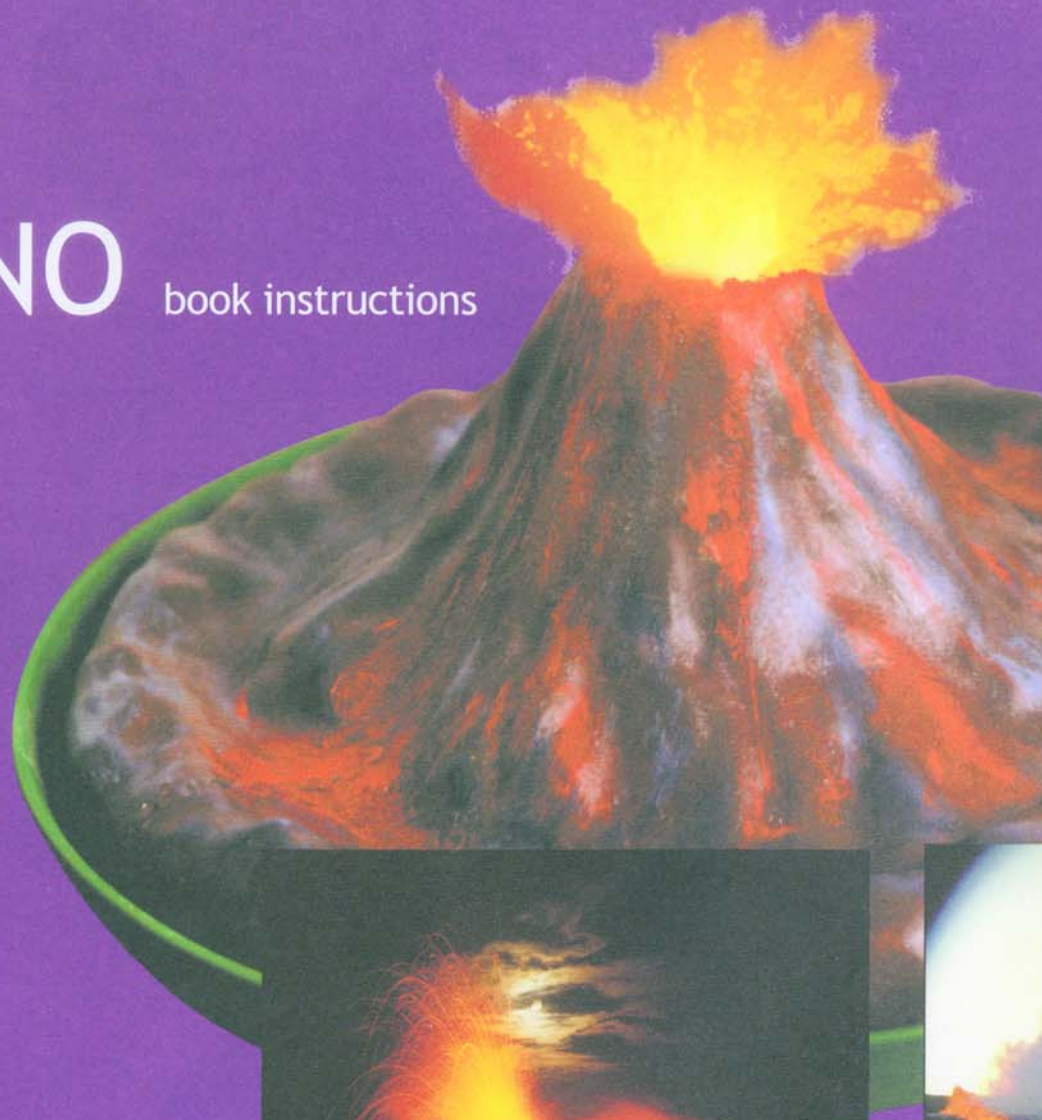
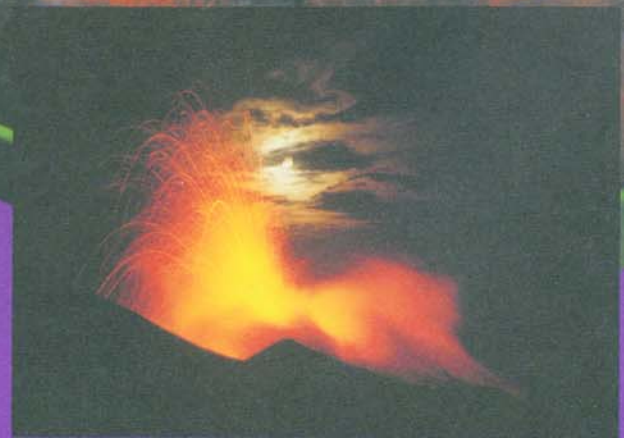
VOLCANO

