

Name: \_\_\_\_\_

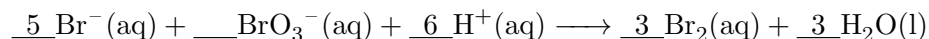
Date: \_\_\_\_\_

- [6 pt] 1. The following rate data was collected for the reaction:  $\underline{2} \text{NO}_2(\text{g}) \longrightarrow \underline{2} \text{NO}(\text{g}) + \underline{\quad} \text{O}_2(\text{g})$ . Using this data, answer the following questions:

Time	$[\text{NO}_2]$ (M)	Time	$[\text{NO}_2]$ (M)
0	$8.00 \times 10^{-3}$	200	$4.29 \times 10^{-3}$
50	$6.58 \times 10^{-3}$	300	$3.48 \times 10^{-3}$
100	$5.59 \times 10^{-3}$	400	$2.93 \times 10^{-3}$
150	$4.85 \times 10^{-3}$	500	$2.53 \times 10^{-3}$

- (a) What is the average rate of decomposition of  $\text{NO}_2$  between 50-100 seconds using the data below?
- (b) How is the rate of consumption of  $\text{NO}_2$  related to the rate of production of  $\text{NO}$ ? (in words and an equation)
- (c) How is the rate of consumption of  $\text{NO}_2$  related to the rate of production of  $\text{O}_2$ ? (in words and an equation)

- [4 pt] 2. The following reaction is first order in  $\text{Br}^-$  and  $\text{BrO}_3^-$  and second order in  $\text{H}^+$ .



- (a) Write the rate law.
- (b) What is the overall reaction order?
- (c) How does the reaction rate change if the  $\text{H}^+$  concentration triples? Explain.
- (d) How does the reaction rate change if the concentration of  $\text{Br}^-$  and  $\text{BrO}_3^-$  is halved? Explain.

**CHE 112 - Homework - Ch 17a**

- [7 pt] 3. Given the reaction  $\underline{\quad} \text{H}_2\text{O}_2(\text{aq}) + \underline{3} \text{I}^-(\text{aq}) + \underline{2} \text{H}^+(\text{aq}) \longrightarrow \underline{\quad} \text{I}_3^-(\text{aq}) + \underline{2} \text{H}_2\text{O}(\text{l})$  and the following experimental rate data based on the rate of formation of  $\text{I}_3^-(\text{aq})$ , answer the following questions:

Exp	$[\text{H}_2\text{O}_2]$ (M)	$[\text{I}^-]$ (M)	Rate (M/s)
1	0.100	0.100	$1.15 \times 10^{-4}$
2	0.100	0.200	$2.30 \times 10^{-4}$
3	0.200	0.100	$2.30 \times 10^{-4}$
4	0.200	0.200	$4.60 \times 10^{-4}$

(a) What is the rate law?

(b) What is the value of the rate constant?

3(b) \_\_\_\_\_

(c) What is the reaction rate when the initial concentration are:  
 $\text{H}_2\text{O}_2 = 0.300 \text{ M}$  and  $\text{I}^- = 0.400 \text{ M}$ ?

3(c) \_\_\_\_\_

- [8 pt] 4. Given the reaction  $\underline{2} \text{NO}(\text{g}) + \underline{\quad} \text{Cl}_2(\text{g}) \longrightarrow \underline{2} \text{NOCl}(\text{g})$  and the following experimental rate data based on the consumption of  $\text{Cl}_2$ , answer the following questions:

Exp	$[\text{NO}]$ (M)	$[\text{Cl}_2]$ (M)	Rate (M/s)
1	0.13	0.20	$1.0 \times 10^{-2}$
2	0.26	0.20	$4.0 \times 10^{-2}$
3	0.13	0.10	$5.0 \times 10^{-3}$

(a) What is the rate law?

(b) What is the value of the rate constant?

4(b) \_\_\_\_\_

(c) What is the reaction rate when both reactant concentrations are 0.12 M?

4(c) \_\_\_\_\_