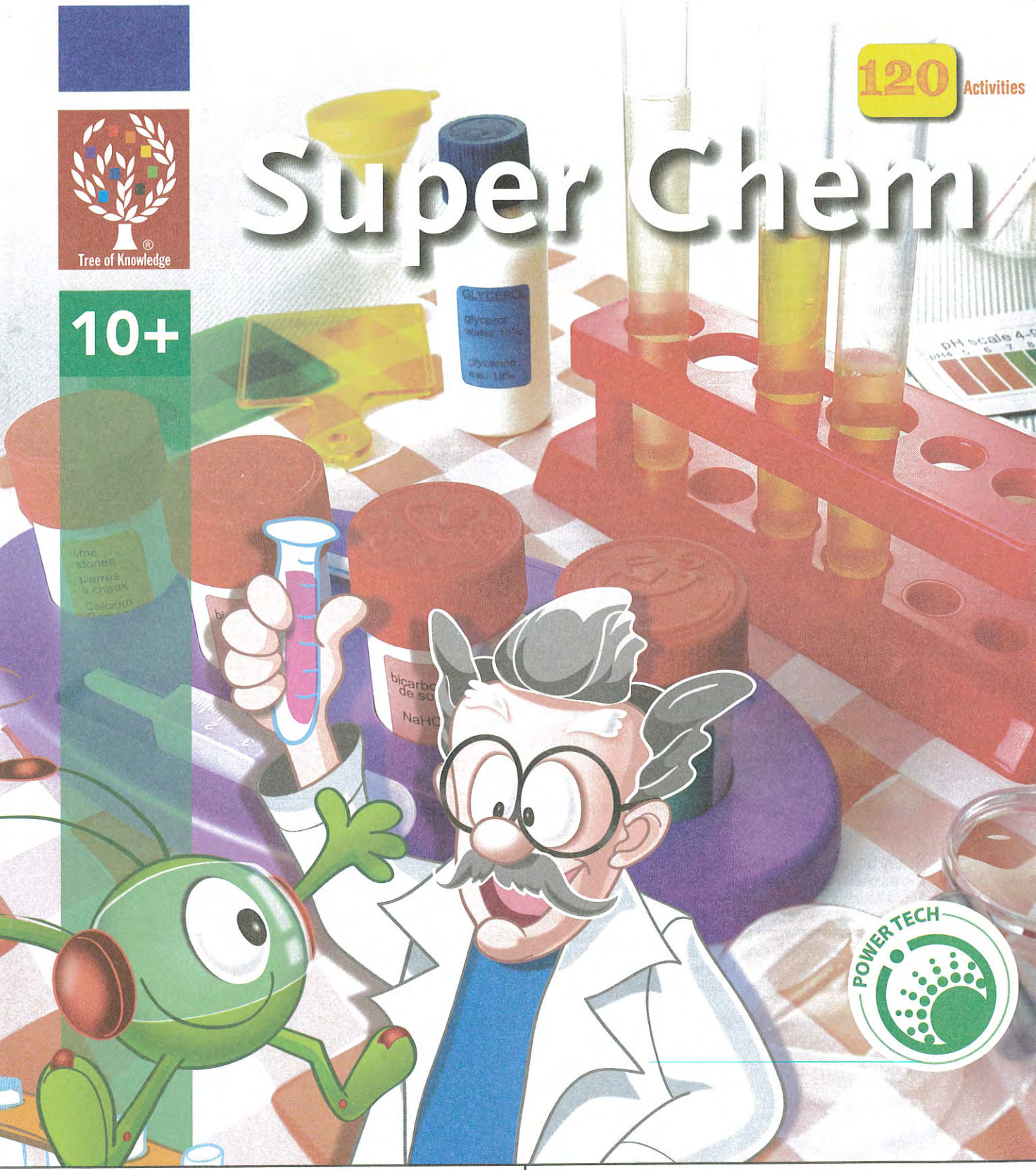
Tree of Knowledge

10+

120 Activities

Super Chem



POWERTECH

WARNING! Only for use by children over 10 years old. To be used solely under the strict supervision of adults that have studied the precautions given in the experimental set. Contains some chemicals which are classified a safety hazard. Read the instructions before use, follow them and keep them for reference. Do not allow chemicals to come into contact with any part of the body, particularly mouth and eyes. Keep small children and animals away from experiments. Store the chemistry set out of reach of small children. Eye protection for supervising adults is not included.

WARNING: **CHOKING HAZARD** - Children under 8 years can choke or suffocate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons from children. Discard broken balloons at once. Made of natural rubber latex. Zum Aufblasen eine Pumpe verwenden. (Use a pump to inflate the balloon.) This product contains small magnets. Swallowed magnets can stick together across intestines causing serious injuries. Seek immediate medical attention if magnets are swallowed or inhaled. Not suitable for children under 8 years.

General first aid information

In case of eye contact: Wash out eye with plenty of water, holding eye open if necessary. Seek immediate medical advice.
If swallowed: Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.
In case of inhalation: Remove person to fresh air.
In case of skin contact and burns: Wash affected area with plenty of water for 5 minutes.
In case of doubt seek medical advice without delay. Take the chemical together with the container with you.
In case of injury always seek medical advice.

Record the telephone number of your local hospital (or local poison centr) in the box below.

(white the number in NOW so you do not have to search for it in an emergency)

Telephone Local Hospital:

Take Chemical with you to the hospital

Advice for supervising adults

- Read and follow these instructions, the safety rules and the first aid information, and keep for reference.
- The incorrect use of chemicals can cause injury and damage to health. Only carry out those activities which are listed in the instructions.
- This chemical set is for use only of children over 10 years of age.
- Because children's abilities vary so much, even within age groups, supervising adults should exrcise discretion as to which experiments are suitable and safe for them. The instructions should enable supervisors to assess any experiment to establish its suitability for a particular child.
- The supervising adult should discuss the warnings and safety information with the child or children before commencing the experiments. Particular attention should be paid to the safe handling of acids, alkalies and flammable liquids.
- The area surrounding the experiment should be kept clear of any obstruction and away from the storage of food. It should be well lit and ventilated and close to a water supply. A solid table with a heat resistant top should top should be provided.

The Safety Rules

DO read these instructions before use, follow them and keep them for reference.
DO keep young children, animals and those not wearing eye protection away from the experimental area.
DO always wear eye protection.
DO store experimental sets out of reach of young children.
DO clean all equipment after use.
DO make sure that all containers are fully closed and properly stored after use.
DO wash hands after carrying out experiments.
DO NOT use any equipment which has not been supplied with the set.
DO NOT eat, drink or smoke in the experimental area.
DO NOT allow chemicals to come into contact with the eyes or mouth. Disposal of chemicals should be in accor dance with local regulations.

Safety Goggles User Information

Instructions for use, storage & maintenance

- Hold the goggles with one hand, if possible without touching the lens.
- Pull the elastic over the back of your head, just above the ears so that the goggles sit on your forehead. Then pull the goggles down over your eyes carefully and adjust strap for a snug and comfortable fit. Ensure the goggles are kept clean and dry and cannot come into contact with loose chemicals or sharp objects.
- Wash and allow to dry after use. Wash with warm soapy water and soft cloth (not to be placed in dishwasher).
- **These Safety Goggles are only to be used with the contents and instructions supplied.**
- If goggles become damaged, do not attempt to repair; please discard.

NOTE: Eye protectors/goggles only protect against high-speed particles at room temperature.

INTRODUCTION

Super Chem introduces you to simple Chemistry using everyday food products such as salt, vinegar, sugar,baking powder etc. You don't need a sophisticated laboratory, the kitchen has many hidden surpriseswhich are waiting to be discovered. With permission, use your kitchen as a laboratory. It is possible that many chemists started experimenting in the kitchen. We all know and love the delicious smells that come from the kitchen, when Grandma's cake is cooking, Mums bread is baking, or Dads quiche is in the oven. All the known smells and tastes are products of a combination of chemicals reacting together when heated or cooled.
This kit will give you hours of pleasure as well as moments of delight. Amongst the things you can prepare there is a special formula for making giant soap bubbles. You can make your own soap as well as jelly sculptures. Grow crystals, make yogurt, cheese, and icecream as well as many other interesting experiments.
In addition to discovering secrets of the kitchen you may turn to creating an indoor garden and discovering how plants depend on chemicals and react to light and the atmosphere. Only if you observe very carefully, will you notice the subtle changes that each day brings. Ordinary plants, that we take for granted, go through a fascinating chemical process every minute of the day, to keep them healthy, green and colorful. Super Chem 100 activities – gives you the opportunity to experience everyday events, and so become familiar with the world of Chemistry.

For the Supervising Adult.
To help your child enjoy this kit, there are several things we would like to suggest.
There are many experiments that need everyday household materials. So that the experiments can be carried out without disturbing the everyday running of the kitchen, we suggest you prepare the following materials in marked bottles or jars for the sole use of the child: salt, 1/2 litre of vinegar, 1/2 litre of house hold liquid soap, sugar and food colorings. It is also advisable to give the child 2 or 3 jars for the preparation of food products.

Some experiments need to be carried out under especially clean conditions, the same as you would use when preparing food – these are marked with an icon:

There are experiments that need adult supervision, these are marked with an icon:

In some experiments, it is very important to throw away all the substances after finishing the activities. These experiments are marked with the icon:

SAFETY MEASURES

* Only for children over 10 years and under supervision of an adult
* Read instructions before use: follow them and keep them for reference
* After activity, wash hands. Close and store all chemicals away from young children
* Keep activity area free from obstruction. Non food activity should be kept away from foodstuffs
* Handle carefully hot surfaces
* When using hot liquids, transer them slowly and carefully to glassware
* When refrigeration is required, keep the materials away from foodstuffs
* All measurement are made in millilitres which appear on the beaker and measuring cup

PARTS LIST

1. Tweezers
2. Measuring spoon
3. Funnel
4. Plastic base
5. Bubble construction kit
6. Coloured felt pen
7. 6 plastic straws
8. Plasticine 80 gr
9. Rubber band
10. Glycerol(25ml)
11. Gelatine (food grading)(11g)
12. Sodium hydrogen carbonate(10g)
13. Magnifying glass
14. (2) Measuring cup
15. 1 soap tablets
16. 2 soap molds (plastic)
17. pH indicator paper
18. pH scale chart
19. Instruction manual
20. Plastic tube
21. 2 balloons
22. Dropper
23. Magnet
24. Thermometer
25. Calcium Carbonate(10g)
26. String
27. Test Tube Rack
28. Glass Test Tubes
29. Colour Filters
30. Safety goggles

Using a measuring spoon

Your measuring spoon has two depressions: one very small, one larger.

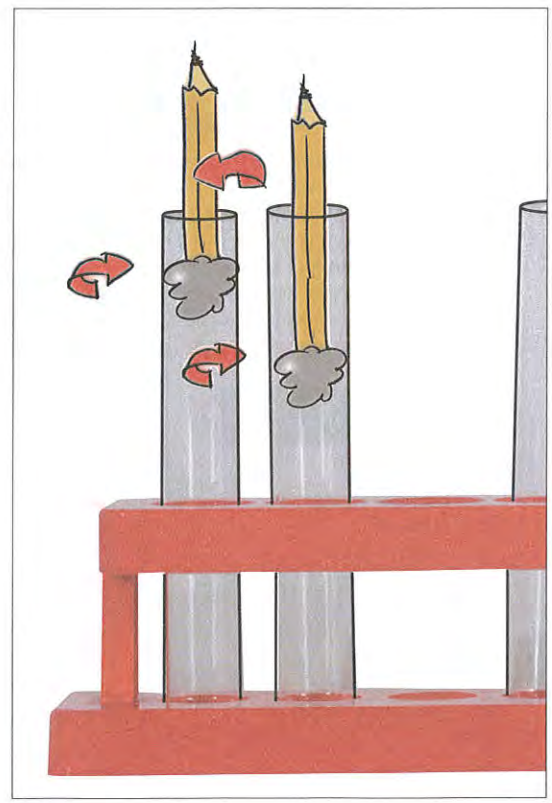
When you read a small measure, we mean that you should use as much material as just fits into the small depression.

If you read "one large measure", or "take five measures", we mean that you should use the larger measure in the same way.

How to clean your test tubes

a small piece of tissue

a pencil



1...Soap bubbles

Discover the fascinating world of soap bubbles; create many different shapes with your bubble construction kit. But first you have to make the basic soap bubble solution.

Prepare the following:

Water
A large container

Dishwashing liquid
Measuring cup
Glycerin

glycerine

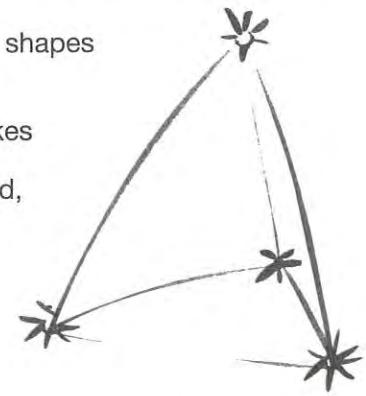
Recipe:

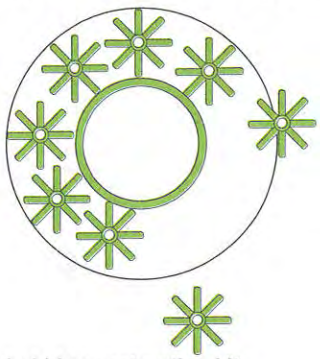
To 5 liters of water add 20ml of glycerin and 200ml of dishwashing liquid.
Stir gently and leave the solution to stand for one day.
If you want to make a smaller quantity, here is the recipe in percentages:
Water: 95.5% Dishwashing liquid: 4% Glycerine: 0.5%
For best results let bubble solution stand for 24 hours. Keep the solution cover and keep it for more experiments that appear later in the book.

2...Make different shaped soap bubbles

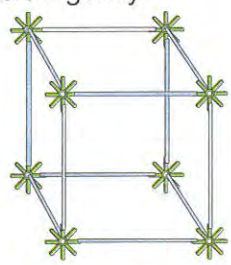
A soap bubble is made from a thin film of soap which is sticky and very elastic.
You may notice that a soap film will sometimes take on different shapes when you dip the frame into the solution again and again. That's because there may be more than one way for the soap film to cover a minimum surface area.

Using your bubble construction kit you can create 2 and 3 dimensional shapes e.g. a cube, a wheel, a pyramid etc.
Cut the straws to the lenght you need.
When you dip your shape into the soap solution see how the bubble takes on the shape you have created .
To make simple bubbles, bend a piece of wire to make a loop at one end, dip into your soap solution and blow gently.





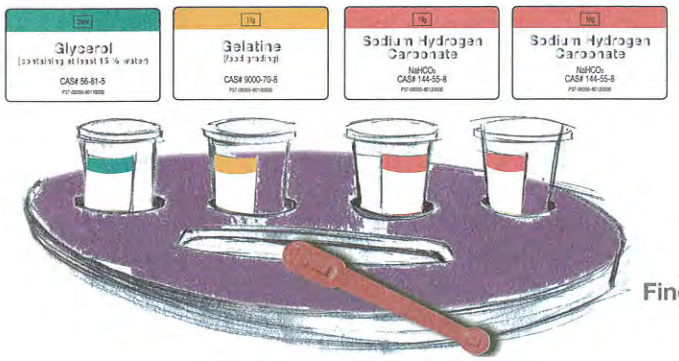
bubble construction kit and straws



pay attention: you can use the center hole of your "stars" to construct more complex shapes, like cubes.

3...Make long lasting bubbles

Bubbles are affected by the weather. They will last much longer in cold wet weather rather than in hot dry weather. The more moisture there is in the air the longer the bubbles will last. You can create a solution with more moisture in it by adding gelatin to your soap bubble solution. Use the same recipe as in **Experiment 1** but add a few drops of gelatin. Compare the time these bubbles last to the original bubbles.



Find gelatine in your kit.

4...Make frozen bubbles

Put a bubble inside the freezer and see what happens.Where does it start to freeze? What happens when the bubble breaks?

5...Try another bubble

Create your own experiments and make different types of bubble.
Add different quantities of glycerin, gelatin and / or cornflour to your soap bubble solution.
Prepare a flat surface: gently place the various bubbles on the flat surface :
(glycerin bubbles, gelatin bubbles, cornflour bubbles)
and record the differences between them.
Observe what happens before the bubbles break

6...Bubble designs

You need:

Soap solution	White paper
Food coloring	Dropper
Flat surface	Plastic straw

Add a few drops of food coloring to your soap bubble solution.
You can use several colours if you want.
Using a straw, blow bubbles onto the surface of the tray
until you have several colourful bubbles.
Now gently lower a piece of white paper onto the bubbles.
Lift the paper and you should have a bubble design. Let the paper dry.

7...Get inside a bubble !

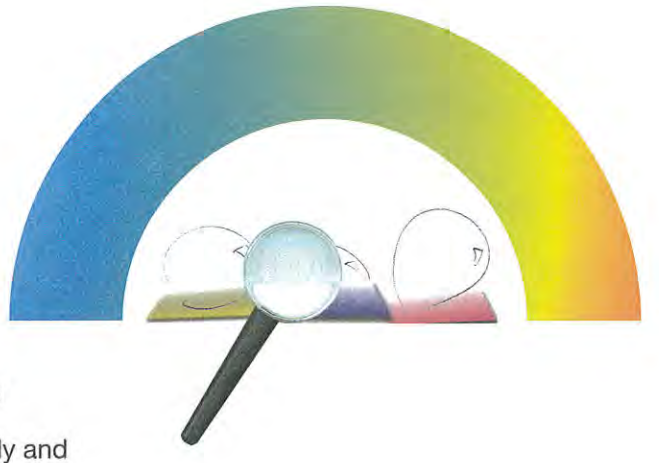
Yes, it is possible to get inside a bubble...but you will need a hoola hoop.
This is how you do it!

Prepare the following:

Soap solution (a lot of it)
Hoola hoop
A very large bowl (larger than the hoola hoop)

You will need help with this experiment.
If you put a lot of bubble solution in the bowl
you can get inside a bubble.
Stand in the middle of the bowl,
place a hoola hoop over your head
and lower it into the soap solution.
Have someone lift the hoola hoop out of the bubble solution
and up over your head.
You see! You are in a bubble!

8...Observing bubbles



Prepare the following:

Bubble solution
Bubble construction kit
Paper
Magnifying glass

Using the bubble construction kit make a bubble and place it on the sheet of paper.
With your magnifying glass observe the bubble closely and see how the colors change all the time.
The wall of a soap bubble is like a sandwich;
a layer of water with a layer of soap film on both sides.Light waves fall onto the bubble and depending on the thickness of the wall of the bubble, different colors are reflected .

9...Acids and Bases

Acids and bases are two very important groups of compounds.
In your home you will find many examples: lemon juice is a common example of an acid, vinegar is another.
A common example of a base is soap, also baking powder.
Would you like to find out which materials at home are acid or base ?

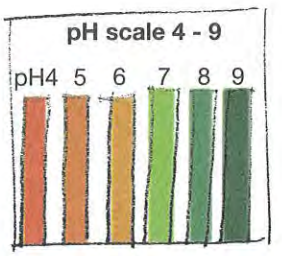
How can you tell what is acid and what is base?
We use a scale for measuring this called a "pH scale"
You will find a printed scale in your kit which covers a range from 4 to 9.
On your scale, number 7 is neither acid or base, it is "neutral"
Numbers 4 to 6 are the values for acids: number 4 is the strongest acid.
Numbers 8 to 9 are the values for bases: number 9 is the strongest base.

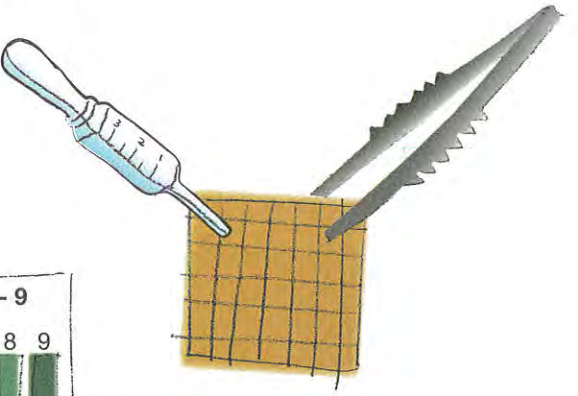
Now look at your pH indicator paper; you will see that it is made up from strips.
Each time you do an experiment, tear off one strip.
Make sure you keep the rest of the paper clean and dry.
Now use your pH scale and pH indicator paper to check the pH value of your tap water at home.

Prepare the following:

dropper
pH indicator paper
pH scale
tweezers
beaker

Put some tap water in your beaker and with your dropper.
Place a drop of water on a small piece of indicator paper. It changes colour when it comes into contact with the water.
Compare the colour on the pH paper to the coloured stripes on the scale: you can now determine the pH of the tap water.
Always handle the pH indicator paper with tweezers, as even the moisture on your fingers can change its colour.



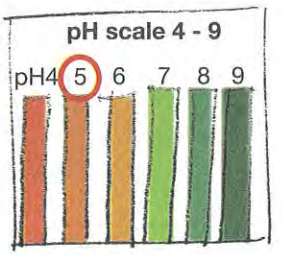


10...What is Acid Rain?

Air pollution produces chemical changes in some of the gases in the atmosphere.
These changes cause the gases to become acidic, and when it rains the gases are washed into our lakes and forests. This acid rain reduces the pH of the soil and the water: living creatures will not be able to survive if their environment is too acidic!
The pH of water should be "7" – neutral;
it may be interesting to check water from various places near you.

Prepare the following:

dropper
pH scale
tweezers
pH indicator paper
empty jam jars
various types of water



Collect as many different samples of water as you can: tap water, rain water, water from an aquarium,
from a lake, from the ocean, mineral water (soda) etc....
You can also check an ice cube and steam from boiling water, but be careful!
Check the pH of each type of water.
If the pH of rain water reaches "5" it is considered to be acid rain.

11...More tests for acid and base

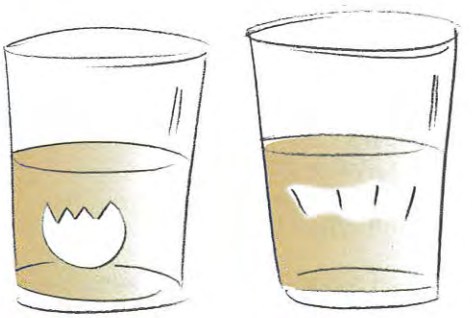
Check the pH of some common household substances: vinegar, lemon juice, shampoo, toothpaste, liquid soap etc...

12...Make a acid/base observation chart

By now you have checked the pH of several materials; record your results on the observation chart. Keep adding your results to the chart as you do more experiments.

observation chart (sample)	pH values	acid	base

13...Make eggshells disappear



Prepare the following:

beaker
vinegar
eggshells

Put some eggshells in your beaker and cover them with vinegar. Leave the experiment for 2 days. Where are the eggshells? They have disappeared !
Eggshells contain calcium, which dissolves in an acid substance such as vinegar.

14...Can you remove an egg's shell without touching it?

Prepare the following:

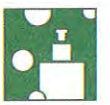
beaker
vinegar
uncooked egg

Place an uncooked egg in a beaker and cover with vinegar. Leave it for two days.
What has happened? You have removed the egg's shell by dissolving it in the vinegar.
Only the inner skin is left!
Hold the egg over a tray and drop it gently. Does it bounce?

before

after 2 days...
the eggshell disappears
and...

15...What about a uncooked egg...?

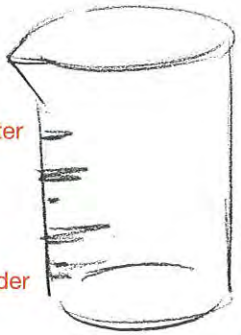


Prepare the following:

beaker
vinegar
hardboiled egg

Place the hardboiled egg in a beaker and cover with vinegar.
Leave it for two days.
What has happened this time?
Did you notice any differences between the experiment with the hardboiled egg and the raw egg?

16...What happens if you mix acid and base solutions?



