Professor Brainstorm's
Exploding Pringles

Safety First

Be careful where you do this experiment. Make sure you place the crisp tube on a surface which will not get damaged if any of the chemicals spill. (In particular, do not do the experiment in a room with carpets on the floor.)

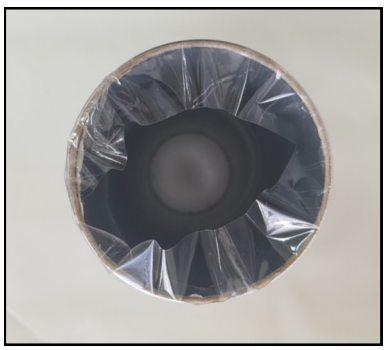
If the crisp tube lid does not 'pop' off, leave it for a minute or so before approaching the container. And prise the lid off very carefully (making sure that the lid is not pointing at your face - or anyone else's face.)

About this Activity
(Information for Parents and Teachers)

This is an experiment about Chemical Change (resulting in the formation of new materials) - and so is most suitable for children in Years 5 & 6 - but younger children will enjoy it too!

What you Need

- A crisp tube - Pringles or similar
- Vinegar - either brown or clear (distilled) Malt Vinegar is fine
- Bicarbonate of Soda
- Wide sticky tape - approx 50mm wide - either clear tape or brown parcel tape



How to make your Pringles Explode

(You can watch a video of how to do this experiment on Professor Brainstorm's YouTube channel - search for 'Professor Brainstorm Science')

First of all you need to modify the crisp tube a little. You will probably find that the lid of the tube comes off quite easily. In order to make it 'pop' you need to make an airtight seal. You can do this as follows:

1. First remove the lid from the crisp tube.
2. Attach the wide sticky tape to the top of the crisp tube - so that approximately half of the tape is protruding beyond the top of the tube. (See photo at top left.)
3. Take the tape all the way around the tube - and then fold the protruding part down into the middle of the tube. (See photo at bottom left.)
4. Repeat this another 3 times. (So you now have 4 layers of tape around the top of the tube.)
5. When you press the lid back on to the crisp tube you should now feel that it is a much tighter fit.

(Note - the more layers of tape you put around the tube, the more pressure is needed to push the lid off - and so the louder the 'pop' will be! But if you use too many layers the experiment might not generate enough pressure to push the lid off at all. So try it first with 4 layers of tape. You can add 1 or 2 more layers later if you wish - up to a maximum of 6 layers.)

How to make your Pringles Explode (continued)

Now we are ready to do the fun bit!

1. Put the crisp tube on a solid level surface. (Make sure you read the Safety First message again as a guide to finding a suitable place to do your experiment.)
2. Pour about 80-100ml of vinegar into the crisp tube. (For a 'standard' bottle of vinegar this is about 1/6th of the bottle. Or enough to fill the crisp tube to a depth of about 3cm)
3. Make sure you have the lid of the crisp tube ready.
4. Put two generous teaspoons of bicarbonate of soda into the vinegar. Straightaway you will hear it starting to fizz - and you may see some 'foam' bubbling up the tube.
5. Press the lid on to the crisp tube firmly - and quickly stand back.
6. After a few seconds the lid should 'pop' up into the air*.
7. Put the lid back on - and it may explode again. (You can do this several times if you are quick!)

* If the lid does not 'pop' off straightaway, leave it for a minute or so before approaching the container - and prise the lid off very carefully (making sure that the lid is not pointing at your face - or anyone else's face.)

How does it work? (This is the science bit)

- Vinegar is a type of **acid**, which chemists call acetic acid. (It isn't a very strong acid - unlike the acid in a car battery - or the type of acid that an evil genius might use in a deadly weapon! But it is still an acid.)
- On the other hand bicarbonate of soda is a type of material called a **base**.
- When you mix together an acid and a base you get a **chemical reaction** - and a gas is produced. (In this experiment that gas that is produced is called **carbon dioxide**.)
- The 'fizz' sound that you heard when you added the bicarbonate of soda is added to the vinegar is just the sound of the bubbles of carbon dioxide gas escaping from the liquid. (Fizzy drinks also make a fizzing sound due to bubbles of carbon dioxide gas escaping from the liquid. But in this case it is not a chemical reaction which produces the gas. The carbon dioxide is already present in the drink. Before you open the a bottle of fizzy drink, the gas is dissolved in the liquid because of the pressure in the bottle. When you open the bottle, this releases the pressure, allowing bubbles of carbon dioxide to escape.)
- When you put the lid on the crisp tube, the carbon dioxide gas is trapped inside the tube. As the chemicals continue to react, they produce more and more carbon dioxide - and so the **pressure** in the crisp tube increases.
- After a few seconds, there is so much gas (i.e. so much pressure) in the crisp tube, that is pushes the lid off.

Did you know ...

- A similar chemical reaction occurs when you bake a cake. Of course, you don't put vinegar in your cake mixture - that would make the cake taste revolting!
- Instead, we put something called Baking Powder in our cake mixture. (If you use Self-Raising Flour instead of Plain Flour, this already has the baking powder mixed in.)
- Baking powder is a mixture of bicarbonate of soda with a powdered acid. When you add water (or other liquids such as milk or a raw egg), the chemicals in the baking powder become activated - and start to react to form carbon dioxide. (However, the reaction is not nearly as vigorous as in our experiment, so the gas is produced much more slowly. There is no danger of your cake exploding!)
- As the cake cooks, the carbon dioxide forms lots of bubbles of gas inside the cake mixture - making the cake nice and light.

