

Questacon at HOME

Activity sheet

Static Electricity – Flying Squid

Background

Have you ever zapped yourself, or a friend, or your pet? That zap is a tiny version of the same thing as lightning! Zaps like these, big and small, happen when you build up a lot of *positive (+)* or *negative (-)* charge in one object compared to another, like between your finger and your friend, or a skyscraper and the sky. The *positive* and *negative* charges are attracted to each other and want to move towards each other so that there is no difference in charge between them. Another way to say this is: opposites attract! The reverse of this is also true, like charges push each other away. In this activity, we are going to look at just how much like charges can repel each other, even to the point of levitation!

Materials

- Charging rod
 - PVC pipe or a long balloon (like those for making balloon animals)
- Charging fabric
 - Wool or silk, ideally
 - Otherwise, rayon or polyester should work
- Thing to be levitated
 - Plastic twine or a plastic bag

Safety

Just in case you do create a zap during these experiments, don't do them near any flammable liquids or gases.

Supervision is recommended at all times for young experimenters.

Procedure

Create your squid: Cut a 15 cm long section of twine and tie one end into a knot. Pull the strands apart from the other end, so that it looks like lots of little strings tied together at the knot. Alternatively, if using a plastic bag, cut out a roughly circular piece of your bag (about 20 cm across) and cut some tentacle strips.

Charge up your squid: Lay your twine (or plastic) flat on a surface and rub with the fabric about 10 times - don't move it. Next, rub the charging rod with your fabric about 10 times - don't put it down.

Make it fly: Throw the twine into the air and try to quickly hold your charging rod underneath it without touching it. Your squid should be hovering right above your rod!



Tips & Tricks

- The flying squid can be tricky, so don't give up if it doesn't work on the first few tries! If the rod and string are not charging, try rubbing with the cloth for longer or try another material (e.g. wool)
- Can you have somebody else hand you a second, charged rod and hold the squid or fish in the air for longer?

Science is all about curiosity! If you don't know the answer– that's okay! Find out where can you find more information and even learn something.

What's the Science?

Everything is made of tiny, tiny particles called atoms. At the very centre of every atom is a positively charged nucleus. Negatively charged electrons are attracted to this positive charge, and spin around it. If the amount of positive and negative charge in an atom are balanced, we say that the atom is neutral. If there are too many electrons then we say the atom is negatively charged, if there are too few, we say it is positively charged.

Some materials find it easier to lose electrons, while others can gain them more easily. In our case, the material in our charging fabric can lose electrons more easily, while the plastics in our rod and string can gain electrons more easily. This means that when we rub the fabric on the rod and string, the rod and string both steal electrons from the fabric! This makes the rod and string negatively charged, and leaves the fabric positively charged.

The attractive and repulsive forces of electric fields like these are what allow tiny atoms to join together into larger and larger structures, like building blocks, to make up everything you can see around you!

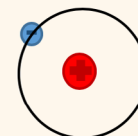
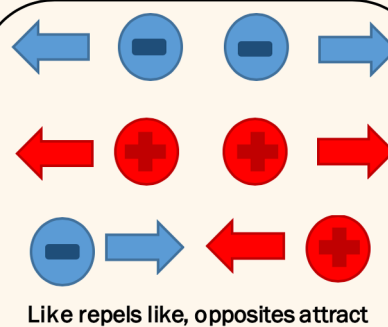
What questions should I ask?

- Why don't the strands of string want to touch each other?
- Where did the charge in the rod and string come from?
- Are the rod and string attracted to you? Why, or why not?
- How do the rod and string lose their charge?

What's next?

Can challenge: Place an empty aluminium can (like a soft drink can) on its side and place a charged rod near it. What happens?

Water challenge: Turn on a tap and form the smallest steady stream of water you can. Place your charged rod near it. What happens?



A simple (hydrogen) atom

