Nanochemistry

Demonstration: Atomic paper clips

The demonstration shows that the smallest part of any substance which can be identified as the substance is an atom. One paper clip represents an atom of paper clips. The demonstration also implies that atoms must be very small.

Time required

About 10 minutes

Apparatus and equipment

- A pile of paper clips – a box of 100 small ones tipped out will suffice
- A sheet of fool's gold (eg as used in an electroscope) or aluminium foil.

What you do

1. Place the pile of paper clips and the gold/aluminium side by side.
2. Start with the paper clips.
3. Divide the paper clip pile into roughly half, making two smaller piles.
4. Repeat the division until there are two paper clips and then finally, to one paper clip alone.
5. The single paper clip represents an atom.
6. Now split the paper clip into two pieces. Invite names for these, such as 'hook' and 'centre'.
7. Now turn to the gold/aluminium sheet.
8. Tear the sheet into two halves.
9. Repeat the tearing until the pieces cannot be torn any smaller.
10. As the piles and gold/aluminium are torn apart, ask students to answer the questions on the sheet. Answers are given.

Answers

1. One paper clip.
2. Yes.
3. Names for the paperclip might be hook, centre. Parts of an atom are proton neutron and electron.
4. No, the paper clip is not useable. A broken up atom would not be useable as an atom.
5. An atom of gold/aluminium.
6. We can't use our hands to tear pieces that small.
7. Yes.
8. We need to use a very powerful microscope.
9. Yes.
10. No.

Note: This resource can be downloaded as part of a collection of activities exploring atoms and nanochemistry (https://rsc.li/37302Bh) or for use with a lesson plan on matter, elements and atoms for 11–14 year olds (https://rsc.li/32yJ6Qu).