book instructions





GO VOLCANO - INTRODUCTION

This kit has been developed to arouse
the interest of the child in the natural phenomena of volcanoes.
The mystery surrounding volcanoes has held the fascination of scientists throughout the ages.
For over 2 million years volcanoes have been erupting and changing the topography of the earth.
The economies of towns and villages in the vicinity of active volcanoes have been seriously damaged,
lives have been lost and many people made homeless due to the damage caused by molten lava ash and
volcanic debris. For those children that want to research Volcanoes more thoroughly
we can suggest going into the USGS web site (www.usgs.gov).
This kit demonstrates volcanic eruptions using simple chemical reactions.
The chemicals are all harmless and some of the materials needed are in everyday use in the house.

Some simple rules must be observed. The area in which the activities are carried out
must be covered with paper or cloth to prevent damage to furniture or carpets.
There are activities in the kit that need adult supervision and some that require the use of
goggles.These activities are marked with an icon.

It is advisable to read the instructions together with the child so that they are fully understood.

The materials supplied in the kit are Bicarbonate of Soda and Citric Acid. They should be
mixed as per the instructions. Household materials that can also be used are Baking Soda,
vinegar, lemon juice, food colouring, red cabbage, and washing powder.

WARNINGS

* MUST have adult supervision for all experiments marked with an icon.
* MUST read the instructions before use, follow them and keep for reference.
* MUST always wear safety goggles.
* MUST keep young children, animals and those not wearing eye protection, away from the experimental area.
* MUST store the kit out of reach of young children.
* MUST clean all equipment after use.
* MUST wash hands after experimenting.
* MUST dispose of any material, which has been mixed and is not for further use.
* DO NOT eat, drink or smoke in the experimental area.
* DO NOT allow materials and solutions to come in contact with eyes and mouth.
* DO NOT use any containers or equipment used in this kit for any other purpose.
* DO NOT dispose of any material from this kit in the kitchen; all materials must be flushed down the toilet.
* DO NOT use rechargeables batteries, only 1.5 AA batteries.

FIRST AID INSTRUCTIONS

IF materials come in contact with the skin, immediately rinse with soap and water.
IF materials come in contact with eyes or mouth, immediately flush with large amounts of water for 15 minutes. If irritation occurs, seek medical attention. If fumes are inhaled, move to an area of fresh air. If any adverse symptoms occur, seek medical attention.
IF materials or solutions are swallowed, immediately rinse the mouth, drink several glasses of milk or water.
Seek medical attention and contact poison control center.

TEL N° :

