

Series N°5

Exercise 1:

Be the following reaction:



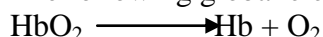
The following experimental results are obtained:

T(°C)	0	6	12	18	24	30
K (mol/l.s)	$5.6 \cdot 10^{-5}$	$11.8 \cdot 10^{-5}$	$24.5 \cdot 10^{-5}$	$48.8 \cdot 10^{-5}$	$100 \cdot 10^{-5}$	$208 \cdot 10^{-5}$

- 1) What is the order of reaction?
- 2) Does the reaction obey the law of Arrhenius?
- 3) Give the value of the activation energy, knowing that the constant $R = 2 \text{ cal/K.mol}$

Exercise 2:

The following global elementary reaction 1 is considered:

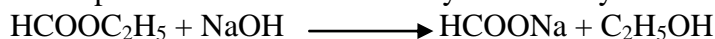


Translating the transformation of oxyhemoglobin. It is found that after $9 \cdot 10^{-3}$ seconds, 30% of the oxyhemoglobin disappeared.

- 1) Determine the speed constant K of this reaction and the half-reaction time $t_{1/2}$.
- 2) Calculate the percentage of oxyhemoglobin remaining after $20 \cdot 10^{-3}$ seconds.

Exercise 3:

The saponification reaction of ethyl formate by soda ash was studied at 20°C:



The initial concentrations of soda and ester are:

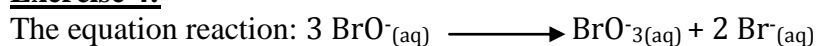
$$[\text{HCOOC}_2\text{H}_5] = [\text{NaOH}] = 0.01 \text{ mol/l}$$

The following table gives concentrations of the ester as a function of time.

$[\text{HCOOC}_2\text{H}_5]$ (mol/l)	0.01	$7.4 \cdot 10^{-3}$	$6.83 \cdot 10^{-3}$	$6.34 \cdot 10^{-3}$	$5.89 \cdot 10^{-3}$
t(s)	0	180	240	300	360

- 1) Show from the above numerical data that the reaction is global 2.
- 2) Calculate:
 - The reaction velocity constant K.
 - The period $t_{1/2}$.
 - The time required for the disappearance of 99% ester.

Exercise 4:



has a rate constant of $5.61 \cdot 10^{-2} \text{ mol}^{-1} \cdot \text{L} \cdot \text{s}^{-1}$ to 25°C. It is assumed that this reaction allows for an order.

- 1) What is the order of reaction to the BrO^- hypobromite ion?
- 2) The starting point is a solution containing BrO^- ions at the concentration $5.0 \cdot 10^{-2} \text{ mol} \cdot \text{L}^{-1}$.
 - Calculate half reaction time.
 - Determine the composition of the solution at $t = 3 \text{ min}$.
 - By what time will 75% of the hypobromite ions have been consumed?