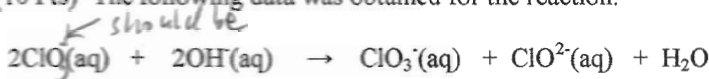


1. (10 Pts) The following data was obtained for the reaction:



	Initial Concentrations (mol/L)		Initial Rate (mol/L.s)
	ClO ₂ ⁻	OH ⁻	
Exp. 1	0.060	0.030	0.0248
Exp. 2	0.020	0.030	0.00276
Exp. 3	0.020	0.090	0.00828

a. Write a general rate equation and then use the above data to determine the rate law.

rate = k [ClO₂⁻]^x [OH⁻]^y

for ClO₂⁻ use Exp 1 } rate₁ = k [ClO₂⁻]^x [OH⁻]^y
 use Exp 2 } rate₂ = k [ClO₂⁻]^x [OH⁻]^y

0.0248 / 0.00276 = (0.060 / 0.020)^x
 9 = 3^x
 x = 2

for OH⁻ use Exp 3 : 0.00828 / 0.00276 = (0.090 / 0.030)^y
 3 = 3^y
 y = 1

Therefore rate = k [ClO₂⁻]² [OH⁻]

b. Determine the value of the rate constant and its units.

using Exp 1 : 0.0248 = k [0.060]² [0.030]

k = 229 = 230 M⁻²s⁻¹

2. (4 Pts) A reaction was determined to have the rate law: rate = k[NO]²[Cl₂]. By what factor would the rate change if the concentration of NO was tripled and the concentration of Cl₂ was doubled? (SHOW YOUR WORK)

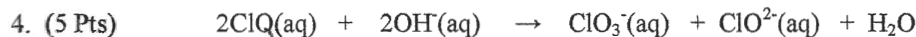
rate = k [3]² [2] = 18 fold change

3. (6 Pts) The reaction: 3I⁻(aq) + H₃AsO₄⁻(aq) + 2H⁺(aq) → I₃⁻(aq) + H₃AsO₃(aq) + H₂O(l) has been found to be first order with respect to each of the reactants.

a. Write a rate equation for the reaction. rate = k [I⁻] [H₃AsO₄⁻] [H⁺]

b. What is the overall order of the reaction? 3

c. What would be the units of the rate constant if the reaction rates are measured in M/min? M⁻² min⁻¹



a. For the above reaction, which term in the following expression is incorrect?

rate = k [ClO₂⁻]^x [OH⁻]^y = $\frac{\Delta[\text{ClO}_2^-]}{2\Delta t}$ = $\frac{-\Delta[\text{OH}^-]}{2\Delta t}$ = $\frac{\Delta[\text{ClO}_3^-]}{\Delta t}$ = $\frac{\Delta[\text{ClO}_2^-]}{\Delta t}$ = $\frac{\Delta[\text{H}_2\text{O}]}{\Delta t}$

b. Explain Why? ClO₂⁻ is a reactant and is disappearing, so there should be a (-) sign