Volcano Parts List

Volcano Base

Two halves of the volcano

Bottle (chamber) and top

Column

Measuring Cup

40 gr Bicarbonate of soda

20 gr Citric acid

Food Coloruing

Safety goggles

Spoon

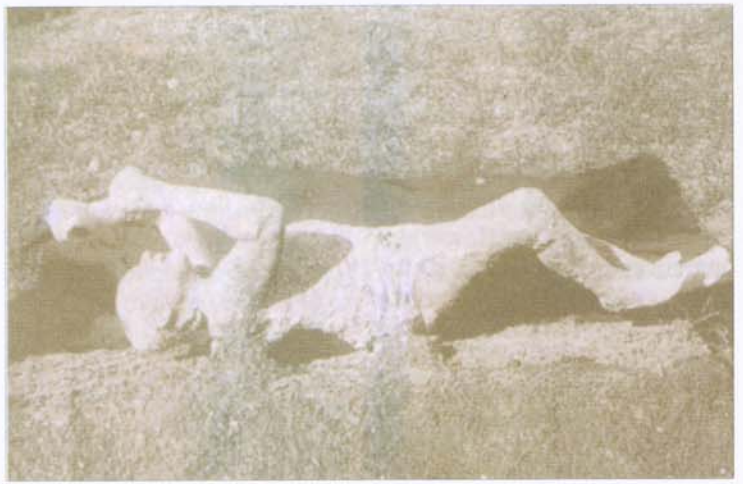
Set of Paints

Paint brush and small sponge

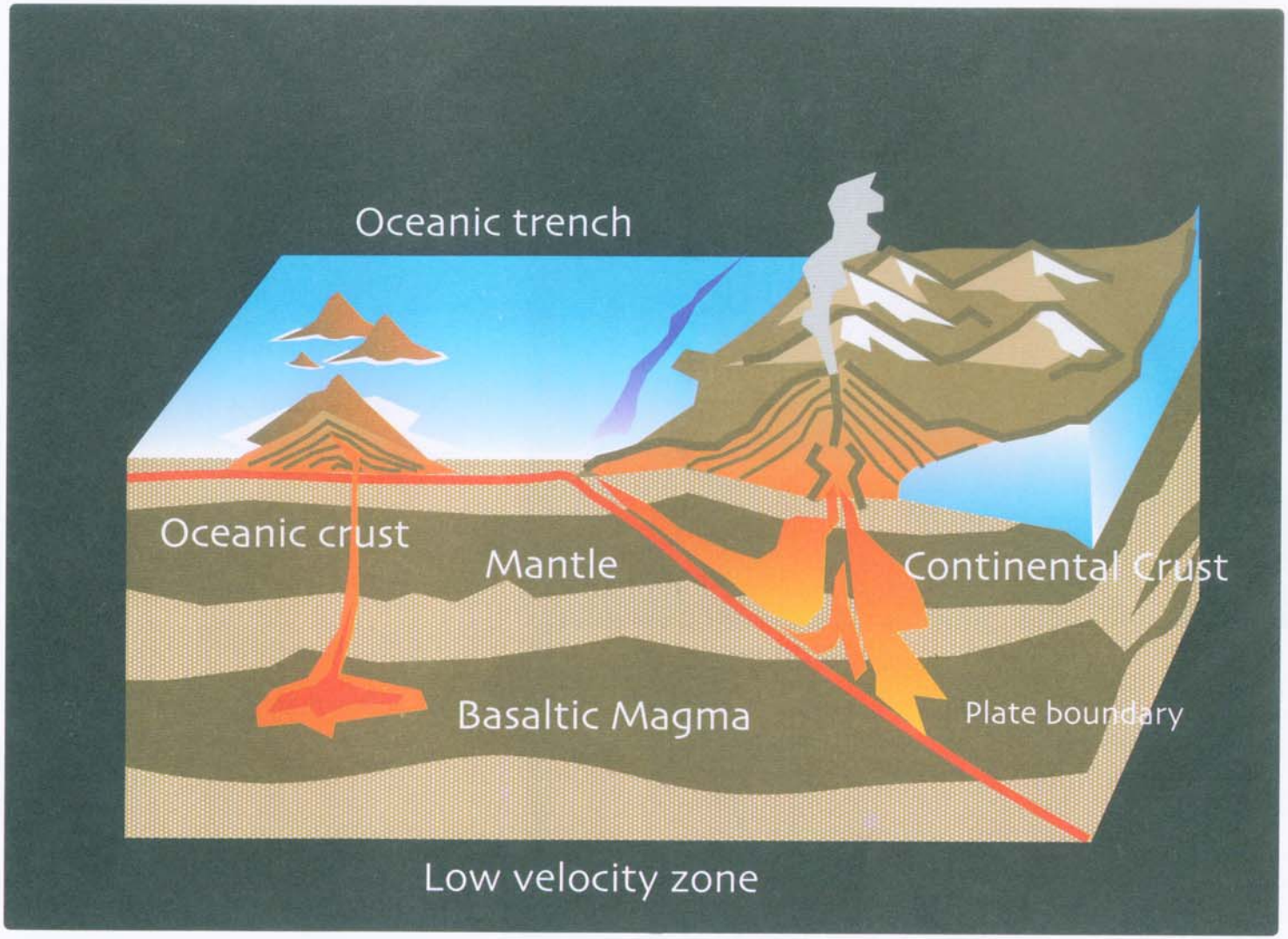
VOLCANOES

The mystery surrounding the formidable and awe-inspiring power of volcanoes has existed for thousands of years.
Man tried to explain the phenomena in many different ways; the anger of the Gods or great storms on underground oceans.
Aristotle had a theory that air forced through narrow underground passages burst into flames as a result of friction.
With the development of modern science around 1600, scientists renewed their interest in volcanoes.
Once again various ideas and theories were put forward, but at that time scientists did not have equipment to explore below the earth's surface, and they were unable to prove their theories. In the 18th century a Scottish doctor came up with the theory that volcanoes were caused by heat escaping from the earth's core: this was close to the truth. Today we know much more about the layers of the earth and why volcanoes erupt.
The outer layer of the earth, called the CRUST, consists of plates of solid rock which fit together like pieces of a jigsaw puzzle. Where these plates meet there are weak spots in the rock formation.

