.66t_{50\%}$$

$$t_{99.9\%} = 9.99t_{50\%}$$

$$t_{99.99\%} = 13.34t_{50\%}$$

A first order reaction is 75% completed in 100 min. How long time will it take for its 87.5% completion ?

A. 125 min

B. 150 min

C. 175 min

D. 200 min

Q

The rate constant for a first order reaction whose half-life is 480 sec

A. $1.44 \times 10^{-3}\ sec^{-1}$

B. $0.72 \times 10^{-3}\ sec^{-1}$

C. $1.44\ sec^{-1}$

D. $2.88 \times 10^{-3}\ sec^{-1}$

Q

99% of a first order reaction was completed in 32 min when 99.9 % of the reaction will complete?

A) 50 min

B) 46 min

C) 48 min

D) 49 min

Q

The rate constant of a reaction is 0.069 min^{-1} and the initial concentration is 0.2 M. the half life period is

A. 400 Sec

B. 600 sec

C. 800 sec

D. 1200 sec

1^{st} Order Reaction in terms of Pressure

For the first order homogenous gaseous A -> 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.

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

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

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

D. None of these

Q The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume. $A_{(g)} \rightarrow B_{(g)} + C_{(g)}$

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

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

Q

At 100°C, the gaseous reaction $A \rightarrow 2B + C$ 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:

A. 94 mm

B. 43 mm

C. 47 mm

D. 176 mm

Q 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

THANK YOU !!

Homework

REVISE FORMULA OF LAST CHAPTER
DPP Of this Lecture