Prepare the following:

vinegar
sodium hydrogen
carbonate (baking powder)
beaker
1 cup
dropper
measuring cup
measuring spoon

Using your measuring cup measure 5 cc of baking powder and place in the empty cup. Measure 30 cc of water in your beaker, add to the baking powder and mix well.
You have now a baking powder solution.
Place 15 drops of vinegar into your beaker.
Add 15 drops of baking powder solution
to the beaker and gently swirl the beaker to mix the two solutions.
What do you see?
Slowly add more vinegar, drop by drop, until the fizzing stops.
Swirl the beaker after each drop.

Now check the pH of the solution. Record the result on your chart.

A chemical reaction takes place when two or more substances are mixed to form a completely new substance.
The "fizzing" stopped once the chemical reaction was completed.

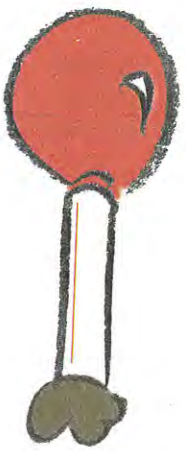
Choose two more substances - one acid, one base, and repeat the experiment.

17...Balloon trick

See how a chemical reaction can inflate a balloon.

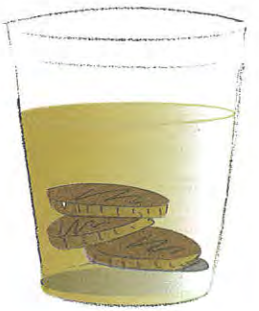
Prepare the following:

balloon
vinegar
baking powder
measuring spoon
dropper
plastic tube
plasticine
funnel



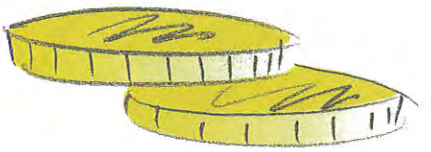
Insert half of the plastic tube into the neck of the balloon.
Insert the funnel into the open end of the plastic tube and using your measuring spoon drop a "large" measure of baking powder through the funnel into the balloon.
Add a few drops of vinegar into the balloon and close the open end of the plastic tube with a little piece of plasticine. What happens to the balloon?

18...Cleaning old coins



Prepare the following:

beaker
tweezers
measuring cup
salt vinegar
old "dull-looking" coins



Using your measuring cup measure 5 mls of salt and place in a cup.
Measure 15mls of vinegar and add to the salt in the cup; mix well.
Place the coins in the solution and leave for two hours. Using the tweezers, remove the coins from the beaker and rinse well with water. What do they look like?
When salt and vinegar are mixed together, hydrochloric acid is formed.
This acid is very often used to clean metallic objects. The coin is made out of a copper metal; after it has been in the salt and vinegar solution it comes out clean and shiny!

19...Cleaning coins with Coca Cola

Try the same experiment, but this time use Coca Cola instead of the salt and vinegar solution. What happens this time?

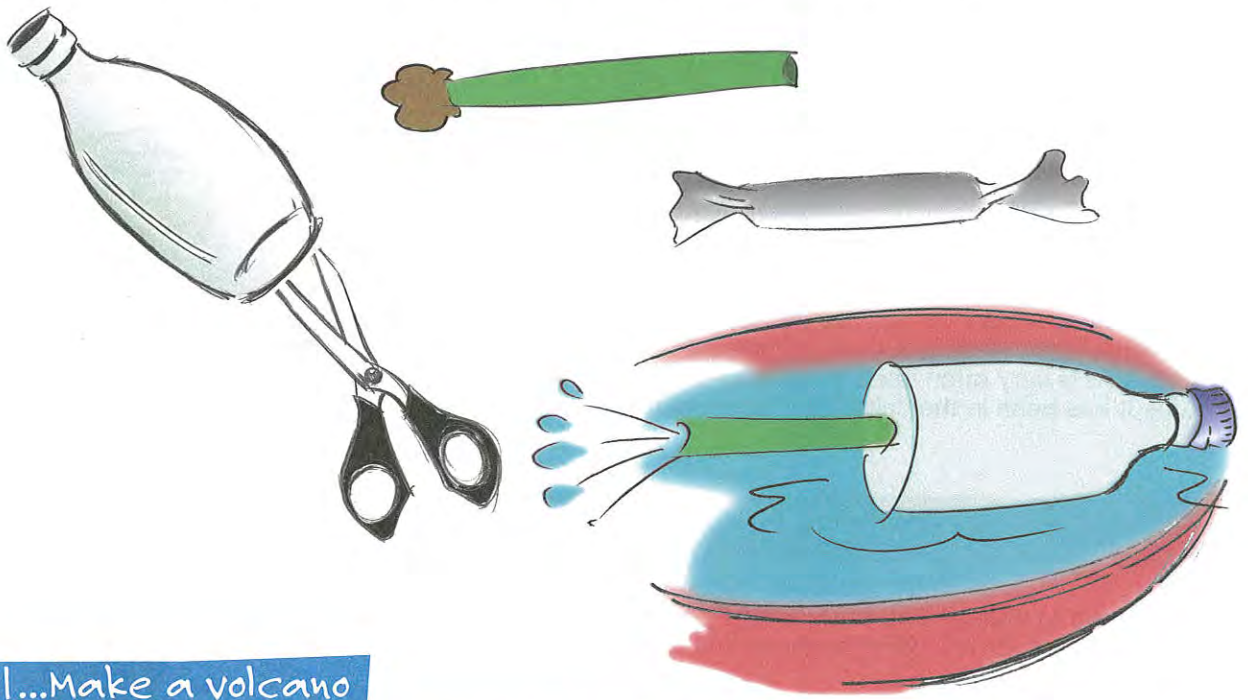
20...Make your own speed boat

Prepare the following:

sodium hydrogen carbonate (baking powder)
vinegar
plastic bottle
paper tissue
plastic drinking straw
plasticine
scissors
measuring cup

Using your scissors, make a small hole in the base of the plastic bottle close to the outer rim.
Push the plastic straw through the hole in the bottle until only about 1 cm sticks out.
Press plasticine round the straw where it enters the bottle to keep it in place.
Shake one measuring cup full of sodium hydrogen carbonate onto the middle of a paper tissue and fold the tissue round the powder to make it look like a christmas cracker.

Pour one measuring cup full of vinegar into the bottle, then push in the paper tissue and close the lid as quickly as you can.
Put the bottle into a bath of water and let go!
The reaction between the vinegar and the sodium hydrogen carbonate creates a gas which escapes through the straw in the bottom of the plastic bottle and pushes the boat forward



21...Make a volcano

Find sodium hydrogen carbonate in your kit.

Prepare the following:

plasticine
food coloring (red)
vinegar
sodium hydrogen
carbonate (baking powder)
measuring spoon
dropper
large plate

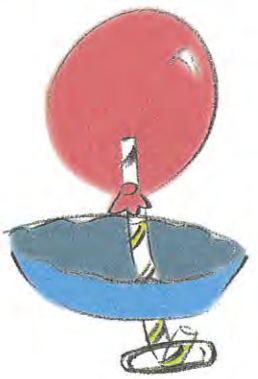
Mold your plasticine into the shape of a volcano and place it on the plate.
Make a small "crater" in the top of the volcano by pressing in with your thumb.
Using your measuring spoon put 1 "large" amount of sodium hydrogen carbonate into the volcano.
Using your dropper, put 2 drops of red food coloring onto the sodium hydrogen carbonate:
add 4 drops of vinegar and wait for the volcanic eruption.!
You caused a chemical reaction between the sodium hydrogen carbonate and the vinegar and the result was " red lava" that bubbled out of the volcano and poured down the sides.

22...Make a "Coca Cola" volcano

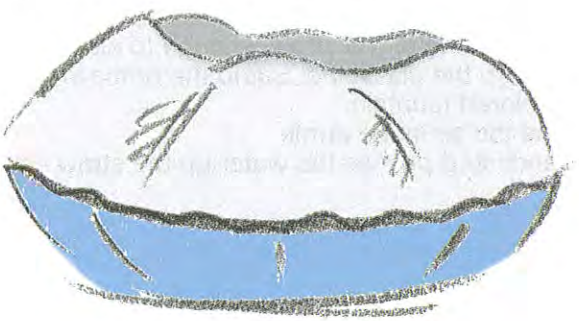
Try the same experiment but this time use Coca Cola instead of vinegar

23...Create a crater and a volcano

Prepare the following:
A large paper plate
Flour
A small balloon
A drinking straw
Paper clip
Sellotape
Old newspaper
Lemon juice
Sodium Bicarbonate (baking powder)
Measuring spoon
Dropper



We suggest that you do this experiment outside. Spread the newspaper on the area where you want to do the experiment. Insert the end of the straw into the neck of the balloon and use the sellotape to close the neck of the balloon firmly round the end of the straw. Now blow up the balloon to a diameter of about 10 cms.
Bend the end 5 cms of the straw up onto itself and catch the two pieces of the straw together with a paper clip.
If the balloon deflates , fasten the sellotape more tightly around the neck of the balloon.
Make a hole in the middle of the paper plate and from the top insert the straw through the hole so that the balloon is resting on the plate.
Cover the balloon completely with flour so that all you can see is a mountain of flour.
Lift the plate up gently and release the paper clip. The balloon will deflate slowly and a crater will be formed.
Now make a volcanic eruption: take your measuring spoon and put one large measure of baking powder into the crater. With your dropper add 5 or 6 drops of fresh lemon juice to the baking powder. The lemon juice reacts with the baking powder and shows you how lava bursts out of the crater at the top of the volcano and pours down the sides.

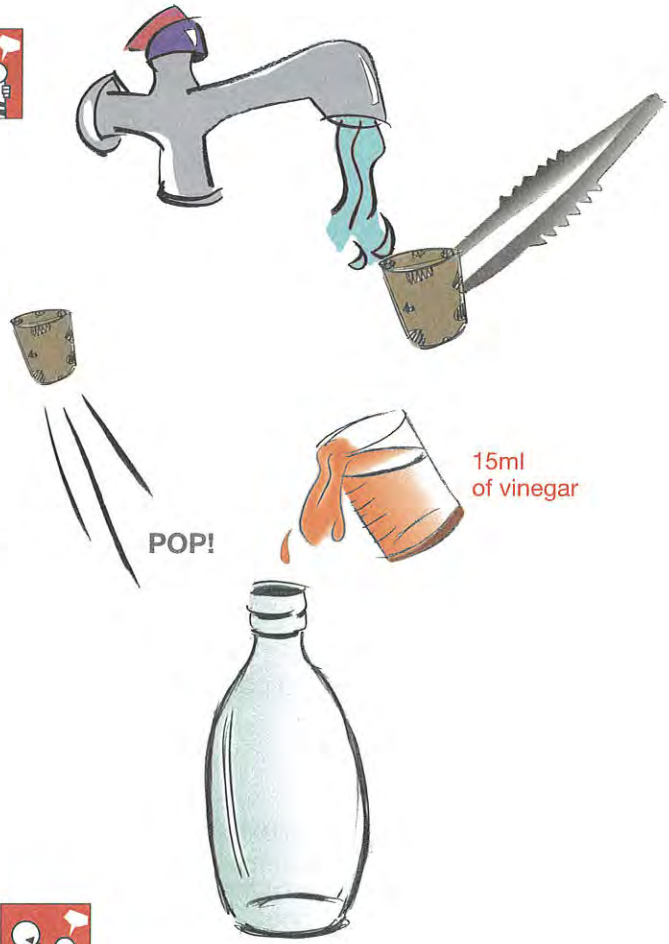


24...Make a gas cannon

Prepare the following:

small glass bottle with a cork
sodium hydrogen carbonate (baking powder)
vinegar
funnel
measuring spoon
measuring cup

Put your funnel into the opening
of the bottle and using yourmeasuring
spoon drop 2 "large" amounts
of sodium hydrogen carbonate into the bottle.
Place the cork in water to make it very wet.
Using your measuring cup pour 10 mls
of vinegar into the bottle
and close the bottle with the wet cork
as quickly as you can.
Stand well away from the bottle
and wait for the cork to pop out!



25...Make a colored geyser

Prepare the following:

small bottle with a screw top
straw
plasticine
pin
food coloring
bowl of hot water
scissors
dropper

Take the top off the bottle and make a hole in it with the scissors, ask an adult to help you with this. Half fill the bottle with cold water and put a few drops of food coloring into the water.
Close the bottle well and push the straw through the hole in the screw top.
Where the straw enters the top, press plasticine round the straw to seal the hole.
Put a small piece of plasticine in the end of the straw, enough to close it and using your pin make a tiny hole all the way through the plasticine. Stand the bottle in a bowl of hot water and wait for your colored fountain.
The hot water in the bowl warms the air in the bottle.
When the air is warmed it expands and pushes the water up the straw and out in a spray.

26...A chemical reaction makes heat

Prepare the following

thermometer
steel wool pad
vinegar
beaker
jar with lid

60 mls of vinegar

steel wool

Place the thermometer inside the jar and close the lid.
Leave it for 5 minutes and then record the temperature.
Measure 60 mls of vinegar into your beaker;
soak one half of the steel wool in the vinegar for 2 minutes.
Wrap the steel wool around the red bulb of the thermometer.
Place the thermometer and the steel wool into the jar and close the lid.
Wait 5 minutes and then record the temperature. Is there a difference in temperature this time?
The vinegar removes any protective coating from the steel wool, allowing
the iron of the steel wool to come into contact with air and so to become rusty.
The heat released by the rusting causes a rise in temperature.

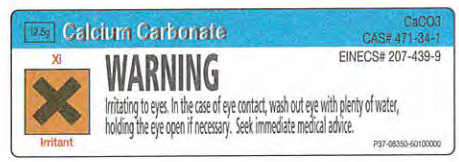
27...Make limestone crystals

Find limestones
in your kit

Prepare the following:

test tube rack
limestone
magnifying glass
vinegar

glass dish
funnel
filter paper
glass test tubes

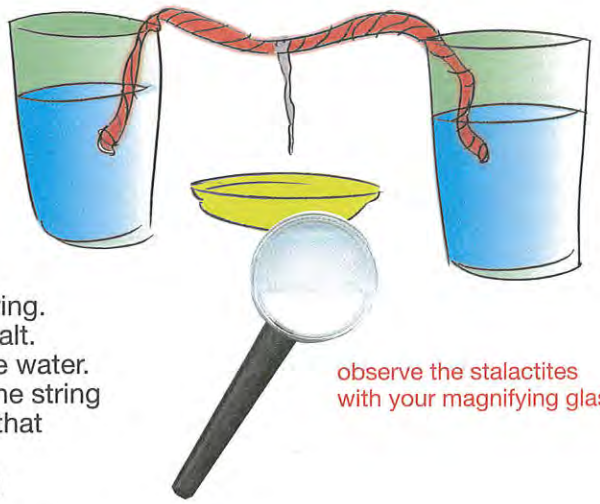


Put some limestone into one of the test tubes
of your kit. Fill the test tube with vinegar and
wait for the limestone to dissolve.
place a small piece of filter paper in the funnel and
pour the solution from the test tube through the funnel
onto the glass dish.
Leave the filtered solution in the dish for a day
or two and see what happens; some really beautiful
crystals will appear.Examine them more closely
with your magnifying glass.

28...Salt stalactites

Prepare the following:

salt
magnifying glass
2 glass jars or plastic beakers
4 lengths of wool each about 30 cm long
hot tap water
dish

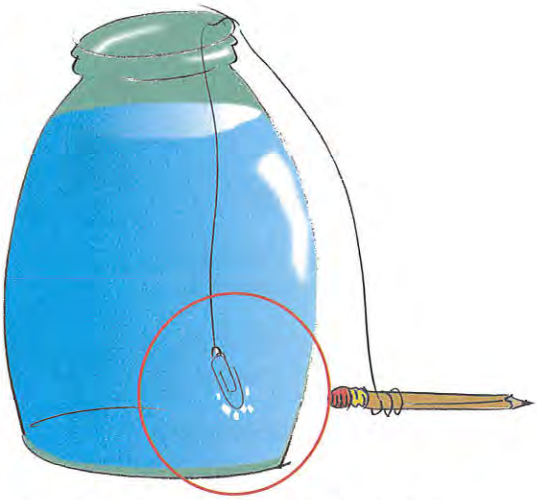


Twist together the lengths of wool to make a thick string.
Fill the two jars with hot tap water and stir in lots of salt.
Keep adding salt until no more salt will dissolve in the water.
Put the dish between the jars and place one end of the string into one jar and the second end into the other jar so that the wool hangs over the dish.
Stalactites are long thin columns of minerals hanging from the roofs of caves.
They form over many centuries as the water drips and deposits the minerals.
In this experiment the salt water from the glasses moves along the string and drips down from the middle
After few days, you will see salty stalactites forming along the center of the string. Examine the stalactites with your magnifying glass.

29...Make salt crystals

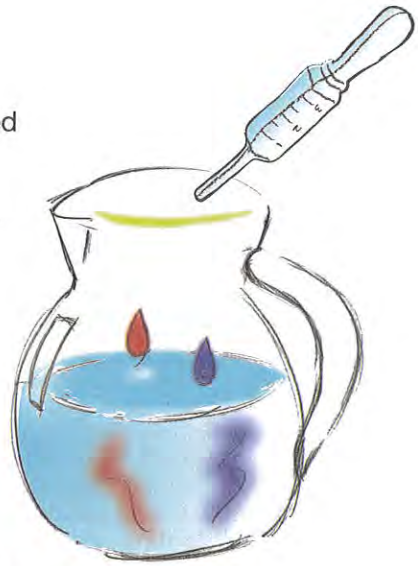
Prepare the following:

glass jar
paper clip
hot water
salt
magnifying glass
pencil
a long piece of string
bowl



Fill up the jar with hot tap water. Put several spoons of salt into the water and stir until it has all disappeared. Add more salt and stir again.
Stand the jar in a bowl of very hot water to keep the water in the jar hot.
Add more salt and stir again. Keep adding salt until no more salt dissolves in the water: you now have a saturated solution. Tie the paper clip to one end of the piece of string.
Tie the other end of the string round a pencil. Now drop the clip into the jar.
The clip must hang in the salt solution without touching the bottom of the jar.
After a few minutes you will see salt crystals on the paper clip.
Look at the crystals with your magnifying glass and see how many different shapes there are.

30.Observing molecular motion



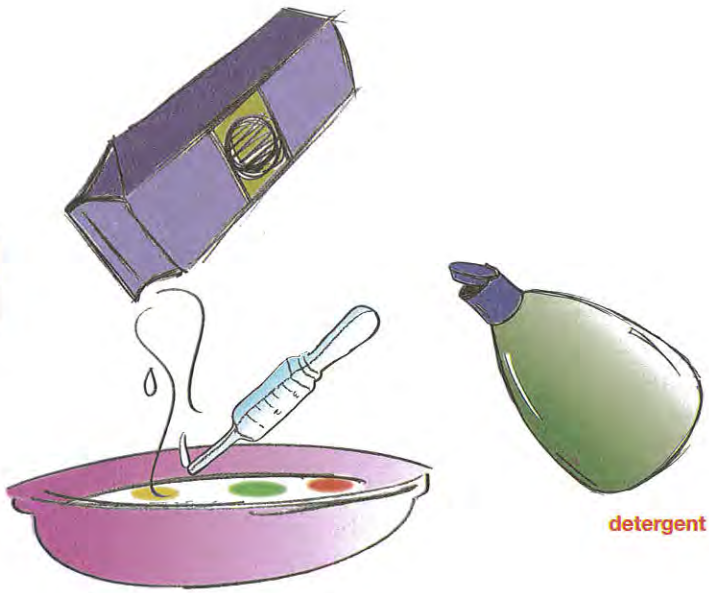
All matter in our world is made up of millions of minute particles called "atoms". You cannot see these particles with your eyes, they are too small. Atoms from different elements join together to make molecules and these molecules are constantly on the move. In this experiment you will see how the water molecules move the food coloring.

Prepare the following:

food coloring
jar
water
dropper

Fill the jar with water and put two drops of coloring into the water with the dropper. The food coloring will sink to the bottom of the jar, forming colored streaks in the water. Leave the jar for 24 hours and look again; the color is now evenly distributed throughout the water.

31...Create your own work of art



Prepare the following

food coloring-red, green, yellow...
milk
liquid dish detergent
saucer
dropper

Pour milk into a saucer. Using your dropper place two or three drops of each food coloring onto the milk. Space the drops around the surface of the milk and create a pattern of your own design. Place one drop of the detergent into the center of the milk and watch how the colors move. The detergent changes the surface tension and causes the food coloring drops to move away.

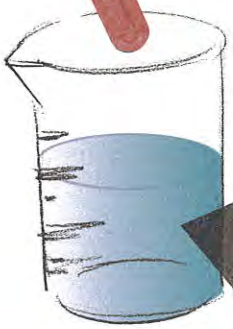
32...Make crystal ink

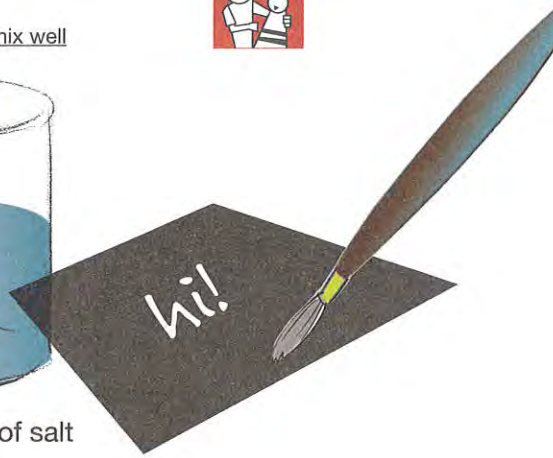
mix well

Prepare the following:

table salt
measuring spoon
beaker
measuring cup
art brush
sheet of black paper
water
radiator

20 ml of salt



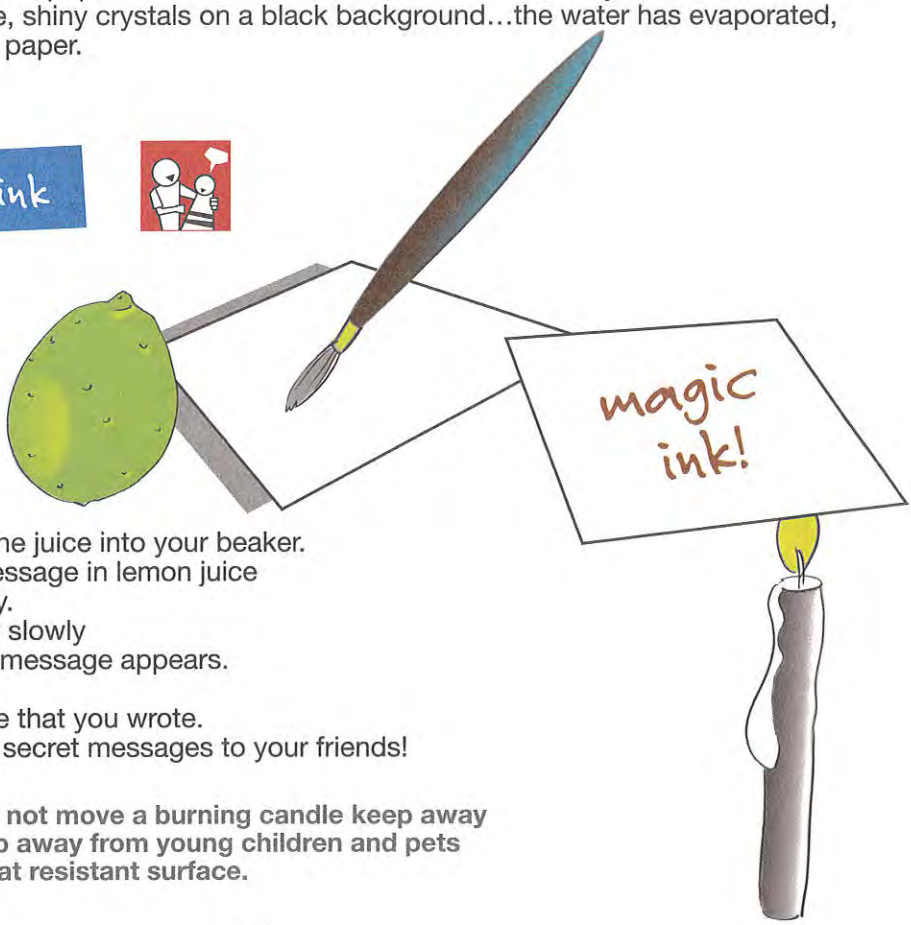


Measure 60 mls of water into your beaker. Measure 20 mls of salt into your measuring cup and add to the water mixing well.
You have now made your crystal ink.
Ask an adult to turn on the radiator so that it will be hot by the time your message is ready.
Use the art brush and your crystal ink to write a message on the black paper.
While you are writing stir the solution frequently otherwise the salt will sink to the bottom of the beaker.
Ask your adult helper to place the paper on the radiator and leave it until it is dry.
The message appears as white, shiny crystals on a black background...the water has evaporated, leaving dry salt crystals on the paper.