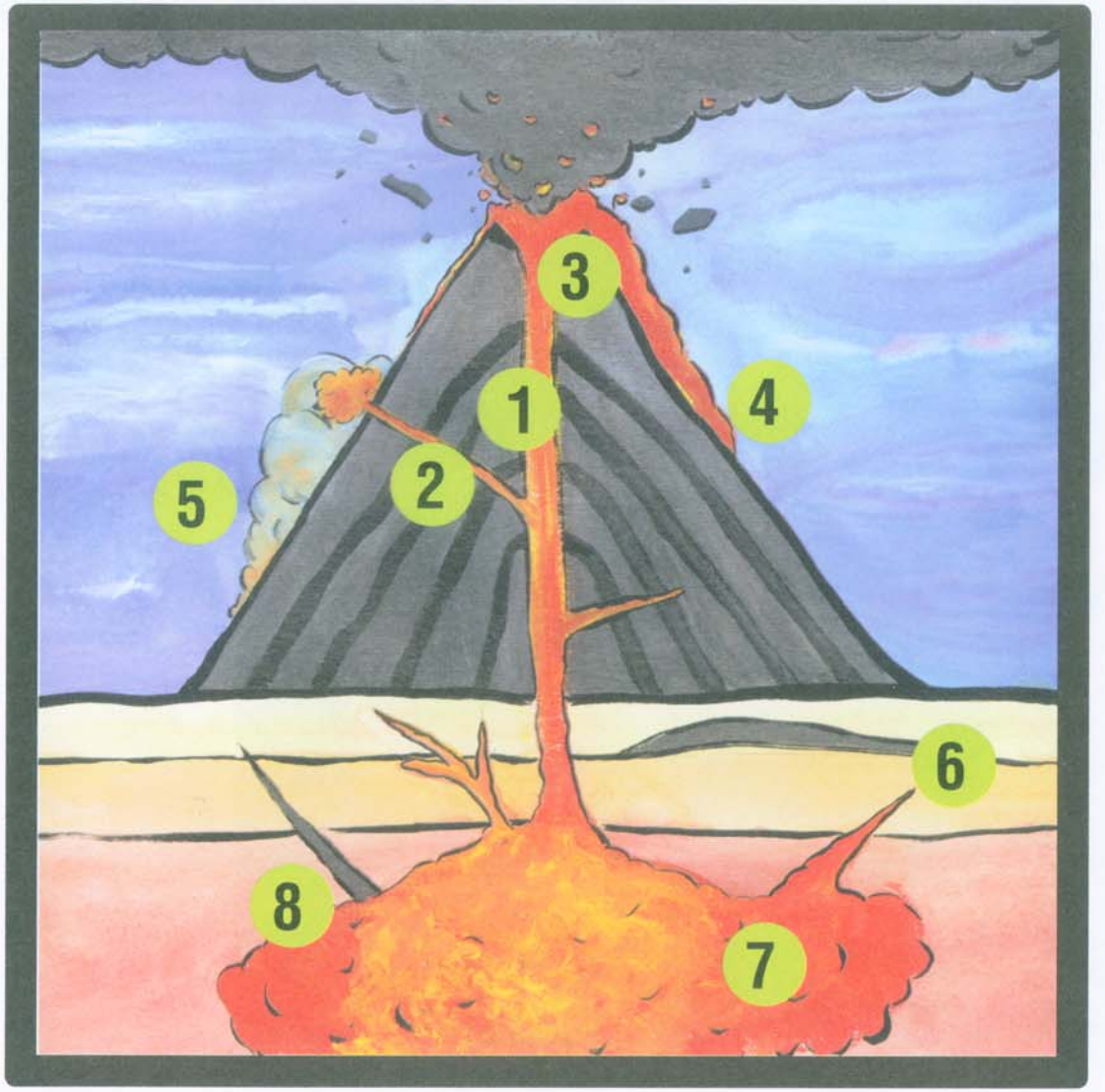
Under the CRUST is a layer of red hot rock called the MANTLE, and deeper still at the earth's core is a layer of rock which is thought to be of iron and nickel.
The layer of red hot rock in the middle, the mantle, is constantly under pressure from the layers on either side which are continually moving.
The result of these forces together with the heat, cause some of the mantle to melt and form molten rock called MAGMA.
The magna consists of crystals, pieces of hard rock, dissolved gases, minerals and traces of other chemical elements.
Magna has a temperature of about 1000 degrees Celcius. The gases and the heat cause the pressure to build up and the magna pushes up through the weak spots in the earth's crust. The magna and the gases erupt through a vent in the earth's surface and a volcano is formed. The magna is now called lava, and as it erupts from the volcano it forms a mountain around the vent from where it emerged.
The remains of the Italian town of Pompeii are one of the most striking examples of the terrible consequences of a volcanic eruption.
Pompeii was situated at the foot of Mount Vesuvius, about 20 kms southeast of Naples.
On August 24th 79 AD, Mount Vesuvius erupted and obliterated Pompeii and most of the 2,000 inhabitants.
