EASY SCIENCE

A BAGFUL OF BUBBLES

Soap bubbles are really fun, especially if you use unusual objects as bubble blowers. Buy or order a bottle of special, strong soap bubble mix from a science shop such as *Experilab* or *Breinwave*. You can experiment with the bubble solution recipe on page 16, but we have not found anything that works quite as well as the bought mixture. If you do have a successful formula, please let us know.

You will need:

- Bubble solution
- Plastic straws
- Shallow baking pan or tray
- Plastic strawberry basket
- Plastic funnel
- Pipe cleaners, or a few lengths of wire and knitting wool
- Coat hanger
- Heavy string
- Toy car
- Pie pan

BUBBLE BLOWERS

Straws and funnels

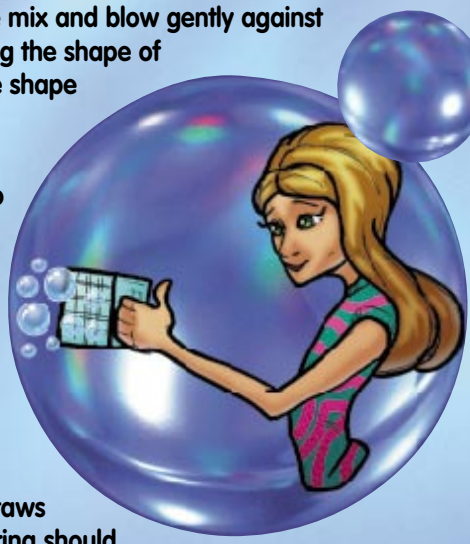
Dip one end of a straw into the bubble solution. Remove the straw and slowly blow into the other end to make a bubble. Try using fat and skinny straws, and straws of different lengths. What kind of straw makes the best bubble blower? Can you blow narrow, long bubbles through a straw? Do they stay this way?

Now dip the wide end of a funnel into the solution and blow through the small end. What kind of bubble can you produce?

Wet part of a washable table-top with your bubble solution. Holding the funnel straight down, blow a big bubble right onto the table. Watch the shape it takes. Now wet a toy car thoroughly in the bubble solution and see if you can make it run through the bubble. It may take some practice, but it is possible!

Pipe cleaners

Bend pipe cleaners (or lengths of wire covered in knitting wool) into different shapes like circles, triangles, or squares. Make sure to leave the end of the pipe cleaner to use as a handle. Dip the loop into the bubble mix and blow gently against the soap film. Does changing the shape of the pipe cleaner change the shape of the bubble?



Strawberry baskets

Dip a strawberry basket into the bubble mix, and then whirl it through the air. How many bubbles does it make? What shape and size are the bubbles?

Giant bubbles

One way to make a giant bubble is to run a piece of heavy string through two straws and tie it into a loop. The string should be about six times the length of one of the straws. Dip the loop into a large pan of bubble mix to cover it with soap film. Holding a straw in each hand, swing the frame through the air. Give the straws a twist in opposite directions to release the bubble. This takes practice! The bubble might not take on a round shape immediately. Why do think this happens?

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SAASTA

Did you know?

- The film of a soap bubble is one of the thinnest things that you can see without using a magnifying glass or microscope. It is about 5 000 times thinner than one of the hairs on your head. It is thinner than even a spider's web or a flu germ!
- A free-floating bubble is shaped like a ball or a sphere, no matter what the shape of the object or hole from which you blow. Soap film will always cover the smallest area possible, and a ball or sphere is the smallest shape for the amount of space it contains inside.
- What's inside a bubble? Bubbles contain some kind of gas. Most soap bubbles have ordinary air inside. The bubbles that you blow contain more carbon dioxide, which is a gas you exhale when you breathe. The bubbles in a carbonated drink are filled with carbon dioxide. The bubbles in a pot of boiling water are filled with water vapour or steam.
- The colours of a soap bubble come from the reflection of a light source such as the Sun or a light bulb. Light is separated into different colours when it bounces off a soap bubble, just as when it passes through a prism.
- The colours of a soap bubble keep on changing. The colours we see on a bubble depend on the thickness of the bubble film. Because gravity pulls the molecules in a soap film downwards, the soap film at the top gets thinner and thinner while the film at the bottom gets thicker and thicker. The colours you see change as the thickness of the soap bubble changes.

