

## **GCSE Biology**

### **Aim**

Does changing the concentration of hydrogen peroxide effect the rate at which catalase breaks it down?

### **Prediction**

I predict the stronger the concentration of hydrogen peroxide the quicker catalase will break it down because if there are a lot of  $H_2O_2$  in one area the catalase does not have to move very far between each particle to the next. But this only true to a certain extent because catalase can only break down so many hydrogen peroxide molecules in a certain amount of time, so no matter how concentrated it is it cannot be broken down any quicker.

### **Diagram**

### **Equipment**

- Hydrogen peroxide 20vol
- A large basin to hold the water and equipment
- Clamp stands and bosses
- Test tube
- Measuring cylinder

- Rubber tubing and bung
- A potato (this contains catalase to do the experiment)
- A white tile and core remover
- Stop watch

### **Method**

1. Set the equipment up as shown above. Make sure the measuring cylinder is full of water write to the top.
2. Poor 10ml of hydrogen peroxide solution into the boiling tube. Depending on how concentrated you want the solution poor out some of the hydrogen peroxide then fill it back up with water.
3. Add the potato which should be cut into equal sized pieces using the core remover and knife. Add only a certain amount every time (I used 5, 1x1x1cm blocks).
4. Immediately after doing this put the rubber bung over the top of the boiling tube and the end of the tube under the measuring tube which should be under the surface of the water.
5. Time for exactly 1minute then remove the tube from under the measuring tube. Take the reading of how much oxygen was produced remembering to look at it level with the eye so to get the most accurate reading.
6. Record the results onto a table then change the concentration of the solution make sure to use regular intervals in the concentration e.g. 20vol, 18vol, 16vol etc...
7. Repeat the experiment another three times and find the averages.

### **Safety and fair test points**

- Wear goggles through out the experiment.
- If hydrogen peroxide contacts your skin wash off immediately.
- Equipment must not be moved if possible.
- The water should be left for 10minutes before the experiment so it is warmed to room temperature. This will prevent temperature affecting the experiment as it will be at a constant temperature.

Adam laughton 10 hr

- Measure the hydrogen peroxide as accurately as possible and check that all concentrations changes are accurately measured by using measuring cylinders.

## Results

### Test 1

Concentration (volume of $\text{H}_2\text{O}_2$ )	Amount of Oxygen given off in 1 minute in ml's
20	4.1
18	4
16	3.5
14	3
12	2
10	1

### Test 2

Concentration (volume of $\text{H}_2\text{O}_2$ )	Amount of Oxygen given off in 1 minute in ml's
20	0.9
18	0.8
16	0.7
14	0.6
12	0.5
10	0.4

### Test3

Concentration (volume of $\text{H}_2\text{O}_2$ )	Amount of Oxygen given off in 1 minute in ml's
20	2.6
18	2.4
16	2.1
14	1.8
12	0.25
10	1.7

### Averaged Results

Concentration (volume of $\text{H}_2\text{O}_2$ )	Amount of Oxygen given off in 1 minute in ml's
20	2.5
18	2.4
16	2.1
14	1.8
12	0.92
10	1.03

### Graph

### Evaluation and Conclusion

As the concentration increased so did the amount of oxygen that was given off. Because there was a high concentration level, there were a high number of particles therefore there were more particles for the enzymes to break down. In the first set of results, the readings for the concentration level 16 and twenty were different to the other four. This made the averages not as accurate. But in the second set of recordings there were no odd results. The graph lines start to even off because the reaction slows down. This is because the number of molecules has decreased so the chance of an enzyme and a molecule colliding is smaller.

The result 20 vol was too low because after this concentration level I think that the  $\text{H}_2\text{O}_2$  stopped reacting with the potato. Although I used a clamping device- to prevent my hand temperature affect the rate - my results may have been affected by the temperature of the room and water, which may differ in a different temperature.

If I were to check any of my results then I would check them all, because set one and set two did not match up in the amount of oxygen let given off. I would definitely check the results for the concentration of 16, 18, and 20.