

HONORS CHEMISTRY

HOMEWORK 10a.

Name: _____

NOTE: All concentrations are in moles/L, and all rates are in (moles/L)/sec, unless otherwise noted.

1. The reaction $2 \text{NO} (g) + \text{Cl}_2 (g) \rightarrow 2 \text{NOCl} (g)$ was studied at -10°C , with these results:

Experiment	$[\text{NO}]_0$	$[\text{Cl}_2]_0$	Initial rate of loss of Cl_2
#1	.10	.10	.18
#2	.10	.20	.36
#3	.20	.20	1.45

Find the rate law and the value of the rate constant k .

2. The decomposition of nitrosyl chloride (the reverse of the process in problem 1) was studied at a certain temperature, with these results:

Experiment	$[\text{NOCl}]_0$, molecules/ cm^3	Initial rate of loss of NOCl
#1	1.0×10^{16}	6.64×10^3 molecules/ cm^3/sec
#2	2.0×10^{16}	2.66×10^4 “
#3	3.0×10^{16}	5.98×10^4 “
#4	4.0×10^{16}	1.06×10^5 “

Find the rate law and the value of the rate constant k .

3. The rate of binding of hemoglobin (symbolized as Hb) to CO was studied, with these results:

Experiment	$[\text{Hb}]_0$, in μM	$[\text{CO}]_0$, in μM	Initial rate of Hb binding
#1	2.21	1.00	0.619 $\mu\text{M}/\text{sec}$
#2	4.42	1.00	1.24 “
#3	4.42	3.00	3.71 “

Find the rate law and the value of the rate constant k .4. The reaction $2 \text{ClO}_2 (aq) + 2 \text{OH}^- (aq) \rightarrow \text{ClO}_3^- (aq) + \text{ClO}_2^- (aq) + \text{H}_2\text{O} (l)$ was studied and the rate of disappearance of ClO_2 was measured.

Experiment	$[\text{ClO}_2]_0$	$[\text{OH}^-]_0$	Initial rate of loss of ClO_2
#1	.0500	.100	5.75×10^{-2}
#2	.100	.100	2.30×10^{-1}
#3	.100	.0500	1.15×10^{-1}

Find the rate law and the value of the rate constant k .Also find what the initial rate would be if $[\text{ClO}_2]_0$ was 0.175 and $[\text{OH}^-]_0$ was 0.08445. Consider the data below for the reaction $\text{A} + \text{B} \rightarrow \text{X}$. What is the value of the rate constant, k ?

Experiment	$[\text{A}]_0$	$[\text{B}]_0$	Rate of formation of X
1	1.0	1.0	$2 \times 10^{-3} \text{ sec}^{-1}$
2	2.0	1.0	$2 \times 10^{-3} \text{ sec}^{-1}$
3	1.0	2.0	$8 \times 10^{-3} \text{ sec}^{-1}$