33...Make invisible ink

Prepare the following

lemon
art brush
sheet of paper
beaker
candle



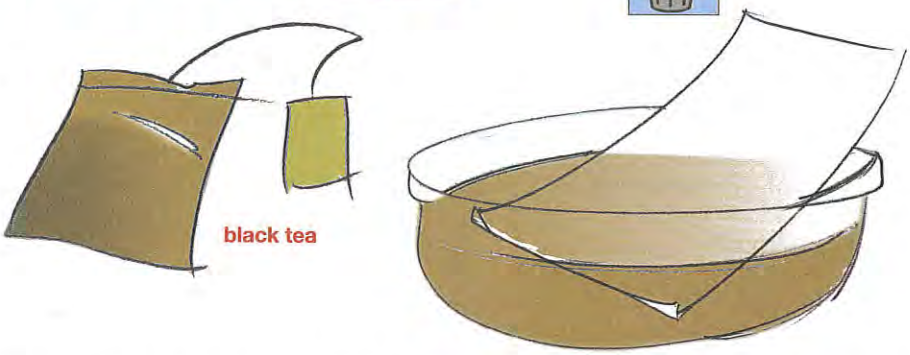
Squeeze the lemon and pour the juice into your beaker.
Use the art brush to write a message in lemon juice on the sheet of paper. Let it dry.
Ask an adult to pass the paper slowly above a candle flame until the message appears.
Never try this on your own!
You can now read the message that you wrote.
You see how easy it is to send secret messages to your friends!

Safely extinguish after use, do not move a burning candle keep away from flammable maerials, keep away from young children and pets and always use on a stable heat resistant surface.

34...Prepare another secret message...

Prepare the following:

strong black tea.
lemon
art brush
a piece of plain paper
beaker
measuring spoon
dropper
bowl



Half fill the bowl with water, and with your dropper add 10 drops of strong black tea to the water. Mix well with your measuring spoon. Squeeze the lemon and pour the juice into the beaker. Prepare a small piece of paper that will fit into the bowl and using your artbrush and lemon juice ink write a message on the paper.
Leave it to dry; your message will disappear!
Now place the paper into the bowl with the black tea making sure it is well covered.
Wait a few minutes; what do you see? Your message is visible again.

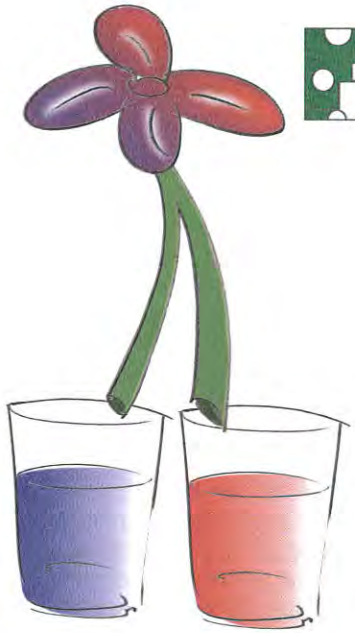
35...Make colorful celery

You need:

celery stalk with leaves
two glasses
two different food colorings (red and blue)
measuring spoon
dropper
a pair of scissors

Fill the two glasses almost to the top with water. Using your dropper put a few drops of red coloring into one glass and a few drops of blue coloring into the other.
With your scissors, cut off the tip of the stalk and carefully split the stalk into half.
Place the glasses close together and put one half stalk into one glass and the other half stalk into the second glass.
Leave your experiment to stand for a few hours.
You will see how the colors gradually travel up the stalks to the leaves giving you a very colorful celery stalk!
The food colorings are dyes which are absorbed in to the water and they show you how water travels up the plant bringing water to the leaves at the top.

36...Absorption and Dyes

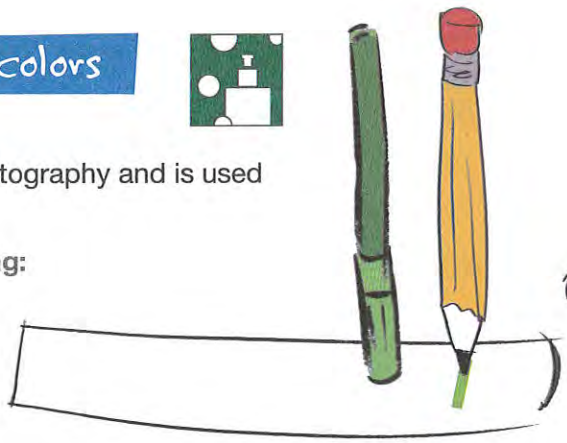


Prepare the following:

a white flower
a pair of scissors
two different food colorings
two glasses
measuring spoon
dropper

Do the same experiment that you did with the celery, but this time use a white flower instead. The experiment with the flower will take longer than with the celery, so be patient.

37...Splitting colors



This is called chromatography and is used in crime detection.

Prepare the following:

minilab
filter paper
scissors
pencil
beaker
water
felt tip pen

Cut the filter paper into strips 10 cms long and 0.5cms wide.
Mark the filter strip with a pencil line 3 cms from the bottom and draw a spot on the pencil line with your felt pen.
Using your beaker pour water into one of the test tubes.
Hang the filter strip in the test tube so that the end dips into the water but the pen mark stays above the water. Bend the upper end of the filter strip over the edge of the minilab to hold it in place.
Now watch what happens as the end of the filter strip soaks up the water. As the water rises up the filter paper you will see how the ink from your felt pen splits up into its basic colors.

38...Testing different colored felt pens

Prepare the following:

Filter paper
different colored felt tipped pens
(one of these should be green)
Beaker
Water

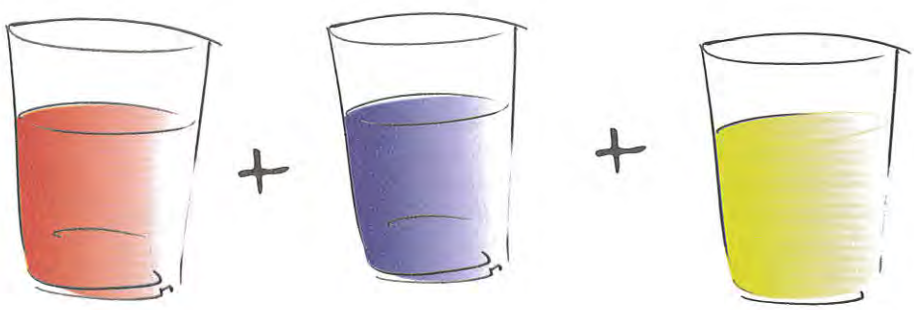
Repeat the last experiment ,but use different colored felt pens
Notice that every color rises to a different height.

39...A treasure of colors

Prepare the following:

Some glasses
Water
Food coloring (blue, red and yellow)
dropper

Fill three of the glasses with water; put 3 drops of red coloring into the first glass, 3 drops of blue coloring into the second glass and 3 drops of yellow coloring into the third glass.
You now have the three basic colours.
Using the other glasses make different combinations of the colored water; see how many colours you can make.



40...Experimenting with solutions

A solution is a mixture of two substances; where one substance dissolves (disappears!) inside the other. Make a sugar solution and you will understand more clearly.

Prepare the following:

beaker
water
sugar
measuring spoon
a cup

sugar solution with hot water

sugar solution with cold water

Half fill your beaker with tap water.
Using your measuring spoon add
2 "large" amounts of sugar to the water and mix.
Do the same experiment in hot water in the cup.
You have made two sugar solutions: you can see that the sugar crystals dissolve more quickly in the hot water, but in both solutions the sugar crystals have spread out through the water and have disappeared.

Now try exactly the same experiment but with salt instead of sugar.

salt

41...Easy to mix, easy to separate...

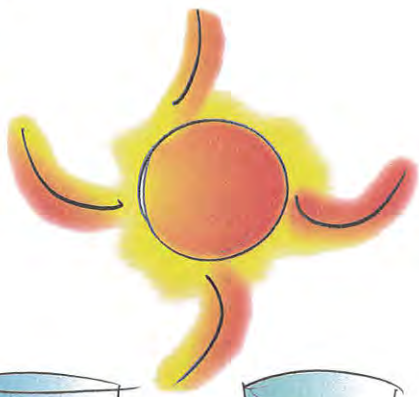
Prepare the following:

a solution of water and sugar
a solution of water and salt

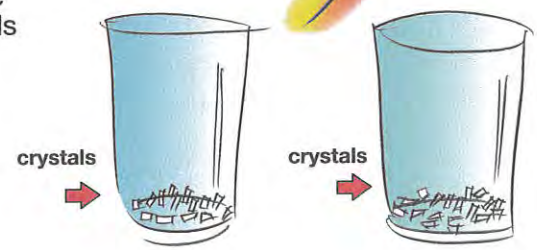
This experiment needs warm sunny weather.

sugar solution

salt solution



Make the two solutions as you did for the last experiment and put each solution into a glass. Place the glasses in a warm sunny place and wait and see! After some time you will see that the water evaporates and leaves salt and sugar crystals on the bottom of the glasses.
You have separated the two parts of a solution.

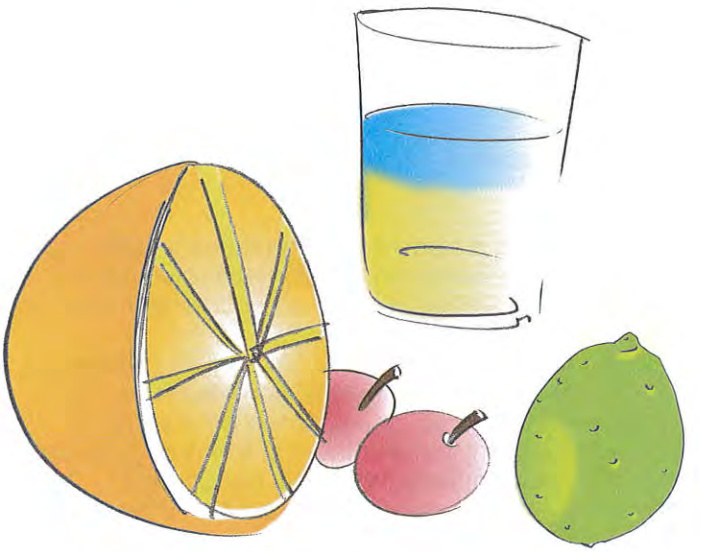


42...Easy to mix, easy to separate 2

Prepare the following:

Water
Fruit juice (orange, peach; cherry)
Measuring spoon
glass

Half fill the glass with the fruit juice and then add water till the glass is full.
Mix well; you have a mixture of water and fruit juice that looks like fruit juice.
Put the glass in the freezer and see what happens.
The fruit juice sinks to the bottom as it is heavier than the water.
The water rises to the top and freezes before the fruit juice.



43...A saturated solution

Prepare the following:

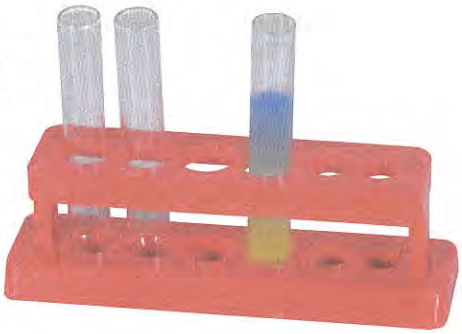
sugar
beaker
water
measuring spoon

Half fill your beaker with water. Using your measuring spoon start adding "large" amounts of sugar to the water; one by one and stirring all the time.
Continue to add sugar until you see that the sugar does not dissolve.
This is now a saturated solution, it cannot absorb any more sugar how ever much you stir.
If you place your beaker in a bowl of hot water, you will increase the temperature of the solution.
Now try adding more sugar and see if it dissolves.
By increasing the temperature of the solution more sugar can be dissolved,
but if you keep adding sugar, the solution will soon become saturated again.

44...Making a suspension

You need:

tap water
cornstarch flour
beaker
measuring spoon
minilab



A suspension is a mixture of a liquid and a solid in which the particles of the solid never dissolve in the liquid. Make a suspension with water and cornstarch flour and you will understand more clearly.
Half fill your beaker with water. Using your measuring spoon add 5 'large" amounts of cornstarch flour to the water and mix well. Immediately pour some of the suspension into one of the test tubes of your minilab and wait a few minutes. What has happened?
The cornstarch has settled at the bottom of the test tube.
It is not possible to make a solution of water and cornstarch; the cornstarch particles are heavy and will always separate out and sink to the bottom.

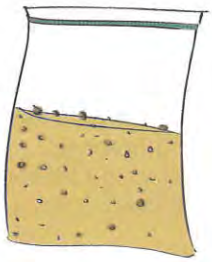
the cornstarch particles are heavy... and sink to the bottom of the test tube

45...Mystery sand

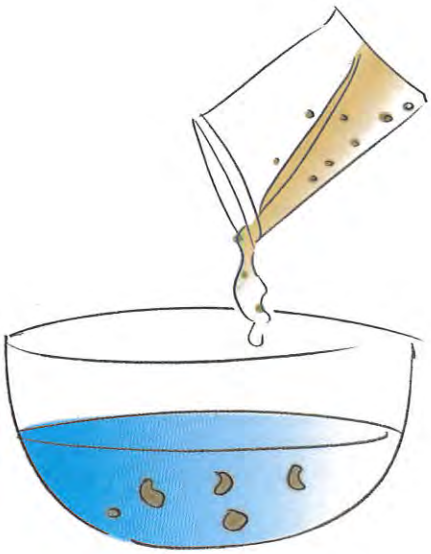
You need:

sand
cooking oil
bowl
small plastic bag
water
food coloring
beaker
dropper

5 drops of oil...



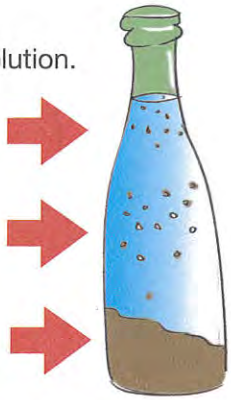
sand



Put half a beaker of sand in a plastic bag. Add 5 drops of oil to the sand with your dropper and close the plastic bag. Mix the sand and oil gently by squeezing the bag.
You can add some drops of food coloring if you like. Prepare a bowl of water and drop some of the sand mixture into the water. What do you see? What has happened to the sand?

46...What is a colloidal suspension?

A colloidal suspension is a mixture of two substances in which the particles of one substance are small enough to remain permanently suspended in the second substance and the final mixture looks like a solution. Here is how to make a sample



Prepare the following:

magnifying glass
a large bottle
measuring cup
garden soil
sodium hydrogen carbonate (baking powder)
measuring spoon

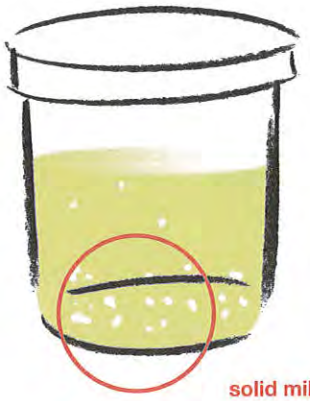
Half fill the bottle with water and add one measuring cup of garden soil.
Shake the bottle well; you now have some very dirty water!
Using your measuring spoon add 2 "large" amounts of sodium hydrogen carbonate and shake the bottle well for
3 minutes. Let the bottle stand for 5 minutes and then look at it again.
Some of the heavier particles of the soil will have settled at the bottom,
a few lighter particles will float to the surface of the water. Some of the soil particles are too light to sink to the bottom of the bottle, but too heavy to rise to the top. Examine the different particles with your magnifying glass. These particles are in what is known as a colloidal suspension.
Clouds and fog are examples of a colloidal suspension of liquids in air.
Another well known colloidal suspension is homogenised milk.

47...Emulsions

Have you ever tried to wash greasy dishes just with water, even with hot water?
We all know that we need to use soap together with the water to move the grease from the dishes.
Water and oil are examples of two liquids which can never be mixed together,
but if we add soap, this acts as a "bridge" between the two liquids,
the soap emulsifies the grease and you have clean dishes!

48...Separating milk

Do you remember that milk is an example of a colloidal suspension?
Leave a cup of milk outside of your refrigerator for 2 to 3 days, and see what happens.
The milk has split up into a liquid and a solid.

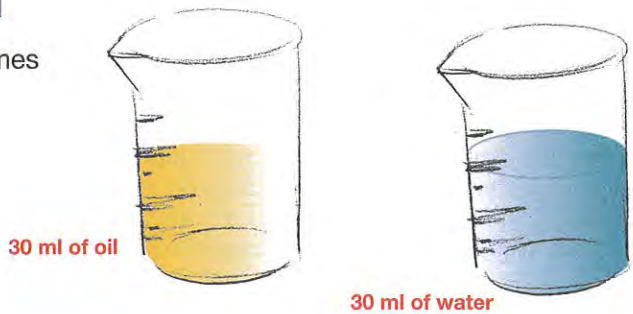


49...Floating oil

In this experiment you will see how water becomes lighter as it freezes.

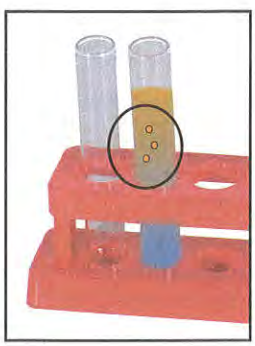
Prepare the following:

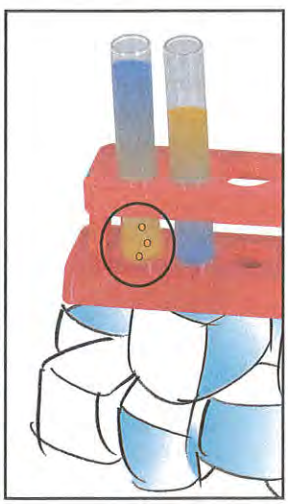
minilab
oil
water
beaker



In your beaker make a mixture of 30 mls of water and 30 mls of oil.
Pour some of the mixture into one of the test tubes of your minilab and leave it to settle for a few minutes.

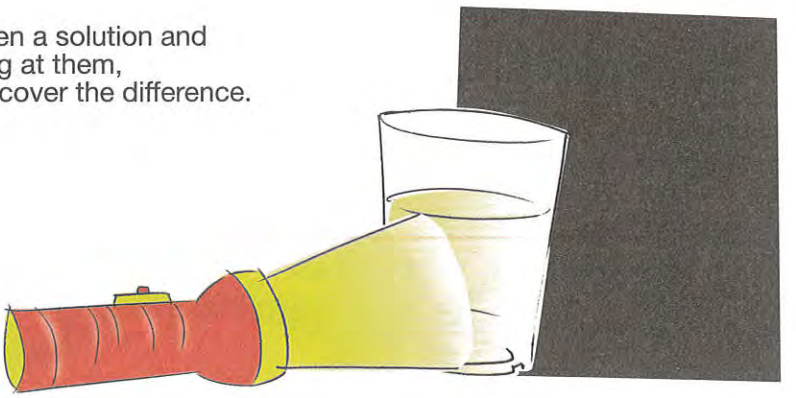
You will see that the water sinks to the bottom and the oil rises to the top.
This is because the water is heavier than the oil.
Now pour some of the oil and water mixture into the second test tube and put your minilab in the freezer,
leave for an hour and see what happens.
This time you will see that the oil has sunk to the bottom of the test tube because water becomes lighter as it freezes.





50...The Tyndall effect

You cannot tell the difference between a solution and a colloidal suspension just by looking at them, but you can do an experiment to discover the difference.



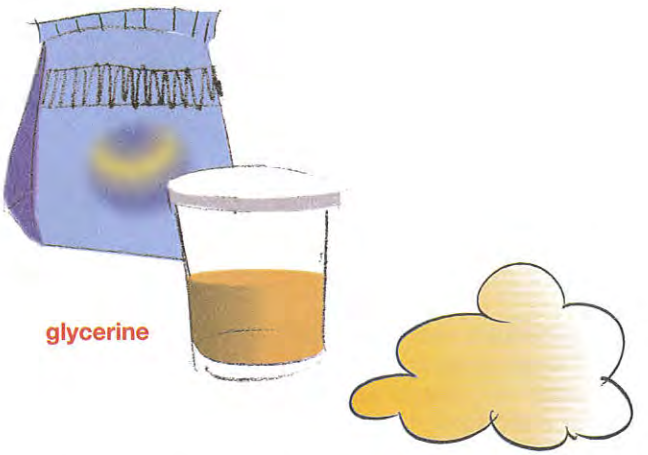
Prepare the following:

Drinking glasses
Tea
Milk
Orange drink
Salt water
Dark background such as black paper or black cloth.
Flashlight

Fill each glass with one of the liquids on the list or with similiar liquids that you can find at home. Stand the glasses in front of a dark background; take your flashlight and pass a beam of light through the mixture in each glass. If you can see the beam passing through the glass the liquid is a colloid; if you cannot see the beam passing through the glass, the liquid is a solution.
Test as many different liquids as you can find.

51...Slime

What is slime? Is it a solid? Is it a liquid?

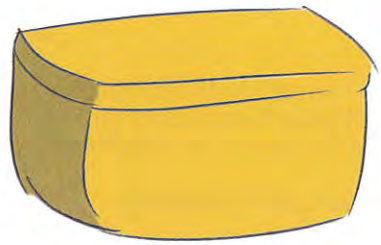


Prepare the following:

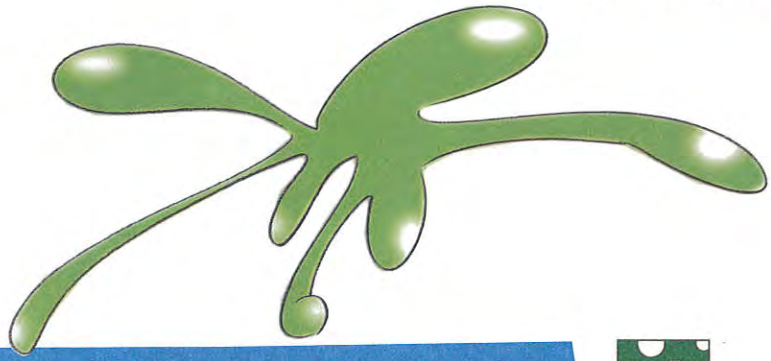
corn starch
water
beaker
bowl
glycerin
food coloring
container with lid
dropper

To make slime, put 200 grams of cornstarch into a bowl, add 400 mls of water and 5 drops of glycerin. To mix it, don't try to stir it; use your fingers to mix it together to make cornstarch dough.

