

# Edexcel Chemistry A-level

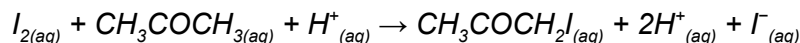
## Practical 13

### Iodine Reactions.



## Continuous Monitoring Method

Equation:



Sulfuric acid acts as a **catalyst** in this process.

Large **excess** of both propanone and sulphuric acid are used so that their concentrations remain effectively constant during reaction. This allows us to measure the influence of iodine on rate of reaction.

### Method

1. Using a pipette, add a sample of mixture to excess sodium hydrogencarbonate immediately after removing it from the flask to quench the reaction.
2. Start a stopwatch.
3. Withdraw samples every three minutes and repeat this process.
4. Titrate these samples with sodium thiosulphate ( $Na_2S_2O_3$ ) adding starch indicator near the end.

[Will turn from blue-black to colourless as iodine reacts with thiosulphate.]

5. Repeat for all samples to find their concentrations.
6. Use these results to plot a graph of concentration against time.  
[Graph should be a straight line. This means 0 order w.r.t. iodine; it is not involved in the rate-determining step of the reaction and therefore has no effect on the rate.]

### Safety

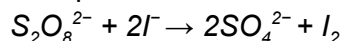
- Propanone is an **irritant** and **highly flammable**. Keep away from naked flames.
- Sodium thiosulphate releases sulphur dioxide when it reacts. Keep the room well-ventilated.



## Iodine Clock Reaction

In this experiment, rate is measured by timing how long it takes to produce a fixed amount of iodine.

The equation for the reaction between potassium iodide and potassium persulphate:



The **total volume** of the solutions used in experiment is the **same**, and the volume of thiosulfate used is also the same. That way, you get to change the concentrations of persulfate and iodine and top up the remaining volume with water (if needed).

In the experiment, you will vary the concentration of  $I_2$  whilst keeping the concentration of the persulfate constant, and vice versa. Therefore, you will measure the order w.r.t. each reactant.

### Method

1. Add persulphate is to a test tube containing potassium iodide, sodium thiosulfate, and starch indicator.
2. Start a stopwatch.
3. When the solution goes blue-black, the clock is stopped.

### Conclusions

- Rate of reaction is proportional to **1/time**. Use changes in rates and concentrations to deduce the order w.r.t each reagent.
- You can **“rewind” the clock** by adding a second amount of thiosulfate and adding the second time to the first.

### Errors

- **Inaccurate** timing of the appearance of blue colour. Two students could time simultaneously and use an average value.
- Adding starch slightly increases the volume which affects the concentrations of the reactants and thus the amount they change over time.

