

A slow practical: rates of reaction

Education in Chemistry

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Try the slow approach with this rates of reaction practical involving marble, chips, acid and gas syringes. Here are the steps involved in running this activity.

1. Before starting, ensure the students have a strong knowledge of rates of reaction.
2. Gather students at the demo table with your fully set-up apparatus.
3. Show students the marble chips of different size and question them on the relationship of size to surface area.
4. Add some hydrochloric acid to a beaker, and tell students you will drop some marble chips in. On a whiteboard, write 'calcium carbonate + hydrochloric acid \rightarrow ' and discuss the products of the reaction.
5. Add the products to the whiteboard and discuss the states of every substance in the equation. Ask if gas is produced, and what we will see.
6. Add the chips to the acid and see the gas evolved. Discuss how we can collect and measure the volume of that gas.
7. Talk about the different-sized chips. Explain that by noticing which chips evolve gas quickest we can establish a relationship between size of chip and rate of reaction.
8. Your students should already know who their work partner is. Task one with collecting two sets of safety goggles, one for them and one for their partner, and the other with collecting a clamp stand and gas syringe. At their desks, students will put on their specs, leave the syringe and then come back to the demo desk. Repeat the instructions and then ask a student to say them back to you.
9. Next, show students how to set up their gas syringe on a clamp stand. They go and do this, then come back.
10. Stay at the demo desk. You can easily look out across the whole class and see what everyone is up to, calling out errors if needed.
11. When the students return, quickly look around the room to check that equipment is set up properly.
12. Repeat the above cycle for students to fetch and set up flasks, marble chips and acid.
13. When students are ready to measure out their acid, discuss why it is important to know the exact volume used and why it is important to control. Show them how to use a measuring cylinder and why they are using a particular size. Send them back to measure out the acid and pour it into the flask.
14. Next, do the same for measuring the mass of marble. Be clear about the importance of removing the weighing boat from the balance in-between additions and why. Discuss as above the need for a controlled mass of marble and so on.