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1st year LMD – SNV Biology **Academic year: 2023/2024**
Subject: Chemistry 2

Applied exercises series No. 5

(Chemical kinetics)

Exercice N°1:

The decomposition by heat, at constant volume, of dinitrogen pentoxide into gas is carried out following the reaction: $N_2O_5(g) \rightarrow 2NO_2(g) + ½\ O_2(g)$

We see that the time t_1 after which half of the initial N_2O_5 has disappeared is independent of the initial pressure.

Knowing that the reaction is of order 1.

1. What is the unit of k?

2. Express v as a function of $d[N_2O_5]/dt$ from $d[NO_2]/dt$ and $d[O_2]/dt$.

3. What is the differential equation linking k, $[N_2O_5]$ and $d[N_2O_5]/dt$.

4. Deduce from the previous question a relationship linking $[N_2O_5]$, k, t and $[N_2O_5]_0$.

5. Express $t_{1/2}$ as a function of k. does the half-reaction time $t_{1/2}$ depend on $[N_2O_5]_0$?

Exercice N°2:

We consider the reaction: $HbO_2 \rightarrow Hb + O_2$ translating the formation of oxyhemoglobin into hemoglobin. We see that after 9.103 seconds 30% of the oxyhemoglobin (HbO_2) has disappeared. Knowing that the reaction is of order 1.

1. Determine its speed constant k by justifying the equation used to calculate it and specifying its unit.

2. Determine the half-reaction time.