Add a few drops of green food colouring to make it
look like something from outer space.
Now have some fun; pull it, pummel it, make shapes with it,
just enjoy getting your fingers into it.
To stop it drying out keep it
in an airtight bag or container



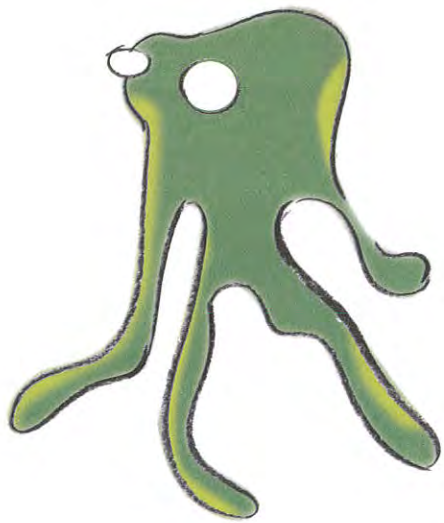
container with lid



52...Make a cornstarch alien

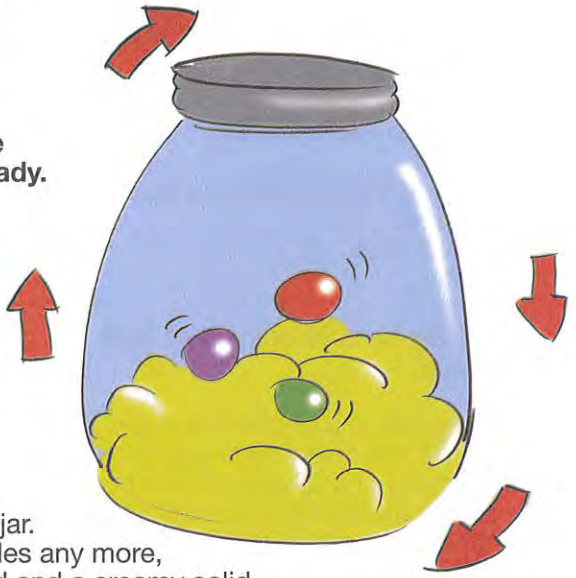
Prepare the following:

bowl
cornstarch
beaker
water
glycerin
dropper
food coloring
colored paper
marbles



You can make a real alien with your slime.
Make the slime as in the last experiment and createa shape for your alien.
Use pieces of colored paper to give him horns and marbles to give him eyes.
Let your imagination run away with you; make him into a real scary creature.
To stop him drying out keep him in an airtight bag or container.

53...Turn cream into butter



Make sure that the jar and the marbles are clean before you start as you will want to eat the butter when it is ready.

Prepare the following:

whipping cream
glass container with a lid
3 clean marbles
salt
beaker

Pour whipping cream into a jar so it is half full. Put 3 clean marbles into the jar and put the lid on. Shake the jar gently and listen to the marbles knocking against the sides of the jar. Carry on shaking the jar and when you can't hear the marbles any more, you will see that the cream has separated into a milky liquid and a creamy solid. Pour off the liquid and remove the marbles.You have just made butter; taste it! Take a cookie and have some more!
Bon appetite.

54...Make some cheese

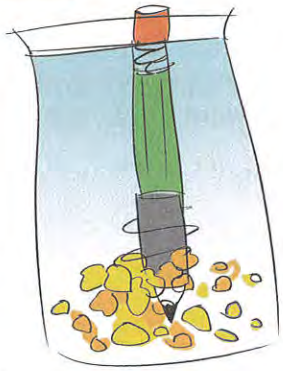
Make sure that all of your equipment is very clean before you start.

Prepare the following:

2 glasses
milk
1 rennet tablet
cheesecloth (muslin)
beaker
measuring spoon

Heat 200 mls of milk until warm and pour the milk into one of the glasses.
Add the Rennet tablet, stir well and leave to stand for 30 minutes.
Put the piece of cheesecloth over the top of the second glass and very slowly pour the contents of the first glass into the second glass through the cheesecloth.
Your cheese mixture is now inside the cheesecloth.
Close the cheesecloth around the mixture , take it out of the glass and squeeze the liquid out of the cheese. Rennet tablets contain a natural enzyme called rennin.
An enzyme is a substance which speeds up a chemical reaction.
When you add rennet to warm milk it helps to change the milk into cheese.

55...My breakfast cereal contains iron?

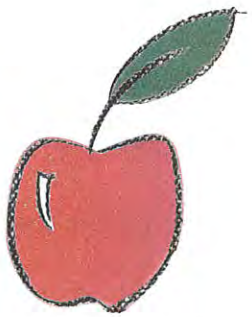


Prepare the following:

several different types of cereal
magnet
ziploc bags
water
pencil
rubber band or cellophane tape
a cup.

Take one cup of cereal and put it into a ziploc bag.
Crush the cereal by pressing on the bag with the cup and pour it into a bowl.
Add one cup of water to the cereal and stir well until you have a soft mixture.
Tape a magnet to the end of a pencil to make a "magnet-spoon".
Seal your "magnet-spoon" inside a plastic bag and use it to stir the cereal mixture for ten minutes.
Have a look at the magnet; the iron filings that were in the cereal have attached themselves to the magnet. Stir for another five minutes: did you find more iron?

56...Browning an apple

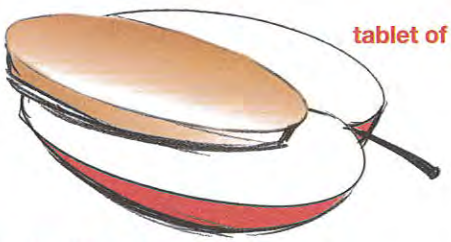


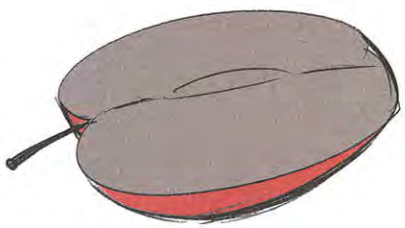
Prepare the following:

vitamin C tablet (or freshly squeezed lemon juice)
an apple
dropper

Cut the apple in half and stand the two halves with the white flesh upwards.
Crush the vitamin C tablet and sprinkle the powder over one of the halves.
If you do not have vitamin C tablet at home then put drops of lemon juice all over the flesh of the apple.
Leave the two halves uncovered for an hour or two.
What color changes do you see?

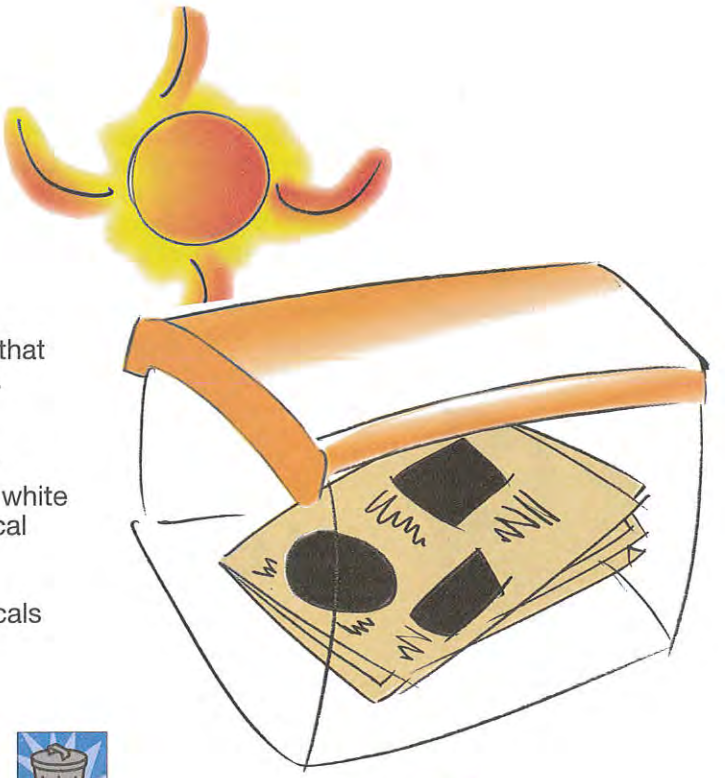
The flesh of fruits such as apples, bananas and pears changes color when it comes in contact with the air. The oxygen in the air reacts with chemicals in the fruit and causes the change in color. Vitamin C reacts with the chemicals in the fruit and prevents the color change.





the original color of the apple does not change

57...New-old newspaper

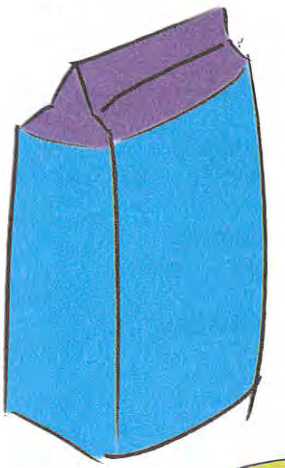


Prepare the following:

newspaper
box with lid.

Put a piece of newspaper in a transparent box with a lid. Stand it in front of a window that catches the sun and leave it for 2 or 3 days.
What has happened to the newspaper?
The newspaper is now yellow, not white!
The materials used to make the newspaper are yellow in color. To make the newspaper white a chemical is added which causes a chemical reaction that removes oxygen.
The sunlight heat up the air and the paper, causing oxygen to combine with the chemicals in the paper and the newspaper returns to its original yellow color.

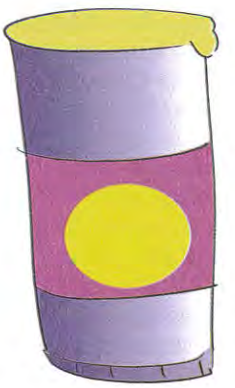
58...Making yogurt



Make sure that all your equipment is clean before you start.

Prepare the following:

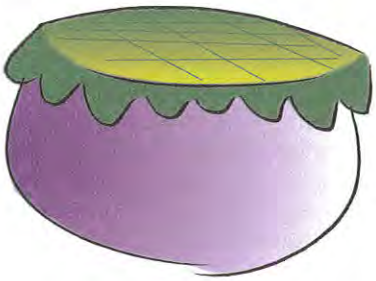
1 small container of plain yogurt (from a super market)
1 litre of skimmed milk
small bowl
thermometer
saucepan
glass container
small towel



Milk contains a substance called lactose which is a form of sugar. Certain bacteria feed on lactose and give off lactic acid as a waste product.
The lactic acid causes changes in the milk proteins, making the milk thicker and producing a sour taste.
Now make some yogurt by yourself.
With help from an adult, heat the milk until it starts to rise up the saucepan:
remove the saucepan from the heat and let the milk cool to 40°C.
Use your thermometer to check this.

Put half of the yogurt into the small bowl,
add an equal amount of warm milk and mix well.
Now add the rest of the yogurt and stir it in well.
This is your first stage culture.
Gently stir the culture into the milk that you left to cool in the saucepan,
and then pour the entire mixture into the glass container.
Wrap a towel around the container to keep in the heat. Let the yogurt
stand, undisturbed and covered at room temperature for 8-12 hours.
The yogurt is ready when it separates easily from the side
of the container if you shake it.
Keep your yogurt in the fridge to stop the bacteria growing any more.
Homemade yogurt is not quite as thick as commercially prepared yogurt.

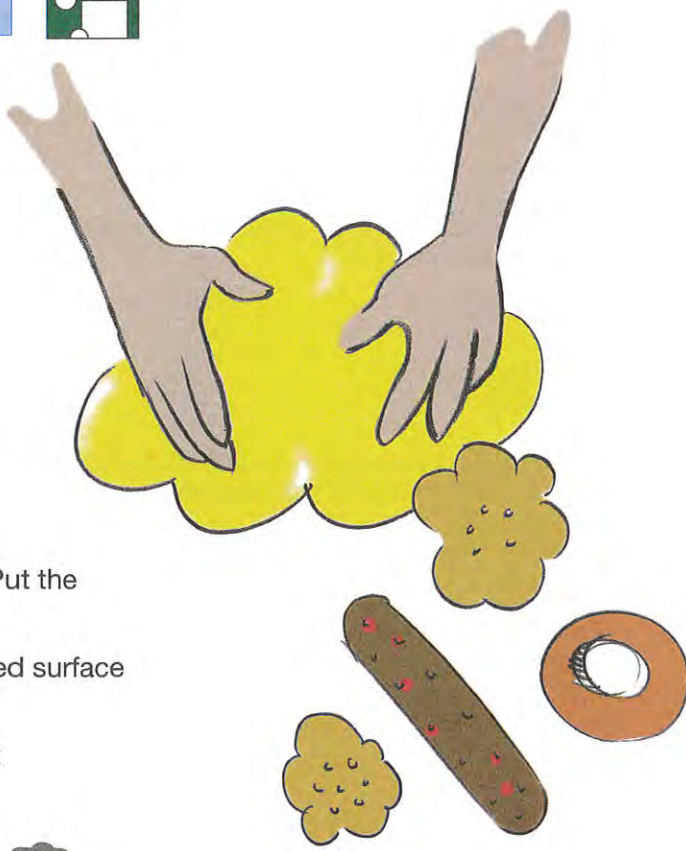
wait 8-12 hours



59...Make cookies

Prepare the following:

3/4 cup of margarine
1 1/2 cups of sugar
3 eggs
1 tsp.vanilla essence
4 1/ 2 cups flour
1 tsp.salt
1/4 tsp.baking powder
bowl
large spoon
glass

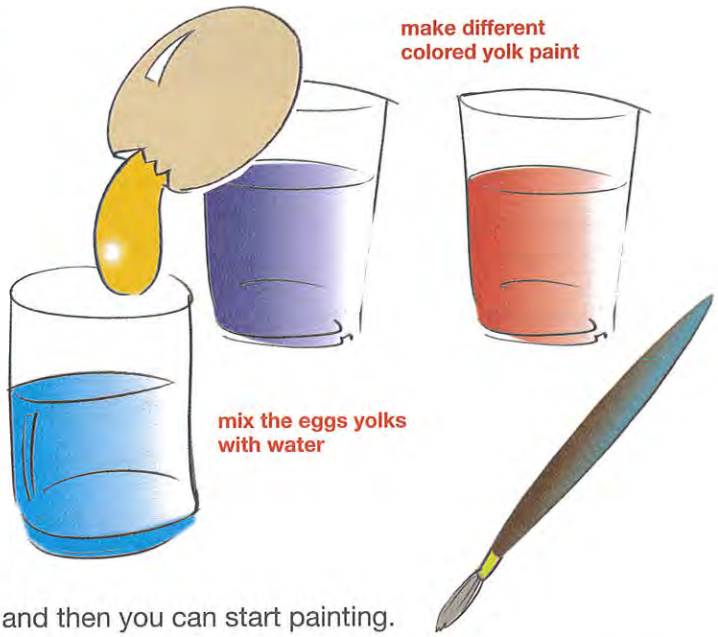


Mix the margarine and the sugar together in
the bowl until you have a soft creamy mixture.
Add the eggs and vanilla and mix well. Now
add the dry ingredients and using
your hands work the mixture into a soft dough. Put the
dough into a plastic bag
and leave in the refrigerator for 4 hours.
To prepare the cookies, roll the dough on a floured surface
to a thickness of 1 centimeter.
Use the top of a glass to cut round cookies or
use cookie cutters if you have them. You can cut
shapes of your own design if you prefer.
Bake the cookies in a hot oven
for about 10 minutes.

60...Make yolk paint

Prepare the following:

food colorings
two egg yolks
water
measuring cup
measuring spoon
cups
1 brush
dropper

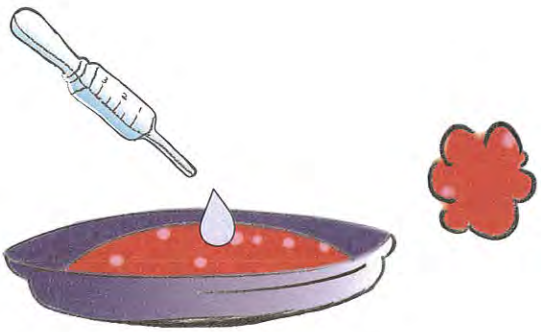


Mix the egg yolks with the water and put some of the mixture into each cup.
With your dropper, add 2 or 3 drops of food coloring to each cup to make different colored yolk paint.
Mix each color well, take your brush and paper and then you can start painting.

61...Make gelatin gum

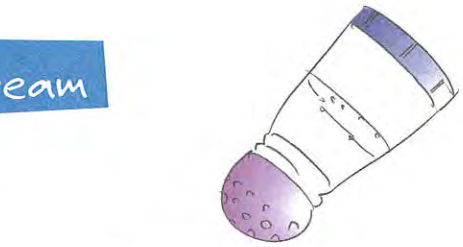
Prepare the following:

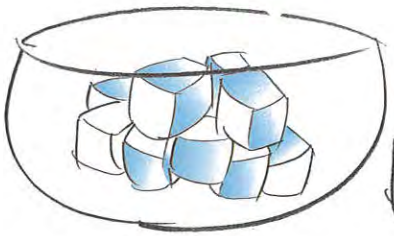
1 packet of flavored gelatin (50 grams)
water
dish
dropper
tweezers

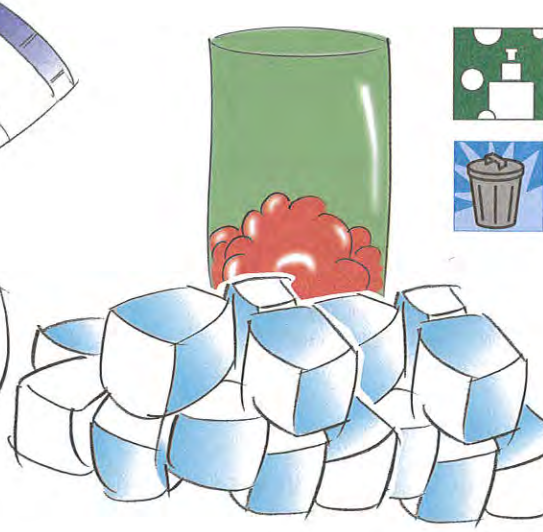


Pour the flavored gelatin into a small dish so that the gelatin is about 2 cms deep.
With your dropper put a drop of water in the center of the gelatin.
Now add a second drop to the same spot and wait until the gelatin absorbs the water.
Continue to do this until you have dropped 6 drops of water onto the gelatin.
The gelatin absorbs the water and swells up forming a jelly like substance.
With the help of your tweezers lift the gum away from the sides of the dish; feel the texture of your gelatin gum.

62...Making ice cream





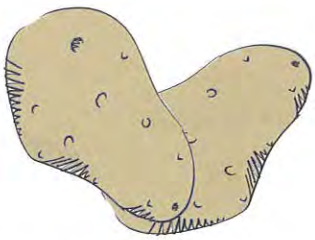


Prepare the following:

several ice cubes
thick cream
milk
drinking chocolate powder
salt
tea towel
glass
large bowl
large kitchen spoon

Put one spoon of chocolate powder, two spoons of milk
and one spoon of cream into the glass and mix well.
Put some ice cubes in the bowl and sprinkle a lot of salt over them.
Put the glass of ice cream mixture into the large bowl and surround the glass with the salted ice cubes.
Place the tea towel over the bowl and leave the mixture for an hour, stirring every few minutes.
You have made ice cream.

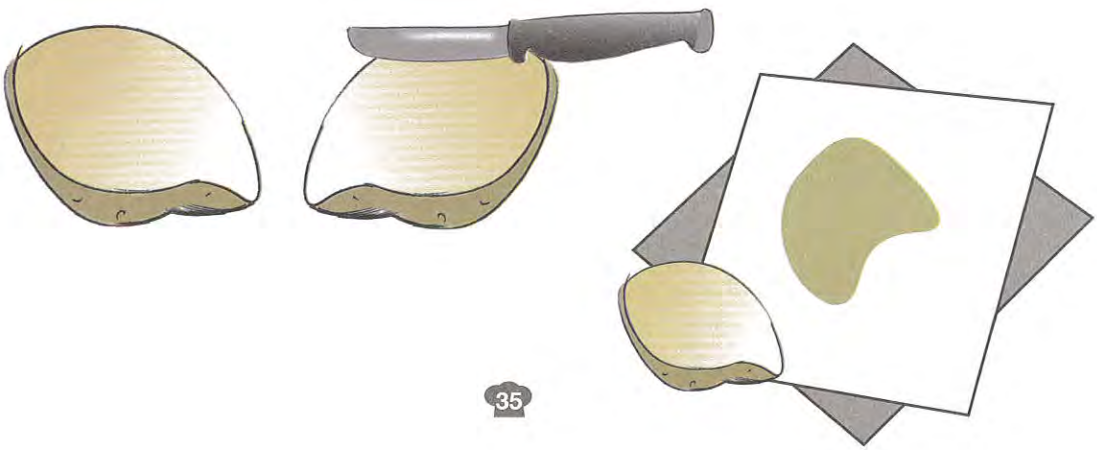
63...Potato stamp



Prepare the following:

potato
dinner knife
sheet of paper

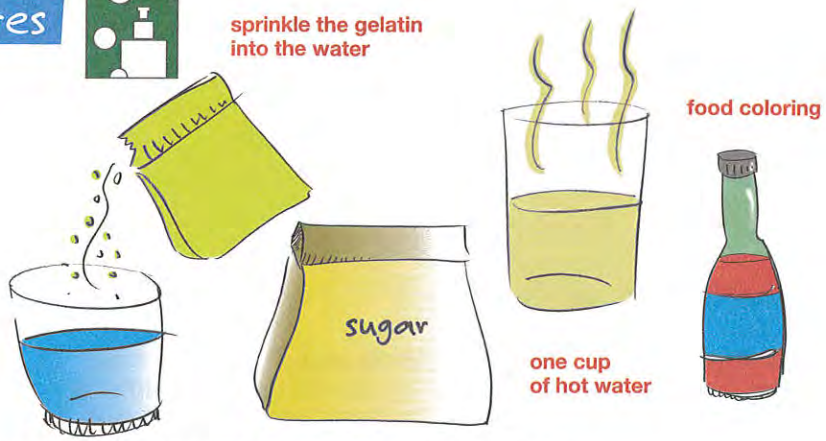
Cut a potato in half and leave the two halves for several minutes.
The oxygen in the air causes the white flesh of the potato to become brown.
Take a sheet of white paper and with your potato stamps make shapes on the paper.
You can cut shapes or letters into the flesh of the potato.
Design your own potato stamps.



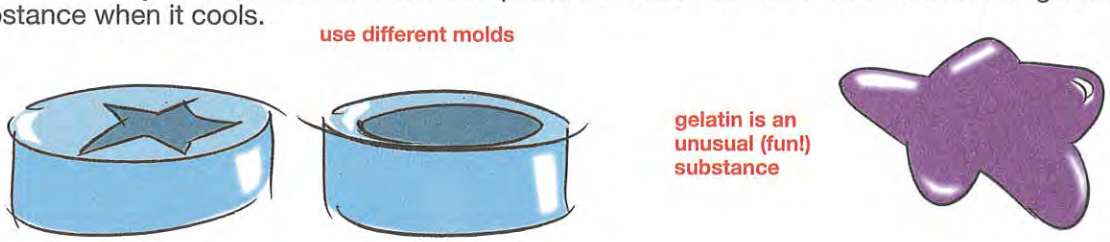
64...Gelatin sculptures

Prepare the following:

1 packet of gelatin
jelly molds or fun containers
measuring spoon
sugar
food coloring
1 cup of cold water
1 cup of hot water
bowl



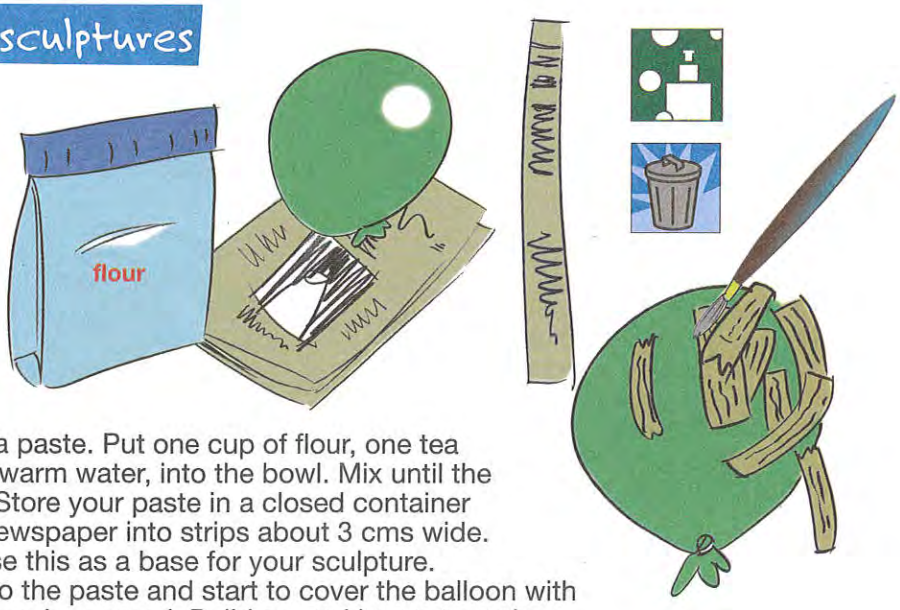
Put one cup of cold water into the bowl and sprinkle the gelatin into the water.
Add 1/4 cup of sugar and one cup of hot water. Stir well until all the gelatin has dissolved.
Add 4 drops of food coloring and mix again.
Pour the gelatin mixture into different molds and put them in the freezer until the mixture is firm.
Gelatin is a very unusual substance:it is a liquid in hot water but turns into a semi solid gel like substance when it cools.