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If you have a large enough pan of bubble solution, you can use a wire coat hanger to make a really large bubble. Use the hook of the hanger as handle and dip the frame of the hanger into the bubble mix to cover it with soap film. Hold the hanger away from your body and move it slowly through the air. Twist it a bit to release the bubble. Does the size of the bubble change if you move the hanger faster through the air? What happens if you move the hanger farther before releasing the bubble?

Double bubbles

Bubbles like wet things. A straw dipped in bubble mix can poke through a bubble without popping it because the molecules of bubble mix on the straw will join together with the molecules of the soap film. You can use this idea to blow one bubble inside another.

Use a straw and double strength bubble mix to blow a bubble in the middle of a pie pan. Remove the straw. Now dip the end of the straw into some bubble mix and carefully push it through the bubble until it touches the bubble mix in the pan. Slowly blow another bubble inside the first. Your inside bubble will be smaller, but see how big you can make it before it joins the outer bubble.

Inside a bubble!

You will need:

- 8 - 10 cups of bubble solution
- A blow-up pool or large washtub
- Hula hoop
- String (about 2 metres)

Can you imagine what it would be like to be inside a giant soap bubble? With a little effort and help from friends, you can find out!

Pour 8 - 10 cups of bubble solution into a child's blow-up pool or a large washtub. Tie four pieces of string (each about 45 cm long) to a hula hoop so they are fairly evenly spaced around the hoop. Pour about 2,5 cm of bubble mix into the pool and lay the hoop in the middle of the pool. Stand bare-footed in the centre of the hoop. Ask an adult and a friend to stand on either side of the pool and hold two strings of the hula hoop. Let them slowly raise the hoop straight up until it is higher than your head. You should be enclosed in soap film!

You may need to try several times before you are successful. The entire hoop and strings should be wet with bubble mix. If the soap film keeps breaking, try adding more detergent to the solution.

BUBBLE SOLUTION RECIPE

A bubble solution works best if it is made a few days ahead of time. Mix 4 parts of water (distilled water works best) to 1 part of thick dishwashing liquid. For example, measure out 2 cups of water and add 1/2 cup of detergent. Stir gently. Add about 1 teaspoon of sugar to the solution. Now try to blow a bubble. Dip a straw into one end of the solution, remove it, and slowly blow on the other end of the straw. Dip your finger into the solution and poke at the bubble you have just blown. If it doesn't burst, your bubble solution is good. If it bursts, you might want to add some more dishwashing liquid. Store the solution to in a closed container to keep it from drying out.

Science wizards show their wares

About 700 participants from primary and secondary schools competed in the national finals of the Eskom Expo for Young Scientists this year. The 460 projects exhibited were selected from ones entered in 27 regional expositions that took place around South Africa earlier in the year.

Parents, teachers, friends and boffins gathered at the University of Pretoria, where the finalists showcased their projects. Participants from Nigeria, Zambia and Zimbabwe added an international flavour to the event.

Primary school learners were well represented among the gold medal winners and other worthy entries. Here are a few of them.

1. Zurien van der Merwe of Laerskool Hennopspark (Gauteng) won gold for her project on the one-day fly and its role as bio-indicator in water quality.

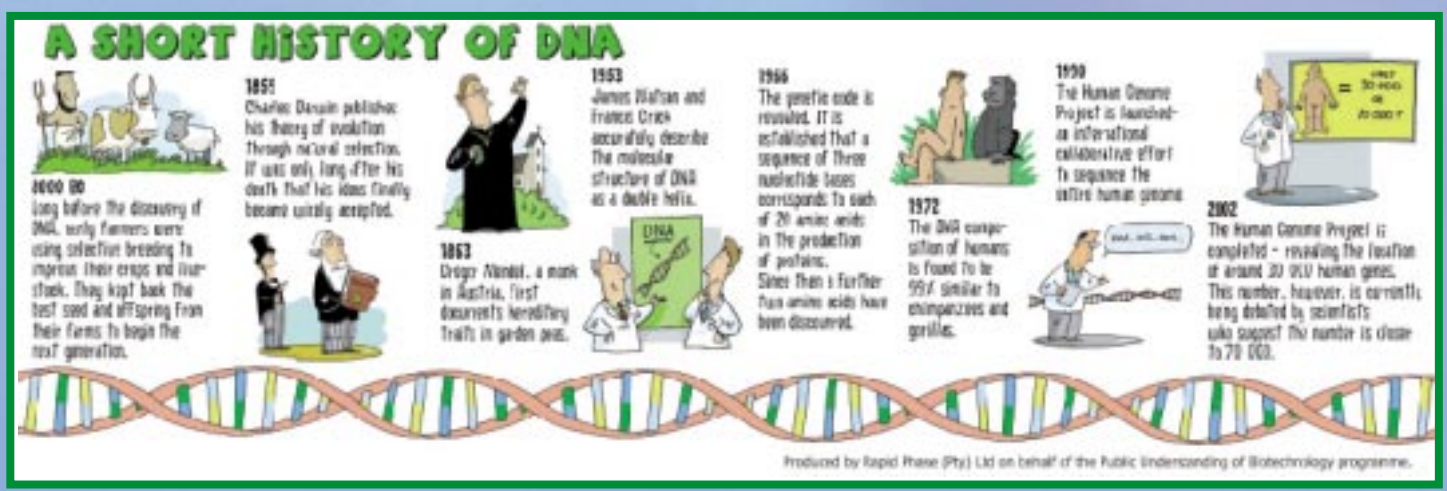
4. Anel Jansen van Vuuren and Faheema Ebrahamof Selly Park Convent in Rustenburg did research into the best container for keeping a cup of coffee hot.

