## Wkst 1.4: Reaction Mechanisms

1. Consider the following reaction mechanism:

Step 1:	OCI-	+	$H_2O$	$\rightarrow$	HOCI	+	OH-	(fast)
Step 2:	l-	+	HOCI	$\rightarrow$	HOI	+	Cl-	(slow)
Step 3:	HOI	+	OH⁻	$\rightarrow$	$H_2O$	+	Ol-	(fast)

- a) Write the overall equation for the above process.
- b) Identify any intermediates/catalysts.
- c) What is most likely to happen to the rate of the reaction if we double the concentration of the iodide ion?
- 2. Ozone decomposes slowly in the atmosphere according to the overall equation:

$$2 O_{3(g)} \rightarrow 3 O_{2(g)}$$

Write a 2-step reaction mechanism for the process, using  $O_{(g)}$  as an intermediate.

- 3. Ethane gas (C<sub>2</sub>H<sub>6</sub>) reacts with chlorine gas to give chloromethane gas (CH<sub>3</sub>Cl). The rate of the reaction is dependent on the concentration of ethane gas. Write a 3-step reaction mechanism for the process.
- 4. The following 2-step reaction mechanism was determined:

Step 1:	H⁺	+	$H_2O_2$	$\rightarrow$	$H_3O_2^+$			(fast)
Step 2:	-	+	$H_3O_2^+$	$\rightarrow$	HIO	+	$H_2O$	(slow)

- a) Write the overall equation for the process.
- b) Which is the rate-determining step?
- c) To increase the rate of the reaction, which reactant's concentration should you increase? Explain.
- 5. Write a 4-step mechanism for the reaction

 $N_2$  +  $H_2$  +  $3 O_2 \rightarrow 2 HNO_3$ 

with HNO,  $N_2O_2$ , and  $H_2O_2$  as intermediates.