65...Papier-mache sculptures

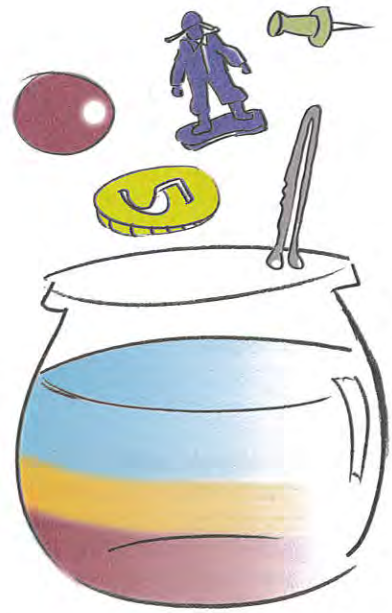
Prepare the following:

old newspapers
water
flour
balloon
cup
bowl
container with lid
salt



First of all you need to make a paste. Put one cup of flour, one tea spoon of salt and one cup of warm water, into the bowl. Mix until the mixture is creamy and shiny. Store your paste in a closed container for a few hours. Tear an old newspaper into strips about 3 cms wide. Blow up a balloon; you will use this as a base for your sculpture.
Dip your newspaper strips into the paste and start to cover the balloon with the strips until the whole balloon is covered. Build several layers to make your sculpture firm and strong. When it is dry insert the pin through the ball to realease the air from the balloon. Now you can paint it.

66...What is density?



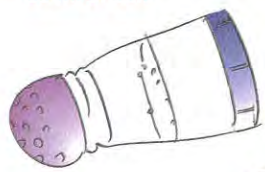
Prepare the following:

syrup
cooking oil
jar
water
a variety of small objects

Carefully pour syrup into the container until it is quarter full. Slowly pour the same amount of oil into the container and finally add the same amount of water. The three liquids do not mix, they form three separate layers. Now add the objects; you will see that they all float at different levels. Liquids can float and sink just as solid objects can. It all depends on their density: density is the weight of the substance for a given volume. A substance with a lower density weighs less than the same volume of one with a higher density. An object or liquid will float only in a liquid more dense than itself.

67...Floating egg

tap water

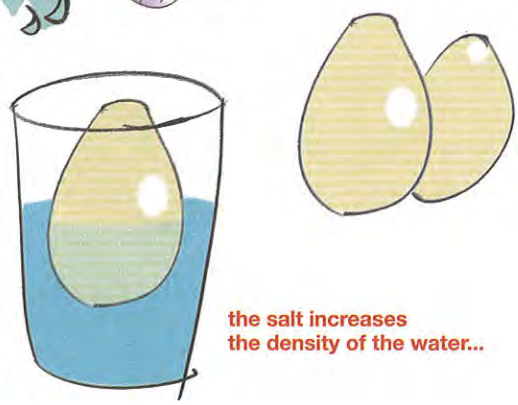


50 ml of salt

Prepare the following:

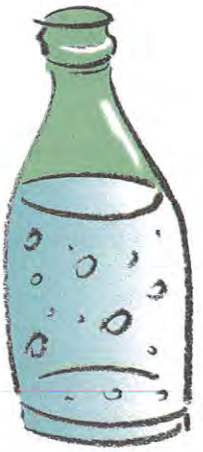
measuring spoon
2 uncooked eggs
salt
2 glasses
water

Fill the glasses with tap water. Add 50 mls of salt to one of the glasses and stir well. Place an egg gently into each glass and observe what happens to the eggs. The egg in the salty water is floating. When you added salt to the water you increased the density of the water allowing the egg to float.



the salt increases the density of the water...

68...Ping-Pong raisin



Prepare the following:

1 drinking glass
Fizzy soda water
a dried raisin

Drop the dried raisin into the glass
of fizzy soda water and watch what happens.
At first the raisin sinks to the bottom,
but then it rises to the surface and then again it sinks;
up and down, a real ping pong raisin!
The bubbles from the soda water attach
themselves to the raisin when it is
at the bottom of the glass and raise it up to the surface.
At the surface the bubbles lose their grip on the raisin,
the raisin sinks to the bottom
and then it all starts over again.

69...What is hard water?

Prepare the following:

2 glasses
water
salt
measuring spoon
liquid soap
boiled water - cooled

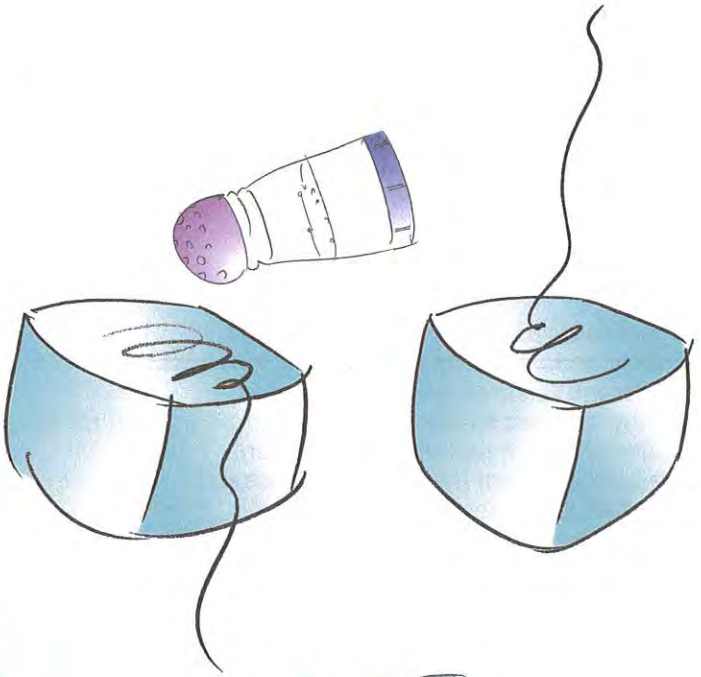
Hard water leaves a deposit of minerals inside pipes and kettles.
This layer of minerals will get thicker and thicker and will eventually
damage the pipes if it is not removed.
You can test your water at home to see if it is "hard".
Fill a glass with boiled water and add 5 drops of liquid soap.
Boiled water is not hard and will easily make a soap solution.
Now put a drop of liquid soap into a glass of tap water. Stir well with your measuring spoon.
If it does not foam, add another drop of liquid soap. Keep adding until you make a frothy soap
solution with the tap water. If the tap water needs more drops to make it foam than the boiled water,
then it is "hard".

70...Catch an ice cube!

Prepare the following:

string
ice cubes
salt
dish

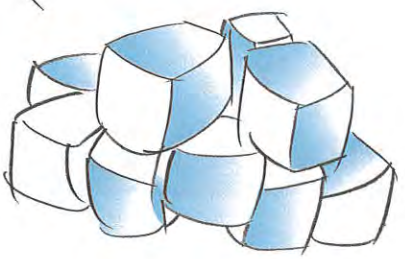
Place an ice cube in a dish.
Lay a piece of wet string across the top of the ice cube and sprinkle salt on the string and ice cube.
See how the string becomes attached to the ice cube.



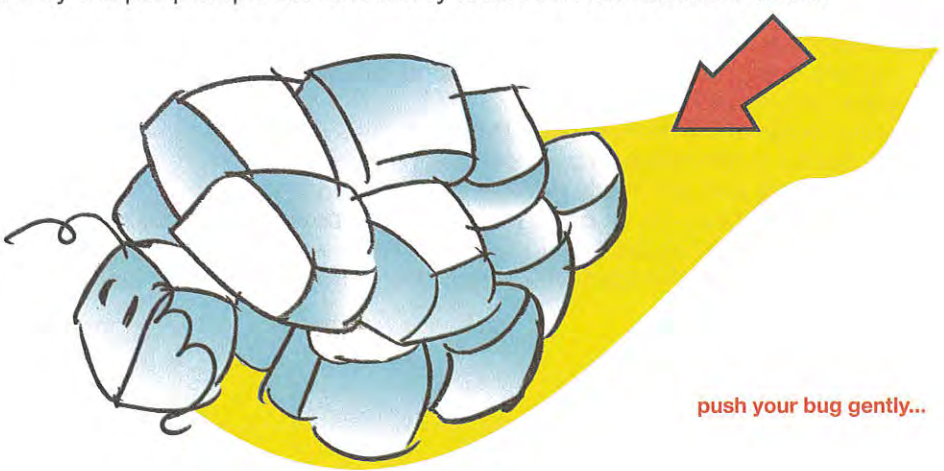
71...Make a frozen "bug"

Prepare the following:

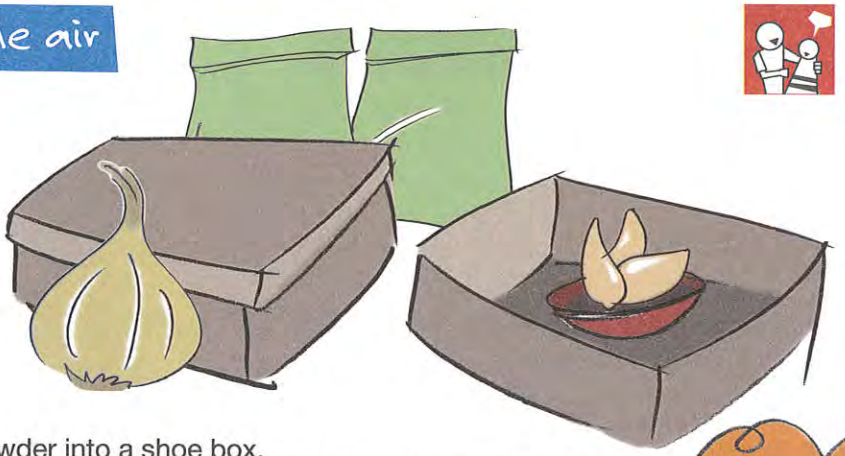
several ice cubes
salt
2 trays
margarine



Place some ice cubes on a tray; pour salt over them and press the ice cubes together to make the shape of a bug.
Now spread a fine layer of margarine on the second tray and place your ice bug on it.
Push your bug gently and see how it runs!
When you sprinkle salt on ice, the ice quickly begins to melt.
Salty water freezes at a lower temperature than tap water.
Now you know why the people sprinkle salt on icy roads and sidewalks in winter.



72...Cleaning the air



Prepare the following:

baking powder
2 ziploc bags
1 onion
shoe box with a lid
measuring spoon
saucer
measuring cup

Pour 1 cup of baking powder into a shoe box.
Remove 15mls of baking powder from the box and place it in a ziploc bag.
Spread the rest of the baking powder evenly over the bottom of the box.
Ask an adult to help you to peel an onion and cut it into four pieces.
Put the pieces of onion onto a saucer, put the saucer inside the box and cover with the box lid.
After 24 hours, remove 15 mls of baking powder from the shoe box and put it in another ziploc bag.
You now have two bags; open the bags one at a time and smell the contents.
The first bag has no smell, but the second bag will smell strongly of onions.
Baking powder absorbs the smell given off by the onion. Baking powder is often placed inside refrigerators to absorb smells and keep the air fresh.

73...Make perfume from petals

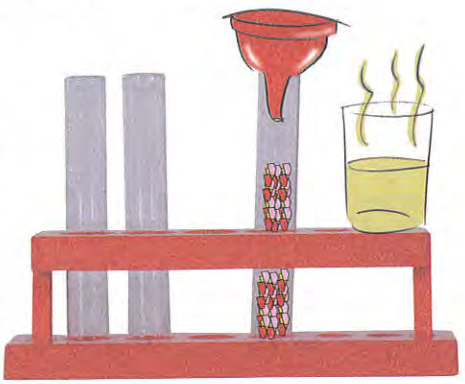
Prepare the following:

flower petals
water
minilab
funnel
beaker

Collect some petals from different flowers.
Take your minilab and fill one of the test tubes and half fill it with the petals.

collect petals from different flowers

add hot water to the test tube



Using your funnel and your beaker, add hot water to the test tube, just enough to cover the petals.
Cover the test tube and wait 1 hour.
Now open the test tube and smell!
You have made some perfume!

74...Create a floral perfume

Prepare the following:

1 cup of flower petals
bowl
water
piece of muslin or cheesecloth (larger than the bowl)
empty bottle for prepared perfume.

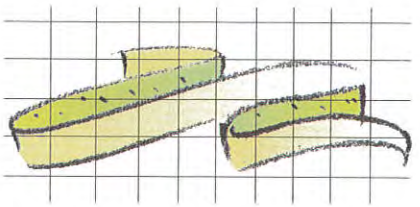
Take the bowl and place a piece of muslin or cheese cloth in it so that the sides hang over the rim of the bowl. Pour the flower petals into the bowl and cover them with water. Use as little water as you can to cover the petals. Cover the bowl and leave it for 24 hours. Gather up the edges of the muslin and gently squeeze the flower petal water into another bowl. Pour the perfumed water into your empty bottle and label it with a suitable name.

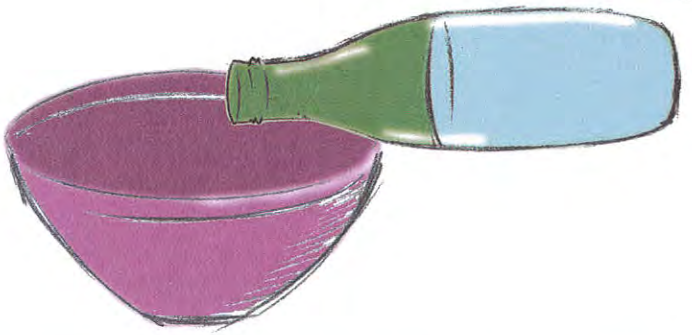
75... Create a citrus perfume

Prepare the following:

1 large lemon or orange
bottled water or cooled boiled water
bowl
empty bottle for prepared perfume

Use the peel from a large lemon or orange. Tear the peel into small pieces (about 2 x 2 cm): put them in a bowl and cover them with bottled water or cooled boiled water.
Cover the bowl and leave it for 12 hours.
Drain of the citrus water, pour into your empty bottle and label with a suitable name.





76...Make an all natural shampoo

Prepare the following:

Olive oil – 30 ml
Lemon juice – 15 ml
Vinegar – 5 ml
I egg (lightly beaten with a fork)
Empty bottle (an empty shampoo bottle maybe)
Measuring cup
Funnel

All the ingredients for the shampoo are mixed together in the bottle.
Using your funnel, pour 30 ml of olive oil, 15 ml of lemon juice, 5 ml of vinegar and one lightly beaten egg into the bottle. Close the bottle firmly and shake well.
Label the bottle with a suitable name and add the date when you prepared the shampoo.
Use the shampoo as you would any other shampoo.
It is best to use it when it is freshly prepared.

77...Make a natural conditioner for dry hair

Prepare the following:

Olive oil – 30ml
Vegetable oil - 30ml
Honey – 30ml
Bowl of hot tap water
Jam jar and lid
Funnel
Measuring cup
Empty bottle for prepared conditioner

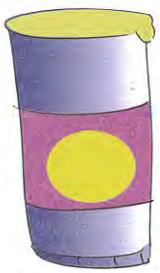
Take the jam jar and put into it 30 ml of olive oil, 30 ml of vegetable oil and 30 ml of honey. Close the jam jar firmly with its lid and shake the ingredients well. Now place the jar in a bowl of hot tap water. You do not need a lot of water, just enough that the water covers the ingredients inside the jar. Remove the lid and mix the ingredients together: the heat of the water will help to obtain a smooth and uniform mixture. When the mixture is ready, pour it into the prepared bottle with the help of your funnel. and label accordingly.

78...Make a natural conditioner for oily hair

Prepare the following:

1/2 cup of plain whole milk yogurt
1 small egg
small bowl
funnel
empty bottle for prepared conditioner

Into a small bowl put 1/2 of a cup of plain whole milk yogurt and 1 small egg.
Mix the ingredients well until you have a smooth and uniform mixture. Using your funnel, pour the mixture into a clean empty bottle and label accordingly.



79...Make some milky hand cream

Prepare the following:

1/2 cup of regular full fat milk
fresh lemon juice
small bowl
measuring spoon
empty container for prepared hand cream

Pour the milk into the bowl and add 4 drops of the fresh lemon juice.
Do not stir: wait for about 3 minutes and see what happens.
The milk has curdled into lumps; this is your hand-cream! Drain off the excess liquid and mix the "lumps" gently to make a soft milky cream.
Pass the cream into your empty container and label accordingly.

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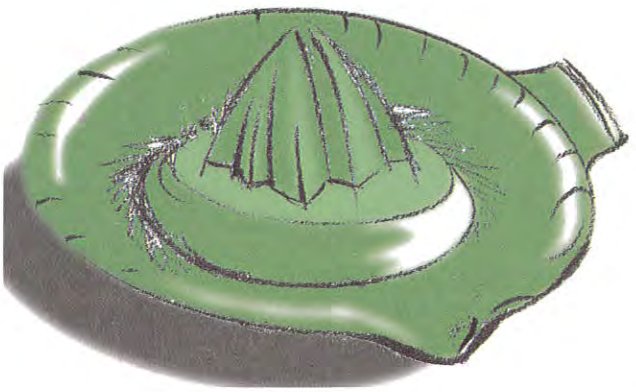
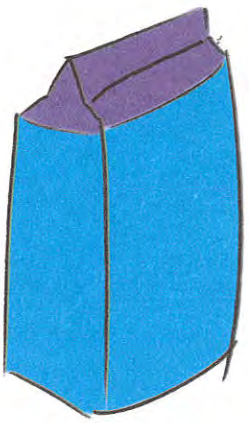
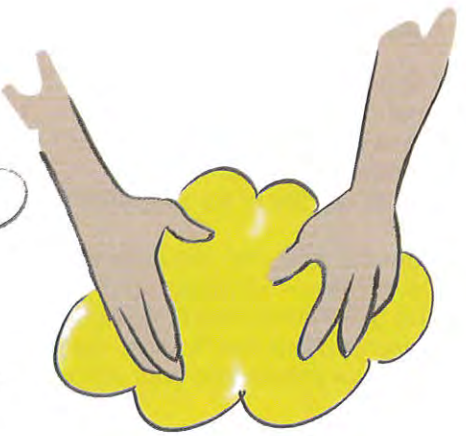


lemon juice



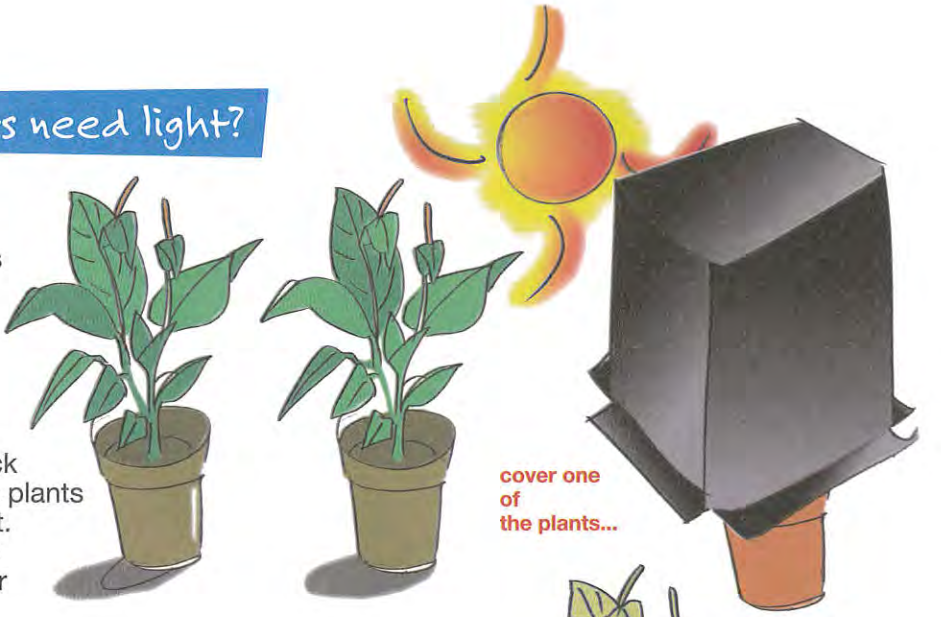
00:03 and wait to see !



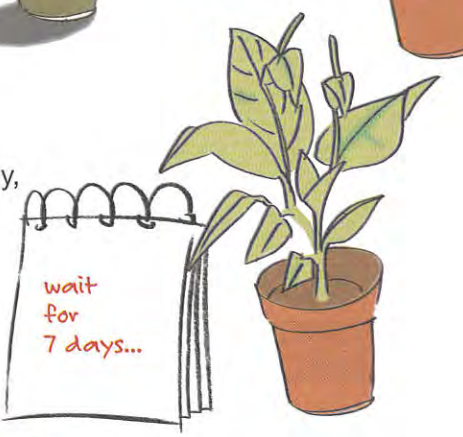
80...Why do plants need light?

Prepare the following:
2 small green potted plants
(both the same type)
black paper

Place the plants in
a sunny area.
Make a cover from the black
paper and cover one of the plants
so that no light can get to it.
Leave the plants for 7 days
and then compare the color
of the plants.



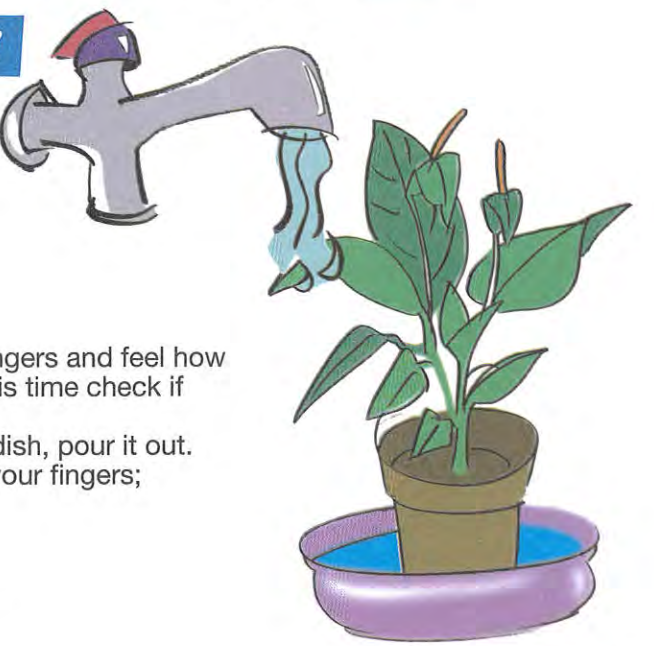
Plants are green because they contain
a dye called "chlorophyll".
Chlorophyll absorbs sunlight and changes it into energy,
which the plant uses to produce new plant material
and so to grow.
Without sunlight, no chlorophyl is produced,
the plant loses its green colour
and will eventually die.



81...How much can a plant drink?

Prepare the following:

a young healthy pot plant.
Dish (to stand the pot plant in)
water



Water your plant. Now touch the soil with your fingers and feel how
moist it is. Water the plant one more time and this time check if
any water collected in the dish
underneath the plant pot. If there is water in the dish, pour it out.
Check your plant daily by touching the soil with your fingers;
as soon as it feels dry, water the plant again.
If water collects in the dish under the plant
pot you have given it too much water.
You will learn how much water your plant needs.

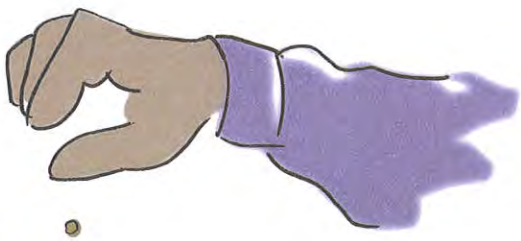
82...Plants turn towards light

Prepare the following:

houseplant
table

Place the plant on a table next to a window which catches the sun and leave it for 4 days. Now rotate the plant, so that the other side faces the sun, and leave it for another 4 days. You will see that the leaves of the plant always turn towards the light.