The town was buried under six metres of lava, pumice (light rock formed from lava with air bubbles in it) and other volcanic debris. Excavations in 1860 revealed the true devastation of Pompeii and very exact documentation was made of each street and house. The lava had preserved everything extremely well and today, if you visit Pompeii you can see the town as it was on that fateful day in AD 79. The excavations have revealed beautiful public buildings, private homes, artisans workshops and even a bakery with the mills, kneading machines and loaves of bread. Inscriptions on the walls show election notices, details of market days and children's scribblings.
The inhabitants of Pompeii were caught unprepared by the sudden eruption of Mount Vesuvius and to this day you can see their bodies preserved in plaster by archeologists.



CROSS SECTION OF LAYERS OF EARTH SHOWING FORMATION OF VOLCANO



FORMATION OF VOLCANO



1.- **Chimney:** brings up lava and gas

2.- **Vent:** opening where lava escapes

3.- **Crater:** top of the volcano

4.- **Lava:** melted rock

5.- **Hot gas:** steam and various gases

6.- **Sill:** hardened magma between layers of rock

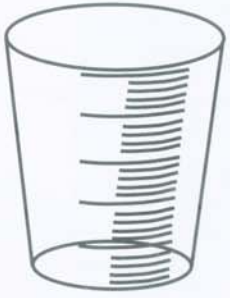
7.- **Magma:** melted rock

8.- **Dike:** magma moves through hardened rock

Activity 1

So that you can have some fun before you start painting the volcano, 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.
Pour the coloured water slowly into the glass with the soda. Only do this once so that you don't finish all of your chemicals.

