Determining the Rate Law

**Purpose**: To determine the rate law for a reaction with hydrochloric acid, iodine, and acetone.

**Materials:**

4.00M acetone solution 0.0050M iodine solution

1.0M HCl solution Pipets

Graduated cylinders Beakers

Stopwatches

**Theory:**

In your theory section you should include a discussion of reaction rates and what can have an effect on them, the differential rate law, the integrated rate law, and the order of a reactant.

**Procedure:**

Obtain samples of each of the three solutions: 4.00M acetone, 1.0M HCl, and 0.0050M iodine. Cover each collected sample with paraffin to minimize loss to evaporation. You will combine these three solutions with distilled water in different amounts always ensuring that you total volume is 25mL. Vary the amounts of the 3 solutions provided to gather information to determine the rate law through instantaneous rates. The iodine solution has a yellow color, and the reaction is finished when the Iodine is used up leaving a clear color. Place the beaker over a white paper to better see when the color disappears. The HCl, I2, and acetone samples need to be mixed quick and the timing started in a consistent way. It is recommended that the HCl be added to the distilled water first, and then add the acetone and iodine. Acetone will evaporate quickly, but putting it in the pipette will minimize this evaporation.

**Calculations:**

All concentrations of the acetone, I2, and HCl must be determined after the dilutions.

Class values of times until clear should be Q tested for better accuracy.

The rate is equal to [I2]/t and must be calculated for all trials.

Calculate the order for each component. Assume they are all whole number values.

Calculate k

Determine the overall order and write the proper integrated rate law for that reaction. (Remember for reactants with a large concentration, the amount of that reactant can be deemed constant if the second reactant is in low concentration.)

**Conclusion:**

Analysis of error, determinations, and improvements to the design of the lab.