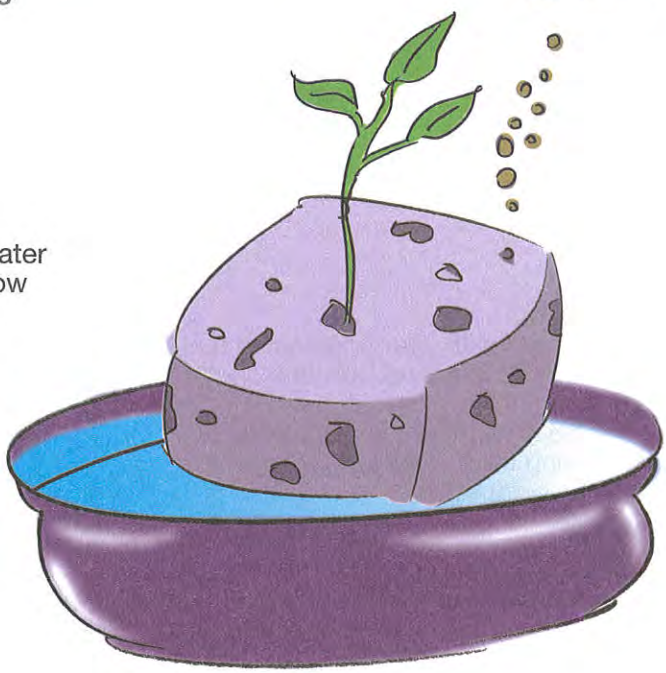
83...Make a sponge garden



Prepare the following:

water
sponge
dish
small seeds
liquid plant food

Soak the sponge in water and place it in a shallow dish of water. Sprinkle seeds over the surface of the sponge.

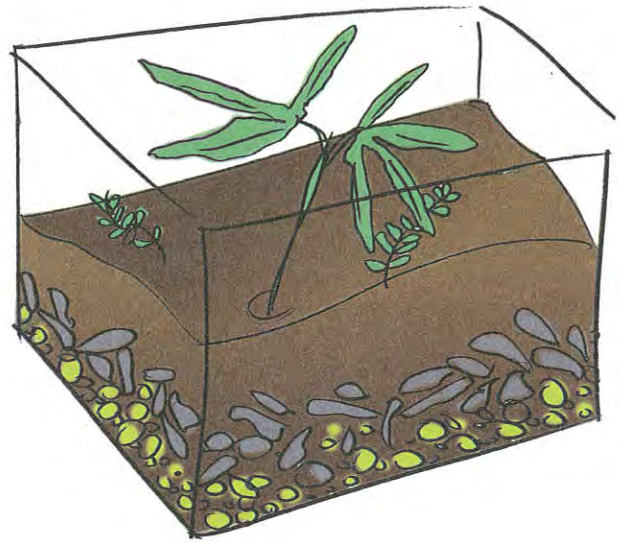


Be sure to keep water in the dish so that the sponge never has a chance to dry out. Add liquid plant food to the water to supply nutrients. Soon you will see that the seeds start to sprout shoots.

84...Make your own miniature garden

Prepare the following:

small stones or gravel
different kinds of moss
large transparent container
water
little plants
lid
soil
charcoal

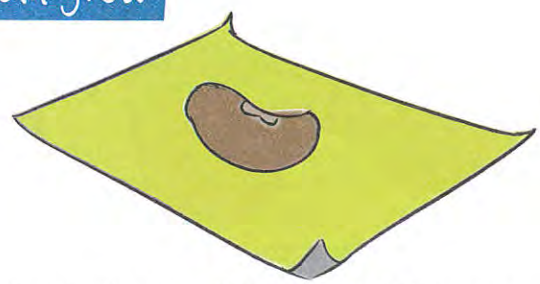


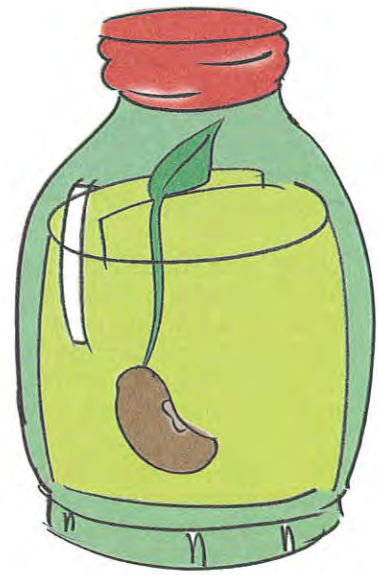
Put a layer of small stones on the bottom of the container and then cover the stones with a thin layer of charcoal.
On top of this put a deep layer of topsoil.
Make a small hole in the soil for each plant, put the plants in, cover their roots with soil and press the soil firmly.
Lay the moss on top of the soil and water them thoroughly.
Put your garden in a place where it will catch the light, but not in direct sunlight.
Keep your garden closed with a lid if you have one, or with a plastic cover.
If you see drops of water on the inside of the container, take the lid off until they disappear and then return the lid.

85...Watch a bean grow

Prepare the following:

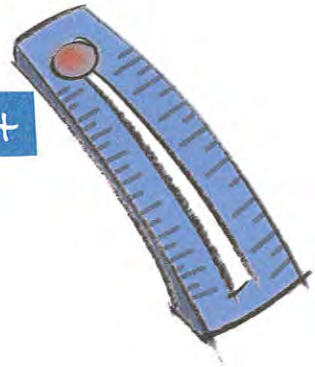
paper towel
empty jar
a dried bean
water





Roll up the paper towel and use it to cover the inside wall of the jar.
Place the bean between the paper and the inside wall of the jar.
Pour water into the bottom of the jar to a height of 3 cms to keep the paper towel moist leave the jar in a warm place.
After a few days a root appears and grows downward: it is searching for water.
After another few days a green shoot appears and grows upwards, the shoot is searching for light.
Watch your bean each day and see how quickly it grows.
You can experiment with another seeds like peas and lentils.

86...The greenhouse effect



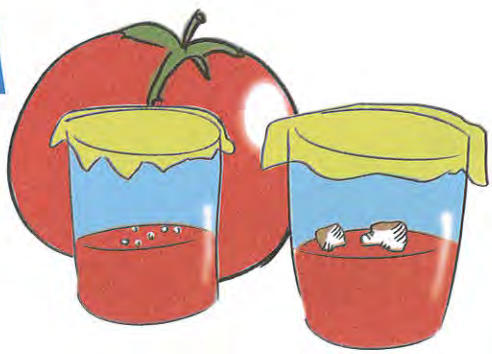
Prepare the following:

2 identical glasses
thermometer
piece of plastic bag
water
rubber band

Half fill each of the two glasses with water and put them in a sunny place. Make sure the level of water in each glass is the same. Check the temperature of the water in both glasses and record your results. Now cover one of the glasses with the piece of plastic bag and hold it in place with a rubber band. Keep the glasses in the sun for an hour and then check the temperature of the water in each glass again: record your results. You will see that the water in the covered glass is slightly warmer that the water in the open glass: this is because the hot air in the covered glass could not escape and caused the water to warm up.
You will also see that water vapour has collected inside the covered glass.
This experiment can help to explain "the greenhouse effect"

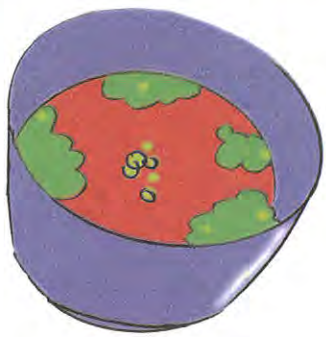
One of the causes of air pollution is an increase of carbon dioxide in the air.
This is the gas that is released from the engine of an ordinary car and there are millions of cars on the roads! It accumulates in the atmosphere creating a layer that prevents heat from leaving the Earth.
The heat is locked in and the temperature of the earth slowly rises causing "global warming"

87...Moldy soup



Prepare the following:

some tomato soup
2 glasses
plastic wrap
measuring cup



Using your measuring cup pour 50 mls of tomato soup into each of the glasses. Scrape your finger over the floor and then dip it into the soup in one of the glasses.
Sprinkle bread crumbs into the second glass of soup.
Cover the glasses with plastic wrap and leave them in a dark warm place for several days.
After a few days you will see spots of mold on the surface of the soup.
You collected invisible mold seeds called spores from the floor.
These spores are everywhere.
They feed on the soup and grow into small plants.

88...Taste test

Prepare the following:

A variety of drinks
A blindfold

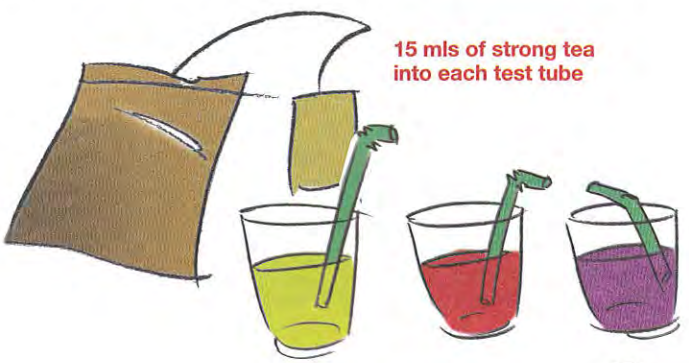
Blindfold your friends and see if they can guess which drink you have given them.
Our tongues know the difference between sweet, salty, bitter and sour flavors.
Your friends will also use their sense of smell when they try to guess which drink you have given them; these two senses work very closely together to get the right answer!

89...Check for iron in fruit juices

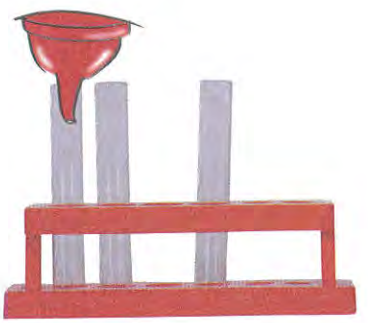
Prepare the following:

test tube track
test tubes glass
cup of strong tea
an assortment of fruit juices,
canned and bottled.
measuring cup

Using your measuring cup pour 15mls of strong tea into each of the two test tubes. Add 15 mls of a fruit juice to one of the test tubes and 15 ccs of a different fruit juice to the second test tube. Leave for a few hours.
There are certain chemicals in tea that react with iron compounds in fruit juices to produce a substance which will collect at the bottom of the test tube. According to the amount of this substance you can see how much iron is in each fruit juice. Check several fruit juices and find out which fruit juice contains the most iron.



15 mls of strong tea into each test tube

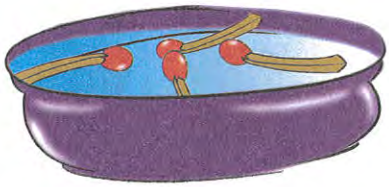


pour 15 mls of different juices into each test tube

90...What is surface tension?

Prepare the following:

clean bowl
a piece of soap
matchsticks
water
sugar lump



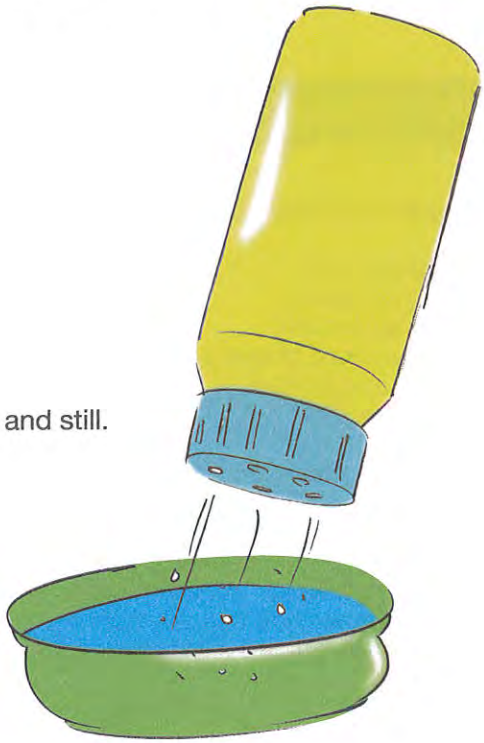
Fill a clean bowl with water. Gently arrange the matchsticks around the edge of the bowl. Now dip a sugar lump into the center of the water and see how the matches move closer together.
The sugar lump absorbs water, increasing the surface tension.
Now dip a piece of soap into the center of the water and see how the matches move apart.
A film of soap spreads across the water, reducing the surface tension.
The surface of a liquid acts like an elastic skin always stretching towards the center; this is the surface tension of the liquid.

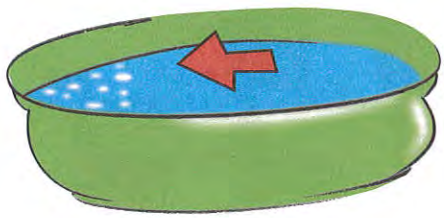
91...Break the tension

Prepare the following:

bowl
water
talcum powder
a piece of soap

Fill the bowl with water and wait until the surface is smooth and still.
Sprinkle talcum powder over the surface.
Now wet one finger and rub it over a piece of soap.
Dip your finger into the water at one side of the dish.
What happens?
All the talcum powder will move to the side of the dish.
How did the soap affect the surface tension of the water?



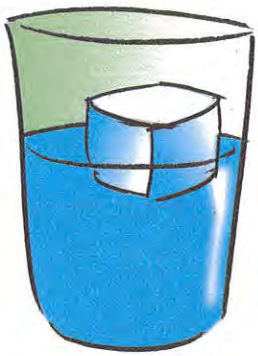


the talcum powder will move to the side of the dish

92...A home made iceberg

Prepare the following:

ice cube
beaker
tap water
beaker



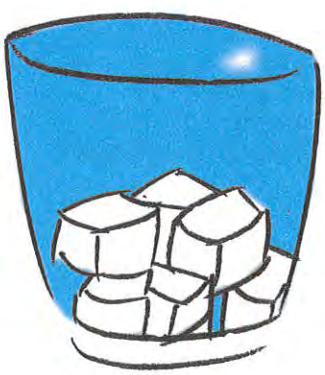
Fill a beaker with warm tap water and put an ice cube in the water.
Does your ice cube sink? Why not?
Water expands when it freezes and becomes less dense than liquid water.
Giant icebergs float in the sea near the Arctic circles.

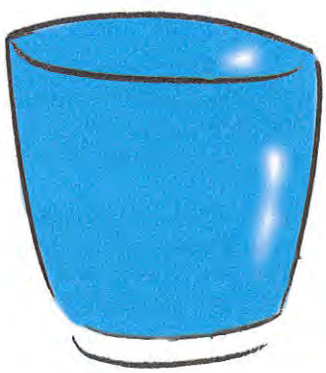
93...Melting icebergs

Prepare the following:

ice cubes
a glass
warm tap water

Place some ice cubes in a glass and fill it to the top with warm tap water.
Ask your friends if the water will overflow when the ice cubes melt.
They will probably say that it will!
But you can show them that the water level will stay exactly the same.
As each ice cube melts, the volume of water it forms is exactly the same as the volume of the ice cube, so the level of water in the glass does not change.





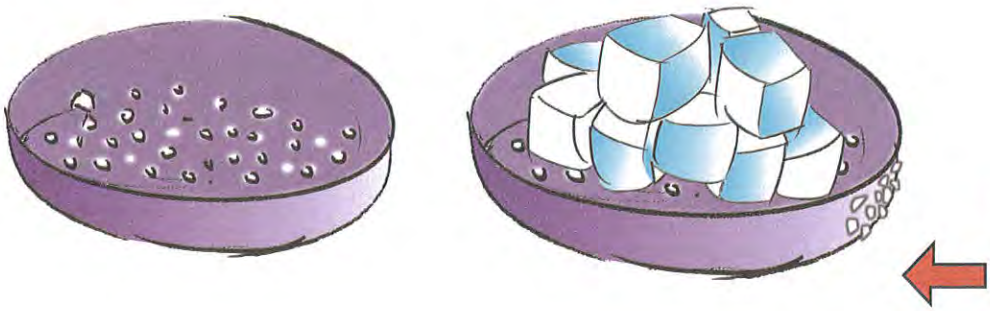
the level of the water in the glass does not change

94...Freeze a can

Prepare the following:

salt
a metal can
ice cubes

Take a clean empty soup can. Cover the bottom of the can with a layer of salt and then fill up the can with ice cubes. As the ice melts, pour off the water and add more ice cubes and salt. After a few minutes you will see that the outside of the can is frozen.
What has happened here?
The air contains water but the water droplets are too small to see.
When warm air touches something cold like your can,
the water in the air changes into big drops that we can see.
Metal gets cold very quickly and by adding salt to the ice, the can becomes colder even faster, causing the water droplets on the outside of the can to freeze.



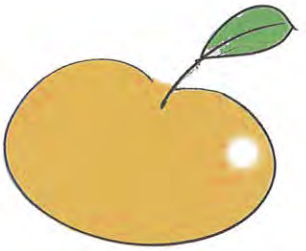
95...Water freezes and grows!

Prepare the following:

minilab
tap water
beaker

Pour tap water into one of the test tubes of your minilab up to mark "4".
Now put the minilab into the freezer and wait until the water is frozen.
Check the measurement next to the test tube: how much water do you have now?
Why did this happen?
When water freezes, the tiny particles of water move away
from each other and become bigger solid crystals.
Place your minilab in a warm place and wait till the water melts.
Check again how much water is in the test tube.

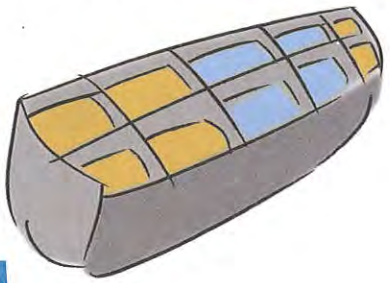
96...Orange ice cubes

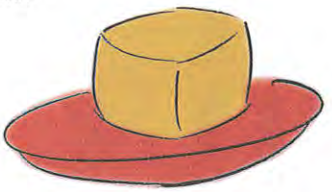


Prepare the following:

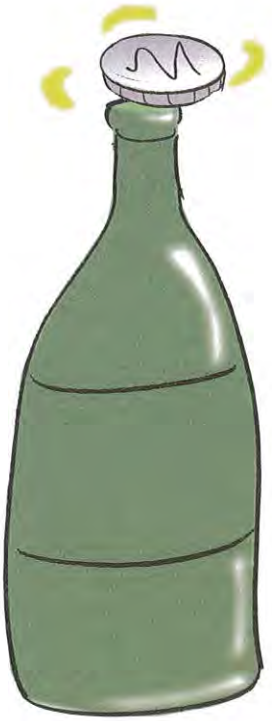
orange juice
ice tray
freezer

Fill half of the ice tray with orange juice.
Fill the other half of the ice tray with water.
When the cubes are frozen remove them.
Try to bite into a cube of orange juice and a cube of water.
The consistence of the cubes is not the same.
This occurs because no all the material in the juice is frozen.
Many liquids freeze at a lower temperature than water does.
The orange cube is a combination of frozen and unfrozen material.





97...Clicking coin



Prepare the following:

coin
beaker with water
Two liter soda or coca cola bottle with top

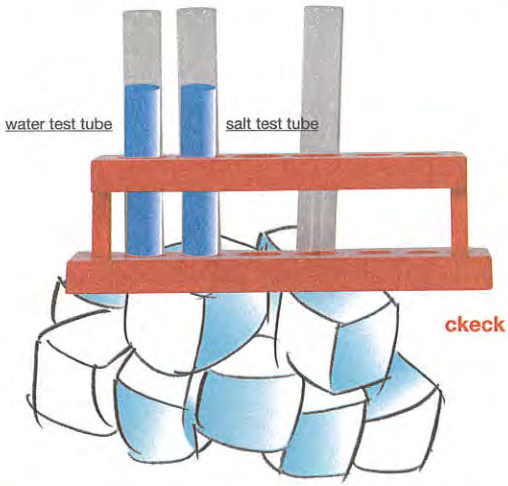
Place the closed empty bottle in the freezer for 10 minutes.
Remove the bottle from the freezer, remove the top and cover the mouth with the wet coin.
After a few seconds the coin begins to "jump", making a clicking sound.
The air in the bottle contracts in the freezer; it takes up less space.
When the bottle is taken out of the freezer, the cold air starts to heat up and expand.
The hot air pushes against the coin and makes it move up and down on one side.
This will carry on until the temperature inside the bottle equals that outside.

98...Freezen

Prepare the following:

test tube rack
test tubes
water
salt
measuring spoon

Fill two test tubes with water. Using your measuring spoon, add one "large" amount of salt to one of the test tubes Put your test tube rack with the test tubes into the freezer and check every 10 minutes. Which freezes first? Is it the water or the salt solution?



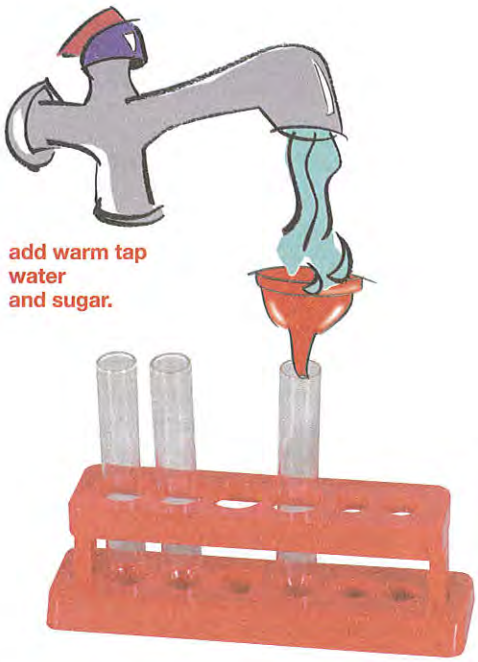
salt

ckeck your test tubes every 10 minutes

99...Where does the sugar go?

Prepare the following:

test tube rack
test tubes
warm tap water
sugar
measuring spoon
beaker
funnel



add warm tap water and sugar.

Put your funnel into the top of one of the test tubes and pour in warm tap water at the middle.
Using your measuring spoon, pour 5 "large" amounts of sugar through the funnel into the water. Close the test tube with a cork and shake the test tube well so that the sugar dissolves.
Now check the measurements next to the test tube.
How much sugar water do you have? You will see that your sugar water is still at the same level.
When sugar dissolves in water, its molecules fill up the tiny gaps between the water molecules, so the sugar does not increases the volume of the water in your test tube.

100...Soap tricks

Prepare the following:

thin art brush
liquid soap or detergent
a mirror or a window
beaker
measuring spoon

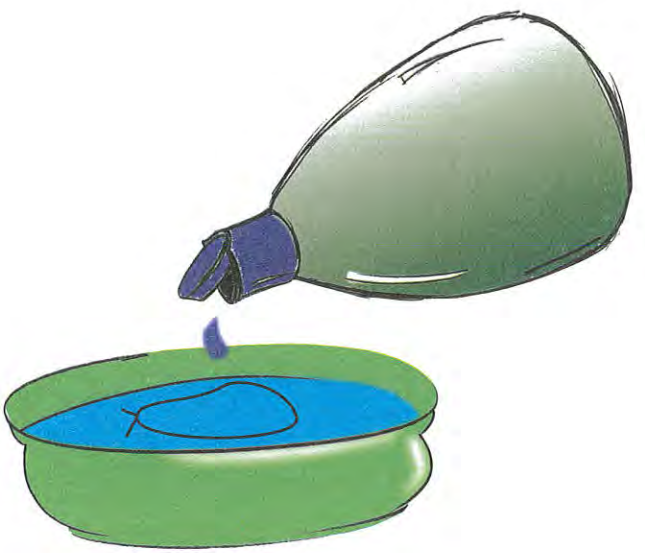
Put a small amount of liquid soap into a beaker and stir slowly.
Dip the tip of your finger or an art brush into the solution and write a message on a window or a mirror.
The writing should be as thin as possible.
Now breathe on the invisible message: the message will suddenly become visible as the area around it becomes foggy from your breath.

101...Soap trick 2

Prepare the following:

string
dish
liquid soap
water

Make a loop of string. Float it in the middle of a dish of water.
Put two drops of liquid soap inside the loop. The string is pulled outward by the surface tension around it to form a circle.