2. Louis van Biljon of Laerskool Menlopark has a clever idea for preventing nasty bee stings when one enjoys a cold drink from a can.

5. Amanthi Weerasingh of the Diocesan School for Girls (Namibia) won gold for her research into aluminium.

3. Mahadi Makwanazi and Litsesana Mopeli of Sentinel Primary (Free State) entered a project on the magic touch of garlic. They received a gold medal for their clever idea.

6. Jean Basson and Jaco de Jager of Suiderhof Primary School (Namibia) built a working solar oven.



BioTECH

Extract DNA from wheatgerm

This experiment will allow you to extract one of the building blocks of life – isolated DNA – from plant cells. Although each DNA molecule is too small to see, if you follow the instructions, you will end up with visible DNA.

You will need:

- A cup of wheatgerm (from health shops or some grocery stores)
- Table salt
- Clear alcohol (cane spirit, gin or rubbing alcohol from the chemist)
- Green dishwashing liquid (not the gel type)
- Lemon juice (fresh or bottled)
- Two glass bottles or large glasses
- A sieve or strainer
- Clean water

Break down the cell walls of the wheatgerm

In a large glass, dissolve one level tablespoon of salt in 300 ml of tap water. Add four squirts of lemon juice. Now add half a cup of wheatgerm to the solution and stir gently for 15 minutes. The lemon juice will break down the cell walls of the wheatgerm. Press this mixture through the sieve and discard the liquid. You will be left with a soggy pulp. Do the same for the other half a cup of wheatgerm. The pulp you now have contains the cell contents without the cell walls.

Dissolve the DNA

Put one level tablespoon of salt in 300 ml of water, stir the mixture until the salt is dissolved and add six teaspoons of alcohol. Add nine large drops of the washing-up liquid and stir gently. Add the soggy pulp from step one and stir it gently for about 20 minutes. During this period, the detergent in the washing-up liquid will dissolve the DNA into the mixture. Now add about 10 level teaspoons of salt and stir gently for 10 minutes.

Separate the DNA solution from the mixture

This step is easy. Just let the mixture stand and allow the solids to settle out. Then gently pour the liquid into another glass, until it is about a quarter full. Take care that the solids do not mix with the solution. The solution in the new glass now contains the DNA in a dissolved form.

Extract the dissolved DNA from the solution

Take the quarter-filled glass, fill it up with alcohol and stir very gently. As you stir, you will notice that the DNA precipitates out as very fine white threads. You can leave this mixture to further allow the DNA to settle. Gently pour the liquid off and ... there you have DNA!

DNA fact file

By: Professor Valery Corfield

- DNA stands for deoxyribonucleic acid.
- It is a chemical substance made from building blocks that form long, thin strings.
- The DNA strings, called molecules, are packed very tightly into the nucleus of cells.
- The DNA molecules twist around each other and form a spiral ladder – the DNA double helix.
- DNA double helixes are organised into 23 pairs of chromosomes in every cell in your body.
- This set of chromosomes is the instruction manual to make YOU.
- Each different instruction is called a gene.
- The gene instructions are written in a DNA code – the genetic code.
- New coded copies are made when the DNA double helix unzips down the middle.

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