

## Measuring the production of a gas

**Big Manny:** How can we measure the speed of a reaction that gives off a gas?

It's time for a little practical, still.

Now, in this experiment, yeah, we're going to be measuring the production of a gas by reacting calcium carbonate with a little hydrochloric acid to produce calcium chloride, water and carbon dioxide gas.

We measure the rate of reaction by collecting the gas in a gas syringe and analysing the data in a graph.

Now, before we get started, yeah, you've got to make sure wearing eye protection, innit, and using the correct apparatus, which is a gas syringe, a delivery tube and bung, a conical flask and a clamp and stand.

Set up the gas syringe on a stand with a boss and a clamp just like this.

We need to add 50 centimetres cubed of dilute hydrochloric acid to a conical flask.

Now I've already added mine here.

Then after that, we need 0.4g of calcium carbonate added to the same flask.

Quickly connect the gas syringe and start the timer to minimise gas loss.

We will start our timer immediately and record the volume of gas produced every ten seconds in centimetres cubed using a table like this.

Alright cool.

So let's get started, yeah.

So what I'm going to do is pour the calcium carbonate into the hydrochloric acid.

Then I'm going to quickly put the bung on top and then start the timer immediately.

Some time has passed and the reaction is now complete.

No more gas is being produced.

Now we can tell this because the syringe plunger has stopped moving and the gas volume has stayed the same for the previous three readings.

Now that we've got our data, it's time to plot the results on a graph.

We plot the volume of gas on the vertical y-axis, and time goes on the horizontal x-axis.

This is the graph from this experiment.

Now we need to draw a curved line of best fit between the results.

We can calculate the mean rate of reaction using volume divided by total reaction time.

We measure in centimetres cubed per second.

Here's the mean rate of reaction for my experiment.

You can repeat the experiment using different concentrations of hydrochloric acid to get different results.

By comparing graphs, you can describe how concentration affects the rate of reaction.

Your graph curves may look different to mine, but if there's gas in a syringe and you've seen an increase in volume over time, then your experiment has been successful.

And there you have it.

That's how we measure the rate of reaction when a gas is given off.