NAME: **HONORS CHEMISTRY**

SECTION: Reaction Mechanisms Problem Set

1. The following mechanism has been proposed for the destruction of ozone, O3, in the upper atmosphere:

Step 1 Cl + O3 → ClO + O2 (slow)

Step 2 ClO + O → Cl + O2 (fast)

* 1. Write the net (overall) equation.

* 1. Which species is a catalyst? How do you know?
  2. Which species is an intermediate? How do you know?

1. The mechanism proposed for the decomposition of hydrogen peroxide is shown below:

Step 1 H2O2 → 2 OH (slow)

Step 2 H2O2 + OH → H2O + HO2 (fast)

Step 3 HO2 + OH → H2O + O2 (fast)

1. Write the net (overall) equation.
2. List the two intermediates present in the mechanism.
3. If the overall reaction is endothermic, draw a reaction profile (PE diagram) that is consistent with this mechanism:
4. What will be the effect on the reaction rate if the concentration of H2O2 is increased? Explain your answer in terms of collision theory.

3. The equation for an ***overall*** reaction is:

1. + OC- → IO- + C-
2. The following is a proposed *mechanism* for this reaction. One of the species has been left

out. ***Determine what that species is and write it in the box.*** Make sure the *charge* is

correct if it has one!

Step 1: *OC- + H2O* → *HOC + OH-* (fast)

Step 2: *I- + HOC* → *IOH + C-* (slow)

Step 3: *IOH + OH-* → *+ H2O* (fast)

b) Which species in the mechanism above acts as a ***catalyst***? How do you know?

c) Which three species in the mechanism above are ***intermediates***? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d) Step \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the rate determining step.

f) How will the rate be affected if additional OC- is added? Explain.

g) How would the rate be affected if additional I- is added? Explain.