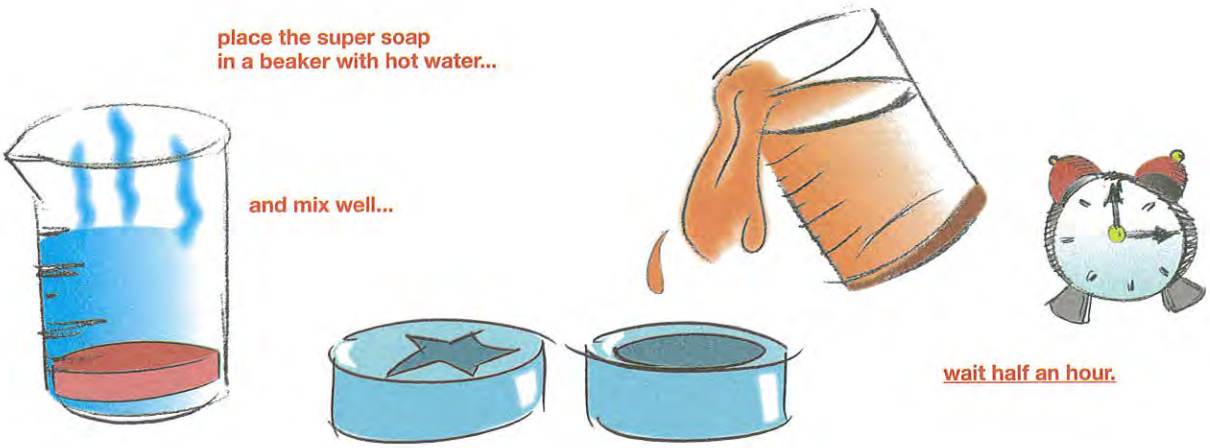


102...Funny soap

You need:

soap molds
a piece of "super soap"
measuring cup
hot water
measuring spoon.
beaker

Take a piece of super soap. Place it in a beaker and pour in 30ccs of hot top water. Mix well with your measuring spoon and pour your mixture into the two soap molds. Wait half an hour and you can take your funny soap out of the molds.

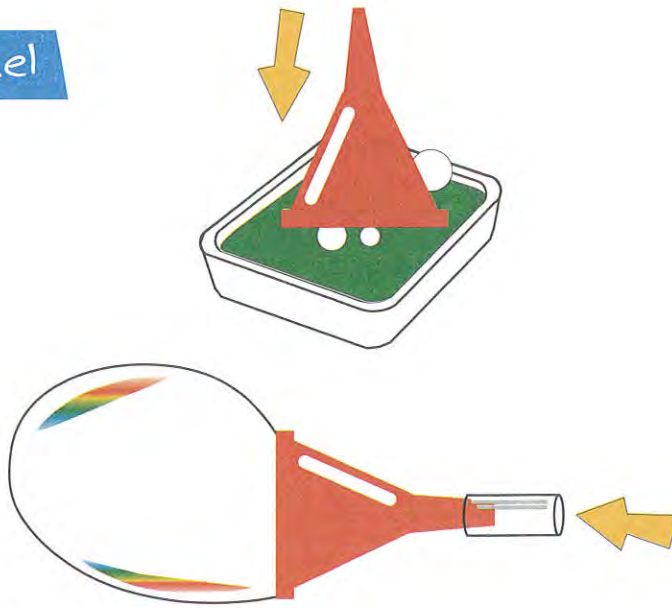


103...Make a bubble with a funnel

You need :

A large dish
A funnel
Soap solution with glycerine

If you don't have enough bubble solution prepare some more and add it to the old solution, wait for 24 hours before use.
Place your funnel gently into the bubble solution... and blow through the funnel to create a big bubble...



104...Make a bubble in a bubble

Find the large soft drink bottle and with help from an adult cut the top third of the bottle,
as you have a large "funnel". You can use it as a stand.
Blow a large bubble and place it and the top of the stand.
Take a straw and wet one end; then gently push it through the bubble which is sitting on the bottle stand.

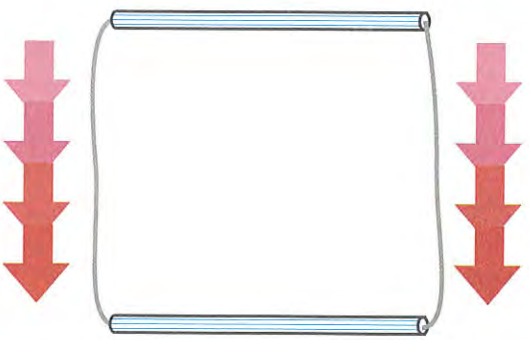
Bottle stand

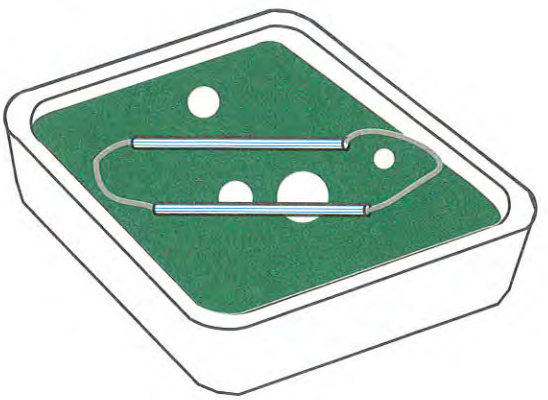
105...How to make bubble with two straws and string

Prepare the following :

Soap solution
Two straws
Un long piece of string

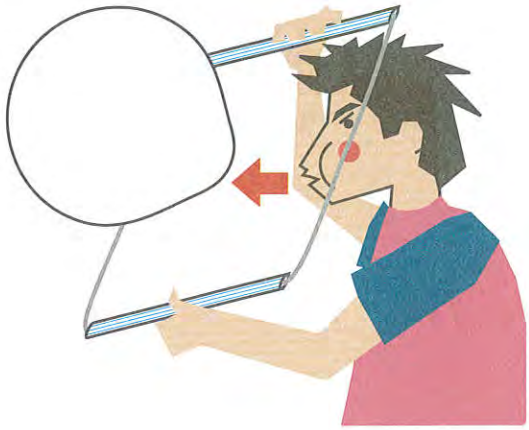
Take 2 straws and thread about a meter of string through them. Tie a knot so that you have a large loop of string with the straws as handles. It is best to pull the knot into one of the straws.
Now holding the straws together, place the straws and the string into the solution.





Slowly pull them out and let the surplus solution drip back into the bath.
Now slowly separate the 2 straws and you will get a rectangle covered with soap film.
Very slowly, pull the straws apart even further and you will get an even larger rectangle.

Now blow slowly into the middle of the bubble.
Take a very deep breath, blow and make a really giant bubble.

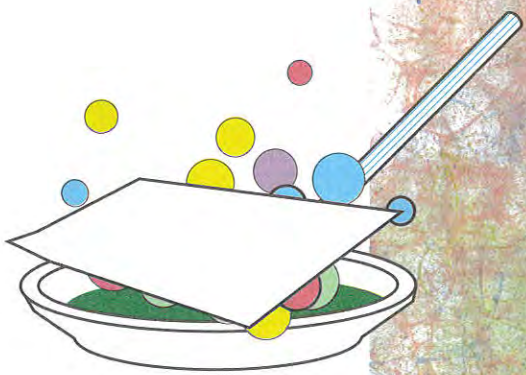


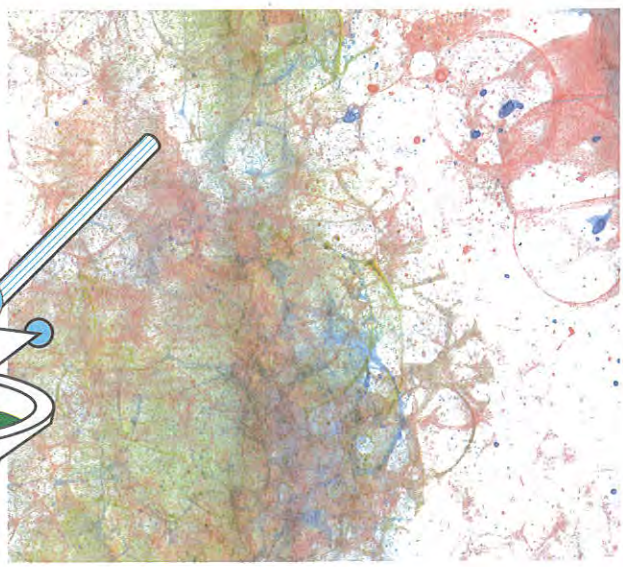
106...How to make bubble art

Prepare the following :

Un small plate
Soap solution <u>without</u> glycerine
Straw
Paper
Gouache paint

Find a small dish and put some water and soap liquid in it.
Take some water-soluble paint (gouache) and mix at least a tablespoonful of paint with the water and soap liquid. Prepare a piece of white paper and dampen it by sprinkling water on it. Now take a straw and blow into the solution to make a collection of bubbles on the top of the dish. Slowly bring the paper down onto the bubbles: as they pop they will make a pattern on the paper.
This page was coloured by this method.



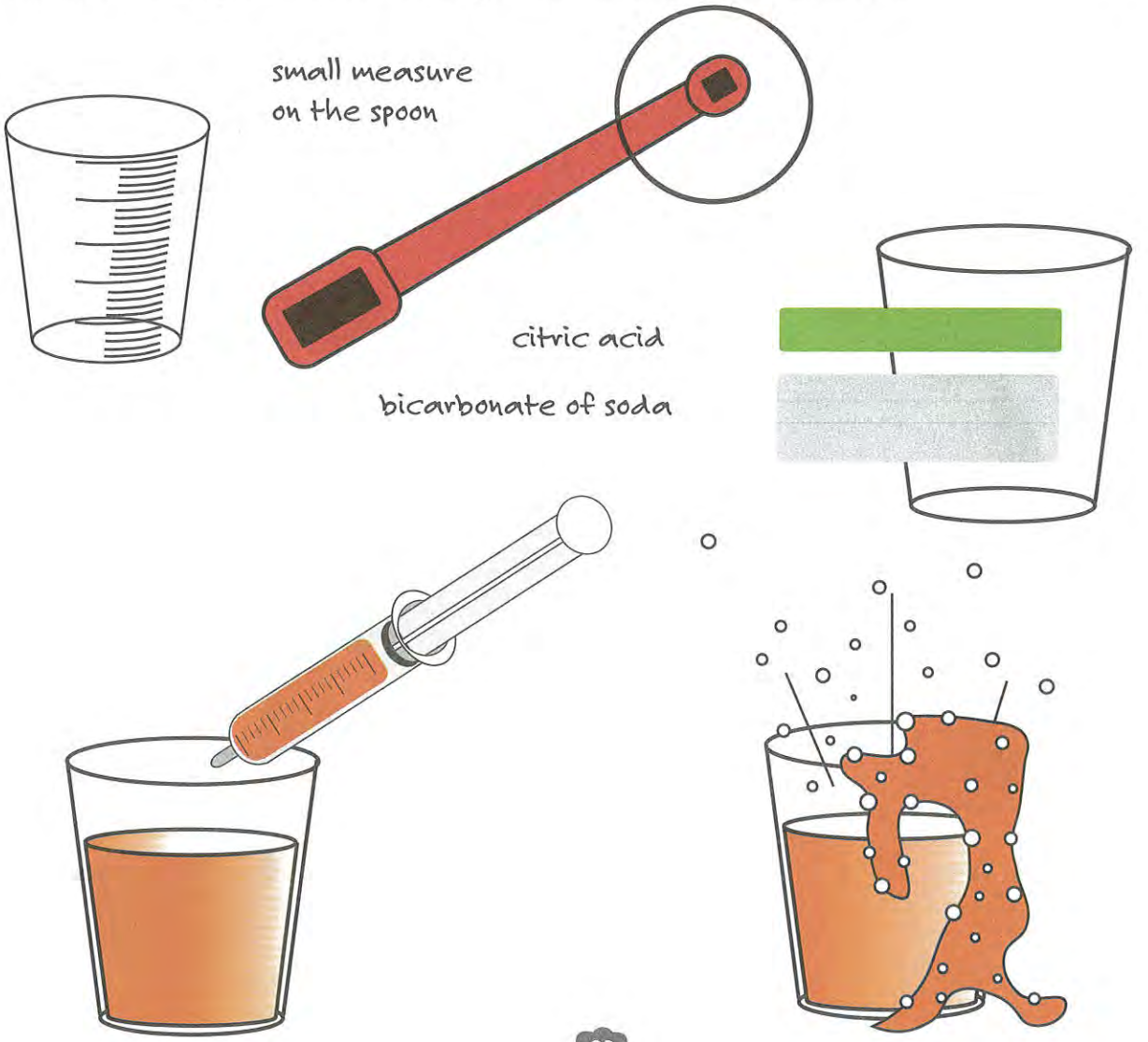


107...How volcanoes work...

Prepare the following :

Large drinking glass
Measuring cup
Syringe
Lemon Juice

You can make a chemical reaction to show the principle of how your volcano works.
Take a glass and stand it on a plate. Using your measuring cup, fill it to mark 10 with the Bicarbonate of soda. Pour this into the glass, add half the amount of citric acid, mark 5, into the glass and stir the 2
chemicals very well. Prepare coloured water by adding food colouring (small measure on your spoon) into another glass of water. Take you syringe, fill it with the coloured water and squirt it into the glass with the soda. Only do this once so that you don't finish all of your chemicals.

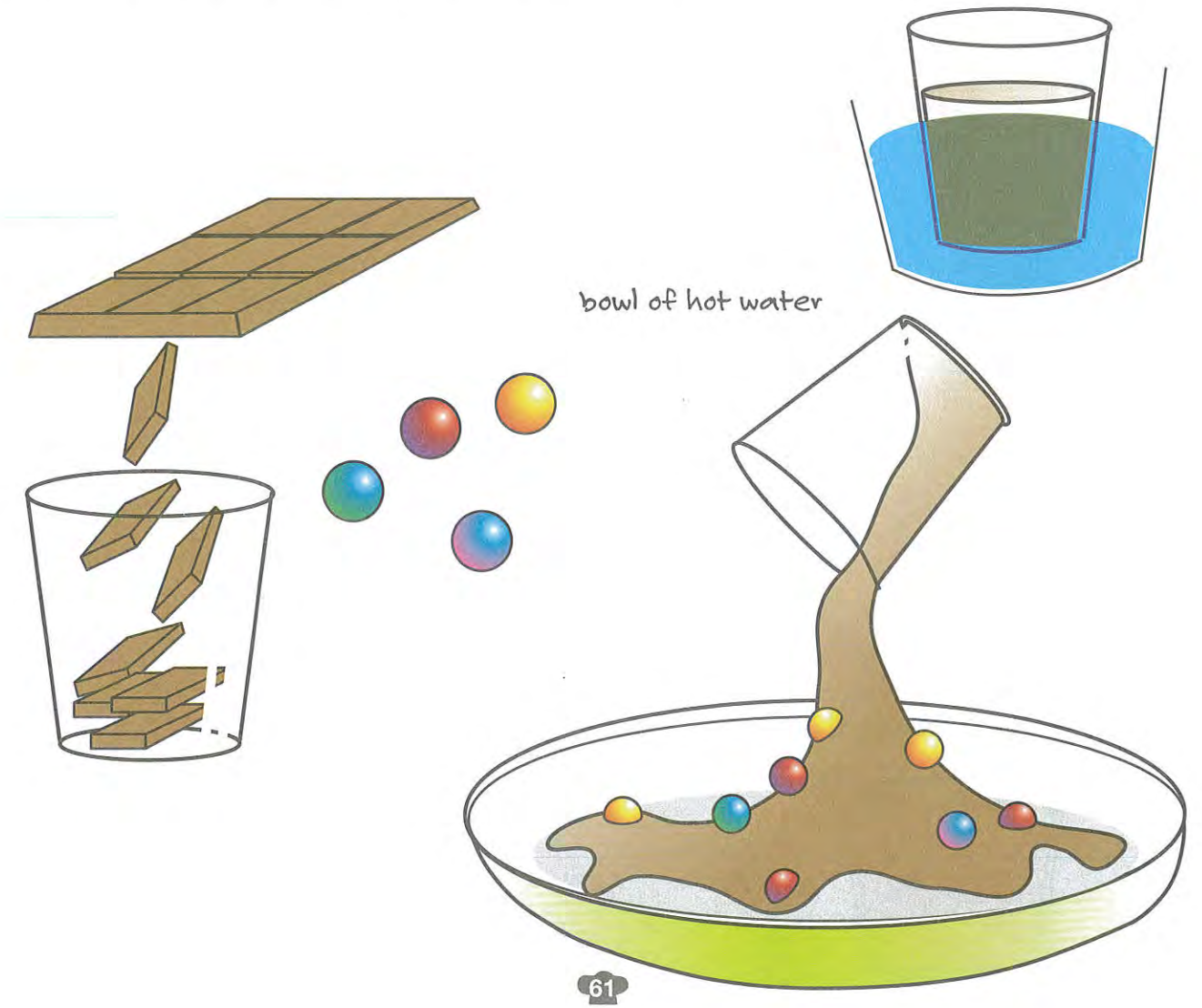


108...Chocolate lava

Prepare the following :

Small Sweets
Bar of chocolate
Plate
Glass
Bowl of hot water

This is a simple and sweet way to show you how lava looks and flows. Find a few different types of small sweets and put them on a plate. Take a bar of chocolate and break it up into small pieces. Put the chocolate into a glass and place the glass into a bowl of hot water and see if it melts the chocolate. If it does not ask a grown up to help you to melt the chocolate. When it has melted pour it slowly over the plate with the sweets; you will see how the lava which was once hard rock flows and covers everything in its way. When finished enjoy.

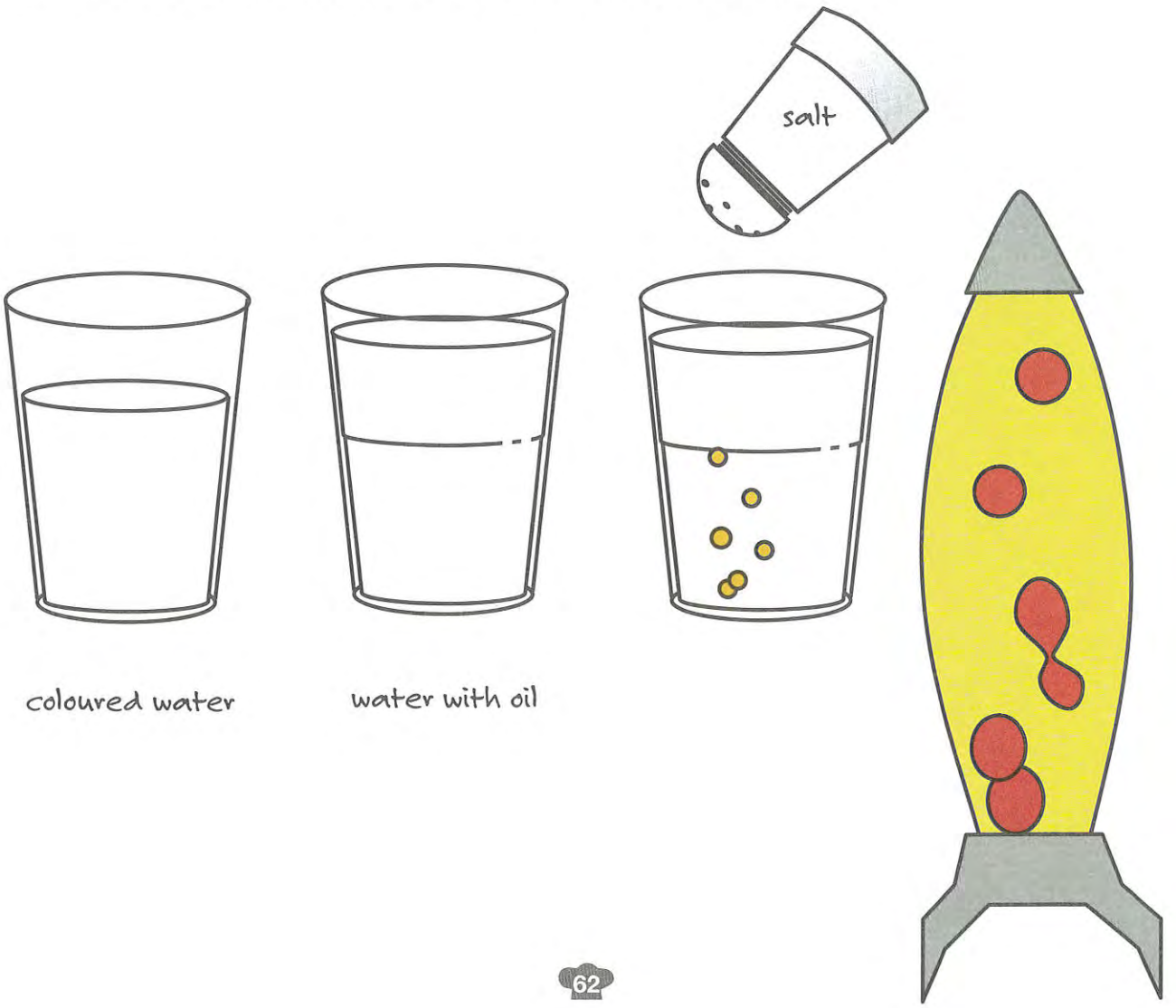


109...Lava light

Prepare the following :

Drinking Glass
Coloured water
Cooking oil
Salt

Have you ever seen a Lava Light ? We are going to make something very like that.
Take a glass and fill it 2 / 3 full of water; it is nice to add a little of the food colouring. Pour ordinary cooking oil into the glass till the glass is nearly full. You will see that the oil stays on top, it will not mix with the water. Try stirring the oil with the water and see what happens, the reason they do not mix is that the oil is lighter than the water. Take some salt and sprinkle it on the oil and watch as it floats down to the bottom of the glass taking with it drops of the oil.
After some time the salt dissolves and the oil floats back up to the top.