small measure on the spoon



10 CC

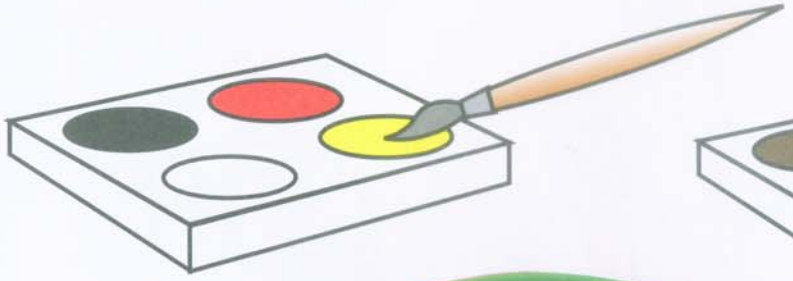
5 CC

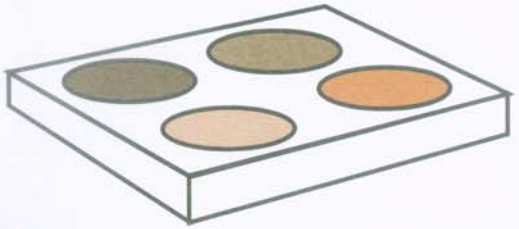
citric acid

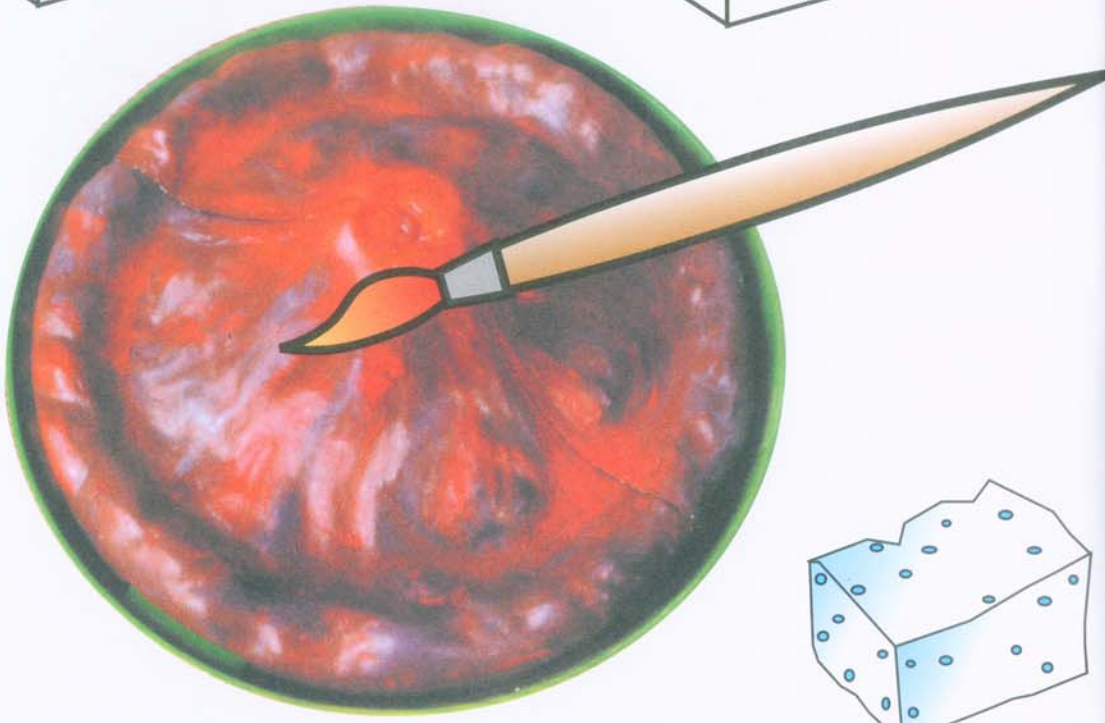
bicarbonate of soda

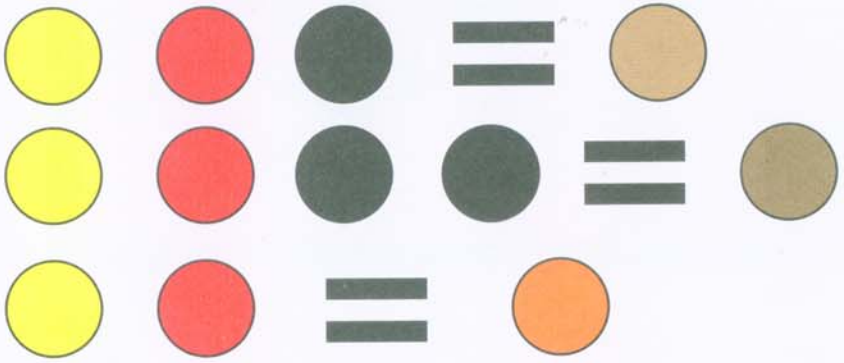
Activity 2

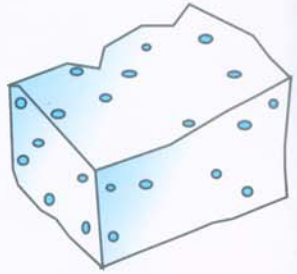
To paint your volcano take the small sponge and paint both of the volcano halves with your white paint, it is best to use the small sponge.
