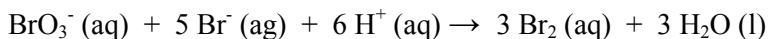


Names: **Group Work****CHM152 – Chapter 12: Kinetics****Please show ALL work for full credit and BOX your final answer!****I want to see everyone's handwriting on this assignment.**

1. (2.5 pts) The following set of data was obtained by the method of initial rates for the reaction:



What is the rate law for the reaction? What is the value of the rate constant? What is the overall order?

Expt	$[\text{BrO}_3^-]$, M	$[\text{Br}^-]$, M	$[\text{H}^+]$, M	Rate, M/s
1	0.10	0.10	0.10	8.0×10^{-4}
2	0.20	0.10	0.10	1.6×10^{-3}
3	0.20	0.15	0.10	2.4×10^{-3}
4	0.10	0.10	0.25	5.0×10^{-3}

2. (2.5 pts) Nitrogen dioxide decomposes at 300°C via a second order process to produce nitrogen monoxide and oxygen gas. A sample of NO_2 (g) is initially placed in a 2.50 L reaction vessel at 300°C. If the half-life and rate constant at 300°C are 11 seconds and $0.54 \text{ M}^{-1} \text{ s}^{-1}$, respectively, how many moles of NO_2 were in the original sample?

3. (2.5 pts) For this reaction: $2 \text{NO} (\text{g}) + \text{Cl}_2 (\text{g}) \rightarrow 2 \text{NOCl} (\text{g})$, the real rate law is $\text{rate} = k [\text{NO}][\text{Cl}_2]$
If the following steps are the mechanism, which one must be the rate determining step? _____
What is the intermediate in this mechanism? _____ What is the overall order? _____
Step 1: $\text{NO} (\text{g}) + \text{Cl}_2 (\text{g}) \rightarrow \text{NOCl}_2 (\text{g})$
Step 2: $\text{NO} (\text{g}) + \text{NOCl}_2 (\text{g}) \rightarrow 2 \text{NOCl} (\text{g})$

4. (2.5 pts) The aquation of tris(1, 10-phenanthroline)iron(II) in acid solution takes place according to the equation:
 $\text{Fe}(\text{phen})_3^{2+} + 3 \text{H}_3\text{O}^+ + 3 \text{H}_2\text{O} \rightarrow \text{Fe}(\text{H}_2\text{O})_6^{2+} + 3 \text{phenH}^+$
If the activation energy is 126 kJ/mol and the rate constant at 30°C is $9.8 \times 10^{-3} \text{ min}^{-1}$, what is the rate constant at 50°C?