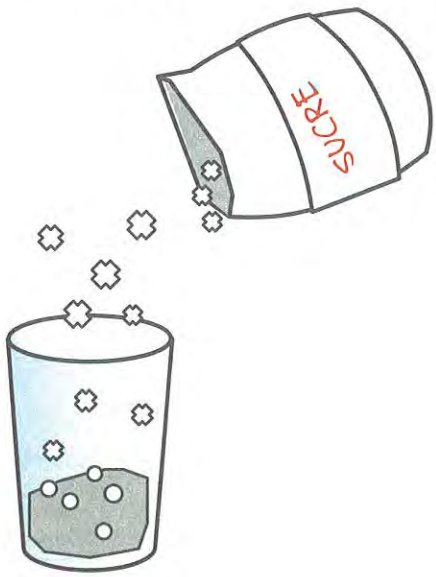


110...Soda

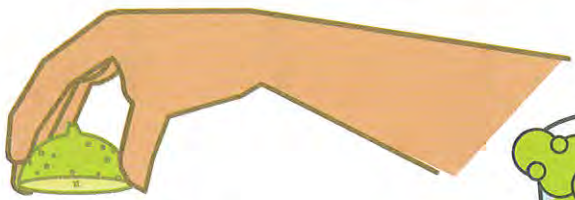
Prepare the following :

Glass
Baking soda
Sugar
Lemon juice

Find Baking Soda (only use baking soda for this) put two large spoon of baking soda into a glass and mix some sugar with it. Take another glass, fill it with water and a little lemon juice and pour it into the soda glass; you have made a Soda fountain drink.



glass with soda and sugar



lemon

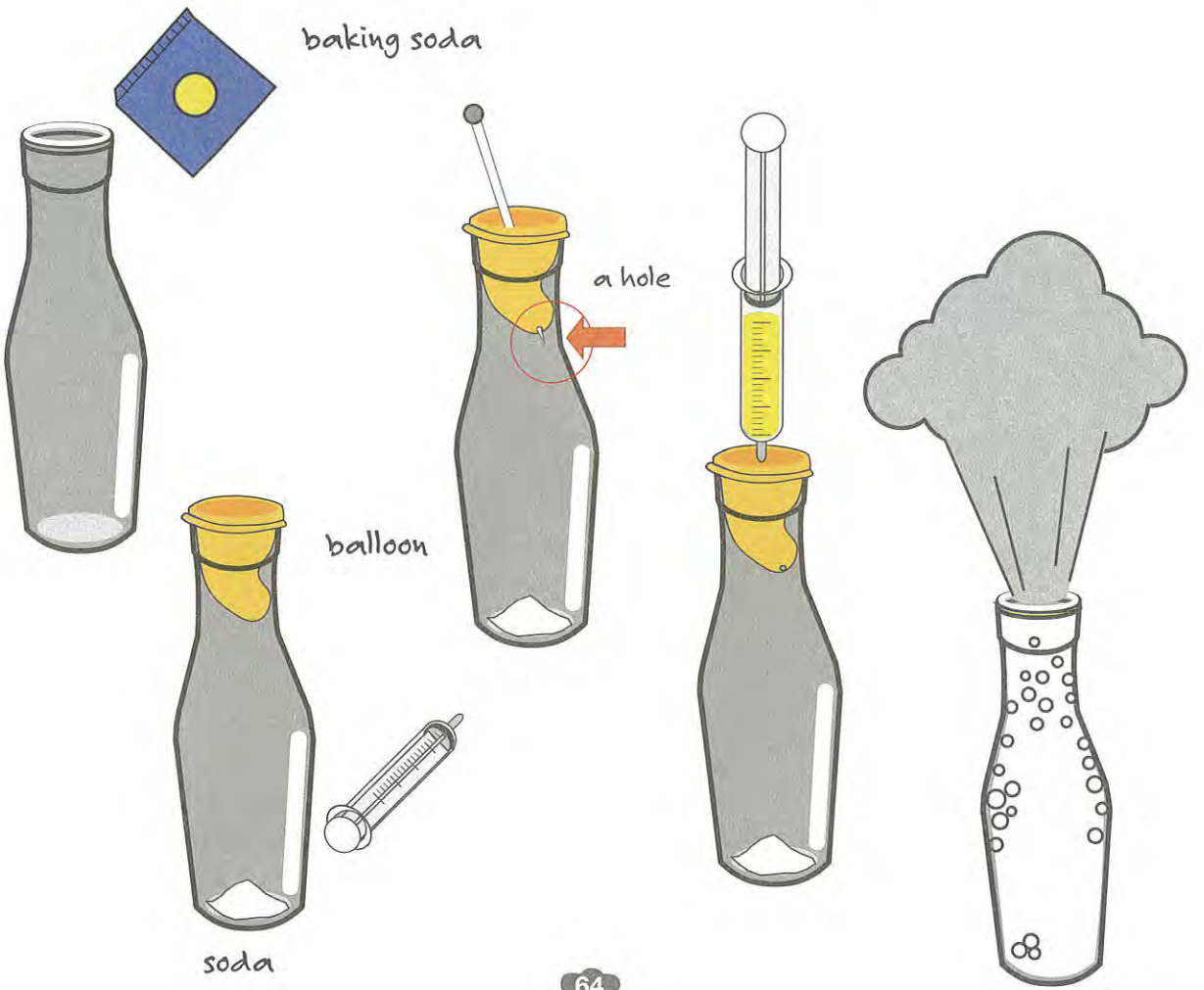
glass with water and lemon

111...Fire extinguisher

Prepare the following :

Syringe
Balloon
Bicarbonate of soda
Small bottle
Vinager or lemon juice

Making a fire extinguisher. Put some bicarbonate of soda into a small bottle.
Insert the small balloon into the bottle leaving the neck of the balloon outside of the bottle.
Fill your syringe with vinegar or lemon juice and insert the liquid into the balloon. Once it is full, poke a hole in the balloon with a needle or a toothpick. You know what is going to happen, so hold it away from you and do this over a sink or outside so that you don't make a mess.
This is how a proper fire extinguisher works. When you pull the handle on the extinguisher it breaks a small glass tube filled with acid. This causes a chemical reaction producing foam or powder that spurts out of the fire extinguisher and smothers the fire preventing oxygen reaching the flames.

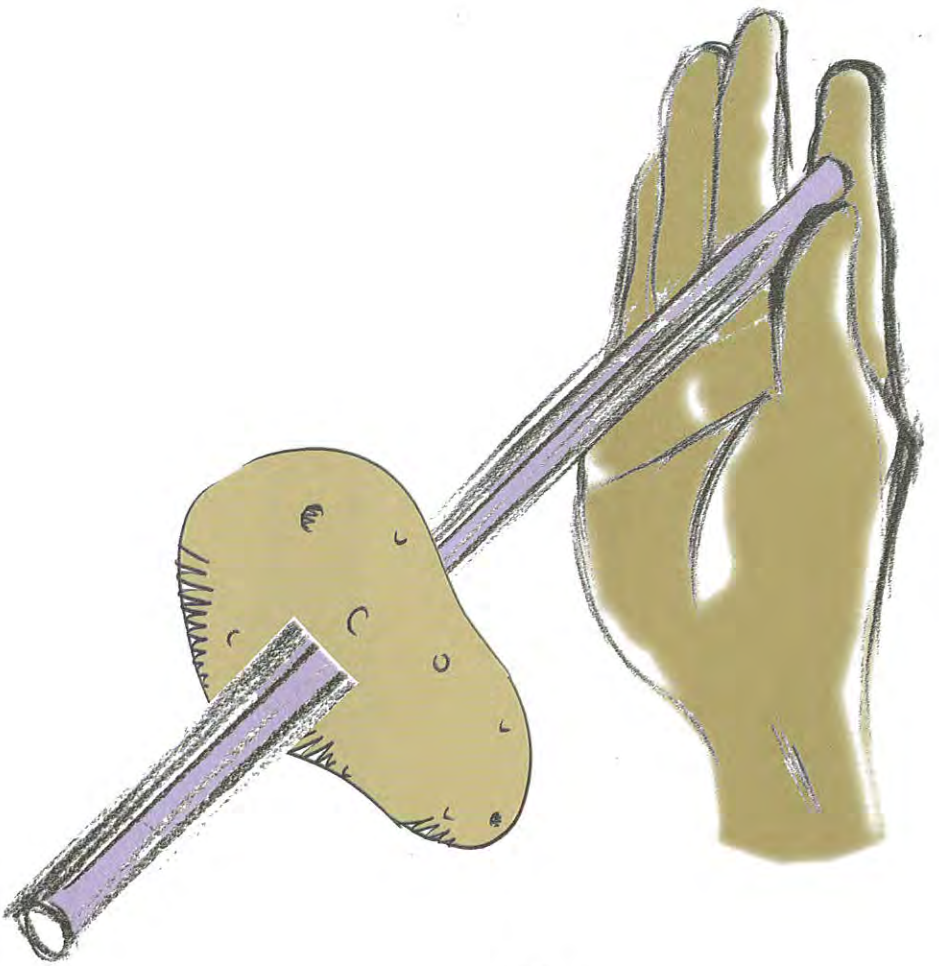


112...The pierced potato trick

Prepare the following:

A raw potato
Drinking straw (without a bend in the middle)

You are about to perform an amazing trick; you will pierce the hard raw potato with a drinking straw! Hold the potato firmly in one hand, and in your writing hand hold the straw as if you were holding a dart. Cover the end of the straw nearest to you with your index finger and with a firm flick, jab the straw through the potato at the top or bottom or at the side. Do not try to pierce the potato through the middle; this would be difficult!
You may find it easier to hold the potato on a firm surface and then try the flick and jab.
By closing the end of the straw with your finger you have trapped air in the straw which makes the straw more rigid and prevents it collapsing when you pierce the potato.
You may have to practice the flick and the jab to perform the trick successfully, but it is possible.
Also there are some potatoes which are easier to pierce than others.

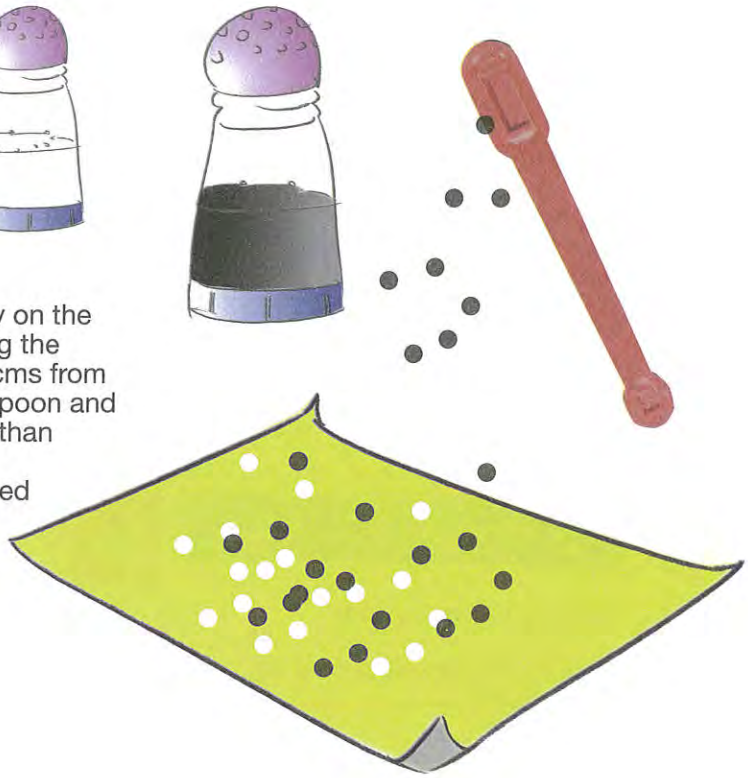


113...Separate salt and pepper

Prepare the following:

Salt and pepper
Plastic measuring spoon
Synthetic or woolen material
Plate

Mix some salt and pepper together on a plate. Take your measuring spoon and rub it vigorously on the woolen or synthetic material. Very gradually bring the spoon towards the pepper and salt. At about 3 cms from the plate the pepper will suddenly fly up to the spoon and leave the salt on the plate. The pepper is lighter than the salt and is attracted to the spoon by the static electricity that you created when you rubbed the spoon on the wool.



114...Can you make paper jump?

Prepare the following:

piece of paper
hole puncher
balloon
table

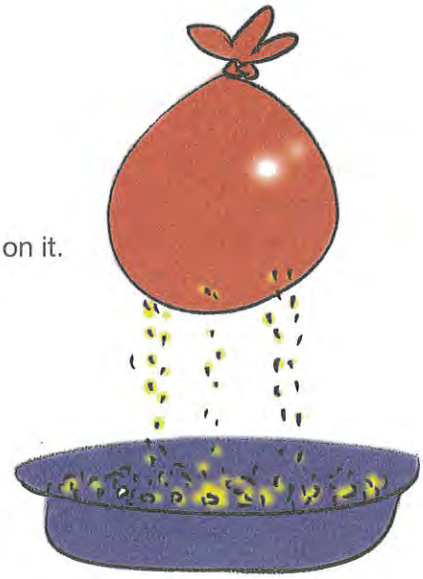
Punch out about 20 small circles of paper with the hole puncher (confeti). Spread the circles out on a table. Blow up a balloon and tie a knot. Rub the balloon a few times on your t-shirt. Now hold the balloon slightly above the circles. What happens to the circles paper?

115...Gelatine atraction

Prepare the following:

gelatin
dish
balloon

Prepare a dish with a little amount of gelatin sprinkled on it.
Blow up a balloon. Rub the balloon on your clothes,
wool material would be best.
Now hold the balloon slightly above the dish.
What happens?



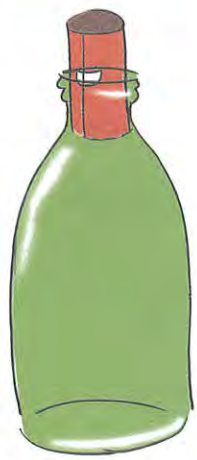
116...Create a cloud

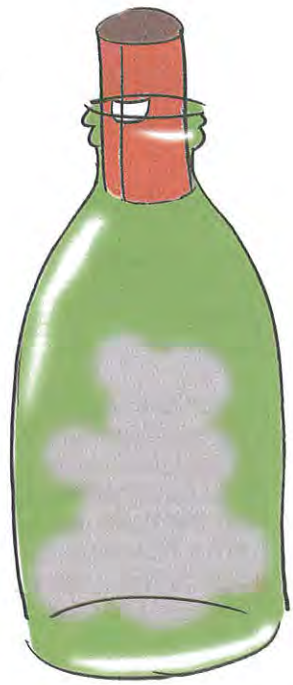
Prepare the following:

glass bottle with wide opening
small candle
paper sheet

Prepare a tube by rooling a piece of paper and securing it with a piece of adhesive tape. Have an adult light a small candle. Turn the bottle upside-down.Hold is opening above the candle flame for about 10 seconds. Immediately and very carefully place one end of the paper tube inside the bottle,
and the other end
in your mouth.
Blow in strongly.
Release the tube from
your mouth.
Observe the cloud...

blow in strongly...



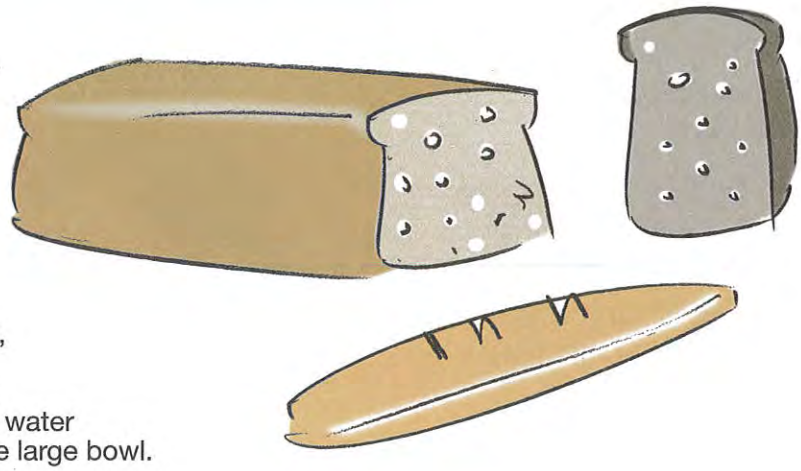


Safely extinguish after use, do not move a burning candle, keep away from flammable materials, keep away from young children and pets and always use on a stable heat resistant surface.

117...Why does bread have holes in it?

Prepare the following:

a 1-liter bowl
a 2-liter bowl
1 cup of flour
15 ml of sugar
15ml sugar
10 grams yeast
small towel

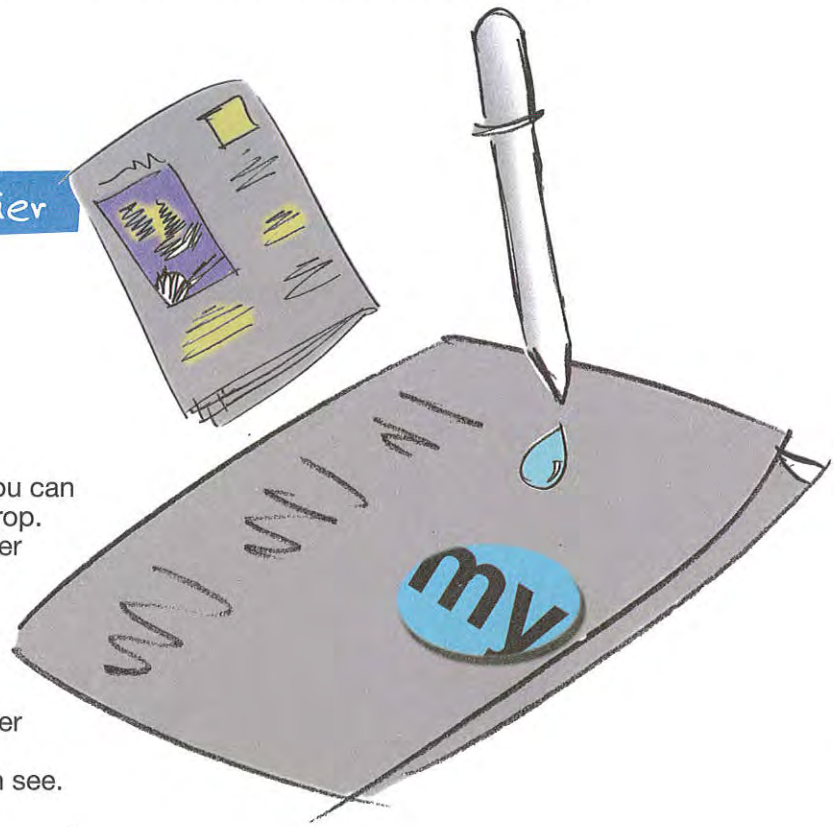


Mix together in the 1 litre bowl, the flour, sugar and yeast. Add 1 cup of warm water and mix well. Pour 3 cups of warm water and stand the small bowl in the large bowl. Cover with the towel.
Leave the mixture for 4 hours but have a look every half hour. You will see that all the time more and more bubbles are appearing on the surface of the mixture. A chemical reaction is occurring between the yeast and the sugar, making bubbles of carbon dioxide. These bubbles make holes in the bread as the mixture rises and also during baking.

118...Water drop magnifier

Prepare the following:

eyedropper
tap water
newspaper



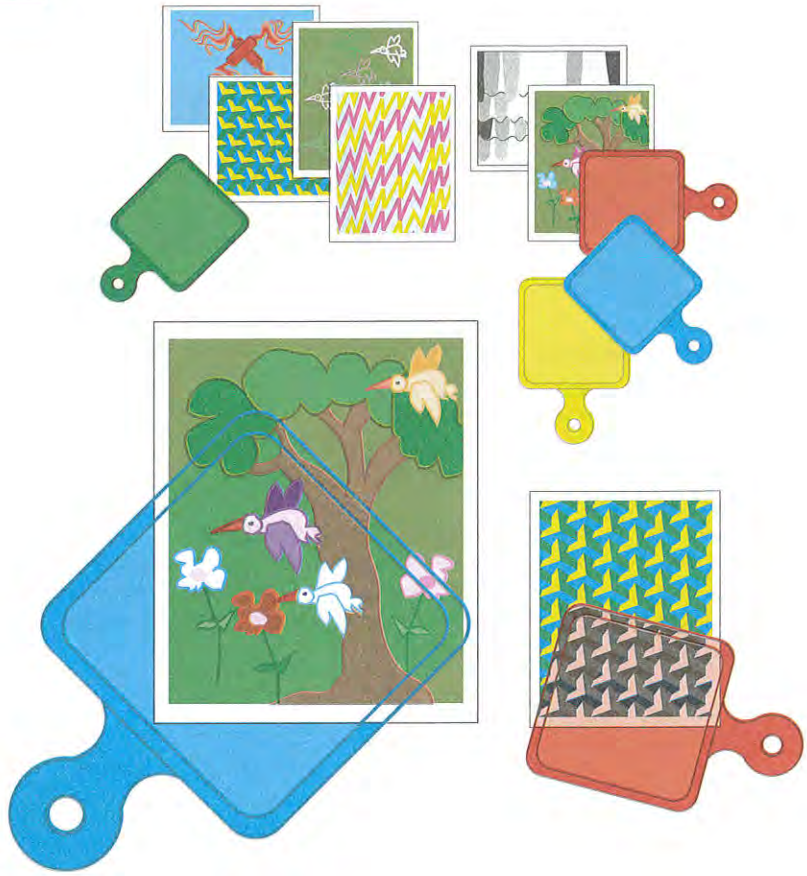
Place the smallest drop of tap water you can on the newspaper. Look through the drop. If you want to enlarge it, add more water with your eyedropper.The water drop bends the light reflected from the object under it like a glass lens of the same shape. The drop of water magnifies better when it is small because the upper surface has a greater curvature,,and therefore the greater the magnification the less area you can see.

119...Changing colours

Prepare the following :

4 coloured filters
Printed cards

Turn to the next page of coloured pictures and see how the pictures change when looking through the filters.

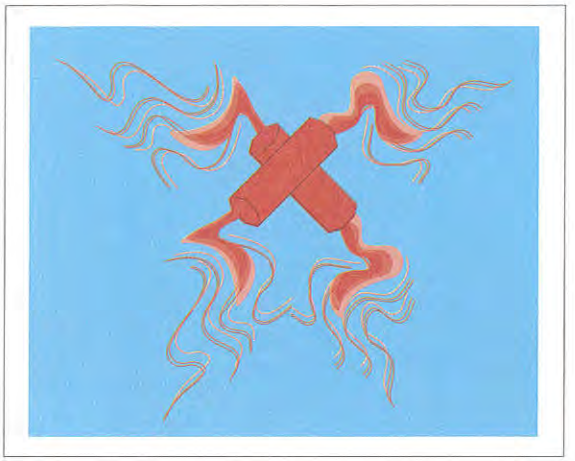


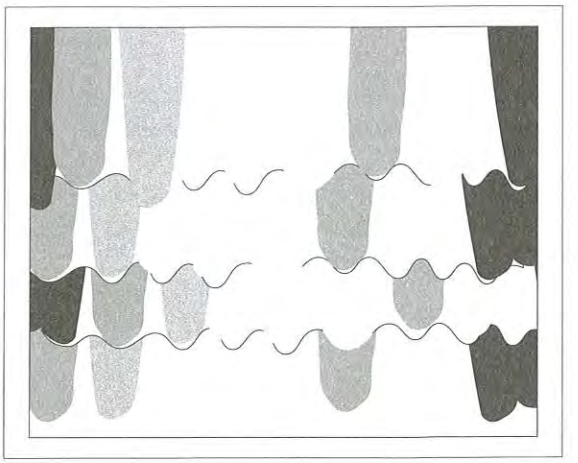
120...Discovering with coloured filters

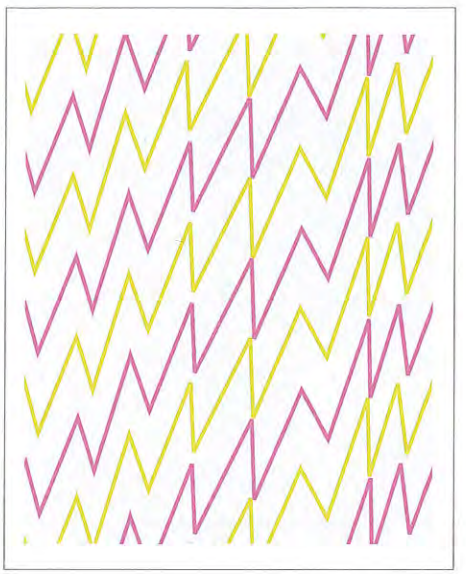
Prepare the following :

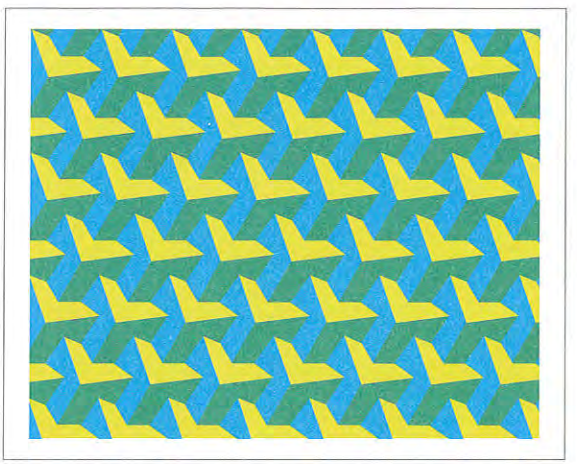
Red and green filters

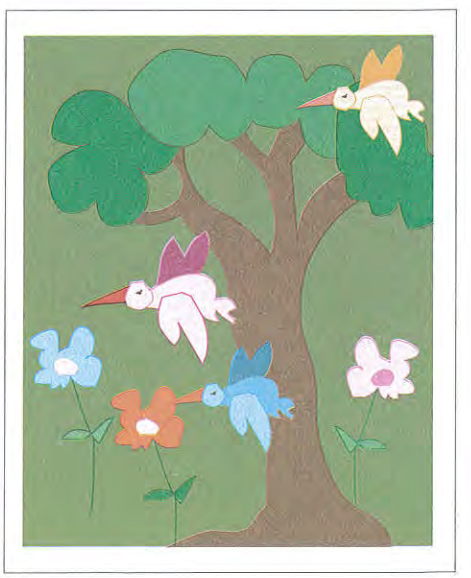
Take the last page of the book.
You will find the page printed in green and brown.
Use the filter to see what happens with the picture.











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