4.1. For the reaction R→P, the concentration of a reactant changes from 0.03 M to 0.02 M in 25 minutes. Calculate the average rate of reaction using units of time both in minutes and seconds.
Ans:

$$\text{Average rate} = \frac{-\Delta[R]}{\Delta t} = \frac{-[(R)_2 - (R_1)]}{t_2 - t_1}$$
$$= \frac{(0.02 - 0.03)}{25} = \frac{-(-0.01)}{25}$$
$$= 4 \times 10^{-4}\ \text{M min}^{-1}$$
$$= 6.66 \times 10^{-6}\ \text{M s}^{-1}$$

4.2. In a reaction, 2A → Products, the concentration of A decreases from 0.5 mol L^{-1} to 0.4 molL^{-1} in 10 minutes. Calculate the rate during this interval?
Ans:

$$\text{Average Rate} = \frac{-1}{2}\frac{\Delta[A]}{\Delta t} = \frac{-1}{2}\frac{[A]_2 - [A]_1}{t_2 - t_1}$$
$$= \frac{-1}{2}\frac{(0.4 - 0.5)}{10} = \frac{-1}{2}\frac{(-0.1)}{10}$$
$$= 5 \times 10^{-3}\ \text{M min}^{-1}$$

4.3. Fora reaction, A+B → Product; the rate law is given by, r =k [A]$^{1/2}$ [B]^{2}. What is the order of the reaction?
Ans: Order of reaction. = 1/2+ 2 = $2\frac{1}{2}$ or 2.5

4.4. The conversion of molecules X to Y follows second order kinetics. If concentration of X is increased to three times how will it affect the rate of formation of Y ?
Ans:
The reaction is : X→Y
According to rate law,
rate = $k[X]^2$
If [X] is increased to 3 times, then the new rate is
rate' = $k[3X]^2$
rate' = $9\,k\,[X]^2$ = 9 rate
Thus, rate of reaction becomes 9 times and hence rate of formation of Y increases 9-times.

*********** END **********