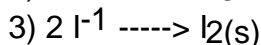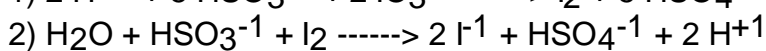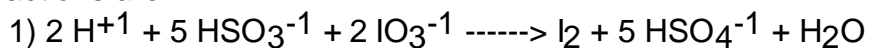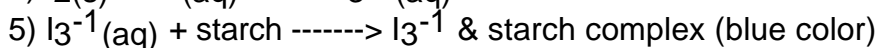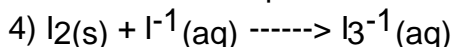# Rates of Reactions

Name_____

Introduction

In this lab you will explore two factors which can affect reaction rates. Concentration of reactants and temperature of reactants. The reaction you will perform can be summarized as follows: Iodate ions (IO_3^{-1}) react with bisulfite ions (HSO_3^{-1}) forming I_2 molecules. However, the I_2 quickly reacts with more bisulfite to form I^{-1} ions. When all the bisulfite ions are consumed I_2 remains in solution and forms a complex molecule with starch. This complex is deep blue.

The reactions are:

1) $2 H^{+1} + 5 HSO_3^{-1} + 2 IO_3^{-1} \longrightarrow I_2 + 5 HSO_4^{-1} + H_2O$
2) $H_2O + HSO_3^{-1} + I_2 \longrightarrow 2 I^{-1} + HSO_4^{-1} + 2 H^{+1}$
3) $2 I^{-1} \longrightarrow I_2(s)$

When all the bisulphite is used up:

4) $I_2(s) + I^{-1}(aq) \longrightarrow I_3^{-1}(aq)$
5) $I_3^{-1}(aq) + starch \longrightarrow I_3^{-1}$ & starch complex (blue color)

Procedure:

Prevention of solution contamination is crucial. Make sure that you **don't pour anything back into the original supply bottle**. If you take too much give some to another lab group or pour the extra down the drain.

Temperature vs. Reaction Rate

1) Set up 3 beakers: one with ice water, one at room temperature, and one with water on a hot plate. The beakers should be 250 ml or larger. You may **borrow** extra beakers from the cabinet.
2) Pour 10 ml of solution A into three test tubes (10 ml in each test tube) and place one in each beaker (cold, room temp, and hot).
3) Do the same with three more test tubes but use solution B.
4) Let these test tubes come to thermal equilibrium while you do the "Concentration vs. Reaction" procedure.
5) When ready, combine the test tubes from each beaker and measure the time it takes to complete the reaction.

Concentration vs. Reaction Rate

1) Pour 10 ml of solution A into one test tube and pour 10 ml of solution B into another.
2) Combine the test tubes and mix them back an forth a couple of times, but begin timing the reaction when you first combine the solutions.
3) Pour 5 ml of solution A into a test tube and dilute this with 5 ml of water. Then add 10 ml of solution B to another test tube.
4) Combine the test tubes as in #2 and time the reaction.
5) Pour 2.5 ml of solution A into a test tube and dilute this with 7.5 ml of water. Then add 10 ml of solution B to another test tube. Time the reaction as in #2.