

Unit 13 – Chapter 12: Kinetics

Name \_\_\_\_\_

Assignment #1

Period \_\_\_\_\_

- 1) Consider the general reaction:  $aA + bB \rightarrow cC$   
and the following average rate data over some time period  $\Delta t$ :

$$-\frac{\Delta A}{\Delta t} = 0.0080 \text{ mol/L} \cdot \text{s}$$

$$-\frac{\Delta B}{\Delta t} = 0.0120 \text{ mol/L} \cdot \text{s}$$

$$-\frac{\Delta C}{\Delta t} = 0.0160 \text{ mol/L} \cdot \text{s}$$

Determine a set of possible coefficients to balance this general reaction.

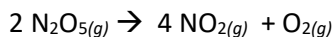
- 2) The reaction:  $2 \text{I}^-_{(aq)} + \text{S}_2\text{O}_8^{2-}_{(aq)} \rightarrow \text{I}_{2(aq)} + 2 \text{SO}_4^{2-}_{(aq)}$  was studied at 25°C. The following results were obtained where

$$\text{Rate} = -\frac{\Delta[\text{S}_2\text{O}_8^{2-}]}{\Delta t}$$

$[\text{I}^-]_0$ (mol/L)	$[\text{S}_2\text{O}_8^{2-}]_0$ (mol/L)	Initial Rate (mol/L · s)
0.080	0.040	$12.5 \times 10^{-6}$
0.040	0.040	$6.25 \times 10^{-6}$
0.080	0.020	$6.25 \times 10^{-6}$
0.032	0.040	$5.00 \times 10^{-6}$
0.060	0.030	$7.00 \times 10^{-6}$

- Determine the rate law.
- Calculate a value for the rate constant for each experiment and an average value for the rate constant.

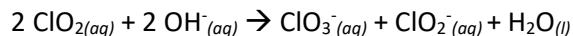
3) The following data were obtained for the gas-phase decomposition of dinitrogen pentoxide,



$[\text{N}_2\text{O}_5]_0$ (mol/L)	Initial Rate (mol/L · s)
0.0750	$8.90 \times 10^{-4}$
0.190	$2.26 \times 10^{-3}$
0.275	$3.26 \times 10^{-3}$
0.410	$4.85 \times 10^{-3}$

Defining the rate as  $-\frac{\Delta[\text{N}_2\text{O}_5]}{\Delta t}$ , write the rate law and calculate the value of the rate constant.

4) The following data were obtained for the reaction:



where Rate =  $-\frac{\Delta[\text{ClO}_2]}{\Delta t}$

$[\text{ClO}_2]_0$ (mol/L)	$[\text{OH}^-]_0$ (mol/L)	Initial Rate (mol/L · s)
0.0500	0.100	$5.75 \times 10^{-2}$
0.100	0.100	$2.30 \times 10^{-1}$
0.100	0.0500	$1.15 \times 10^{-1}$

- Determine the rate law and the value of the rate constant.
- What would be the initial rate for an experiment with  $[\text{ClO}_2]_0 = 0.175$  mol/L and  $[\text{OH}^-] = 0.0844$  mol/L?