When this is dry, mix some Black+Red+Yellow paint to make a brown colour. It's best to prepare several shades of brown. You do this by changing the amount of Yellow in the mixture. You can use your artistic talents to make it life like.
Before making a volcanic eruption you have to wait a good few hours for the paint to dry so that the colour does not come off when the volcano erupts. If you have clear lacquer at home it would be a good idea to spray or paint over the paint.







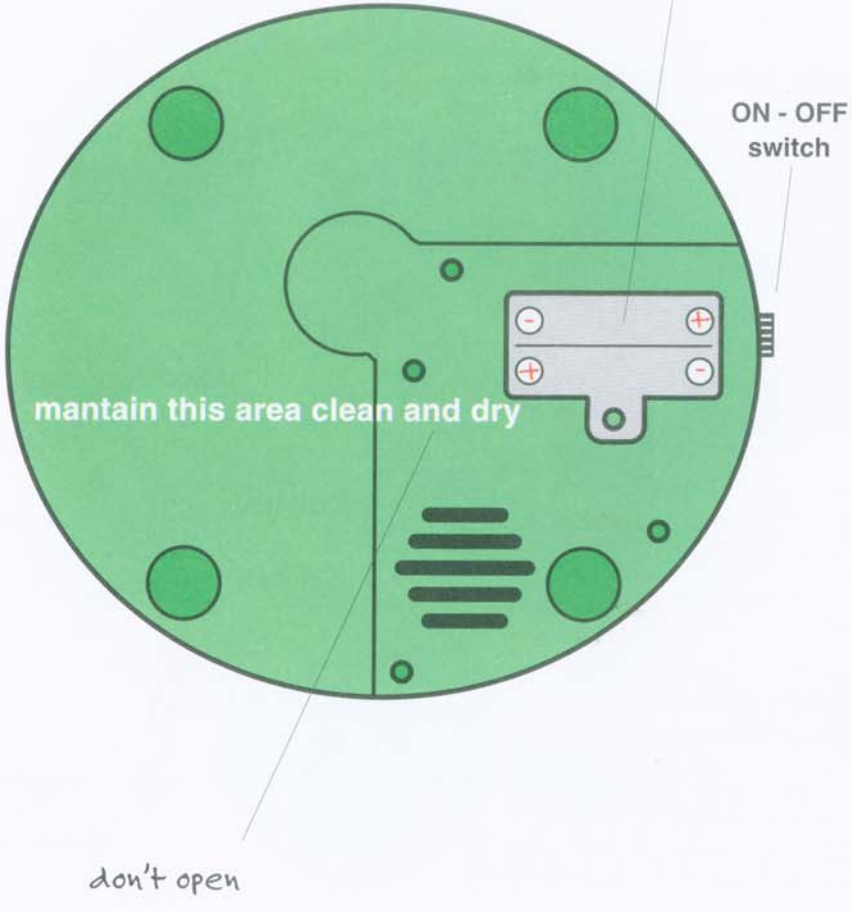


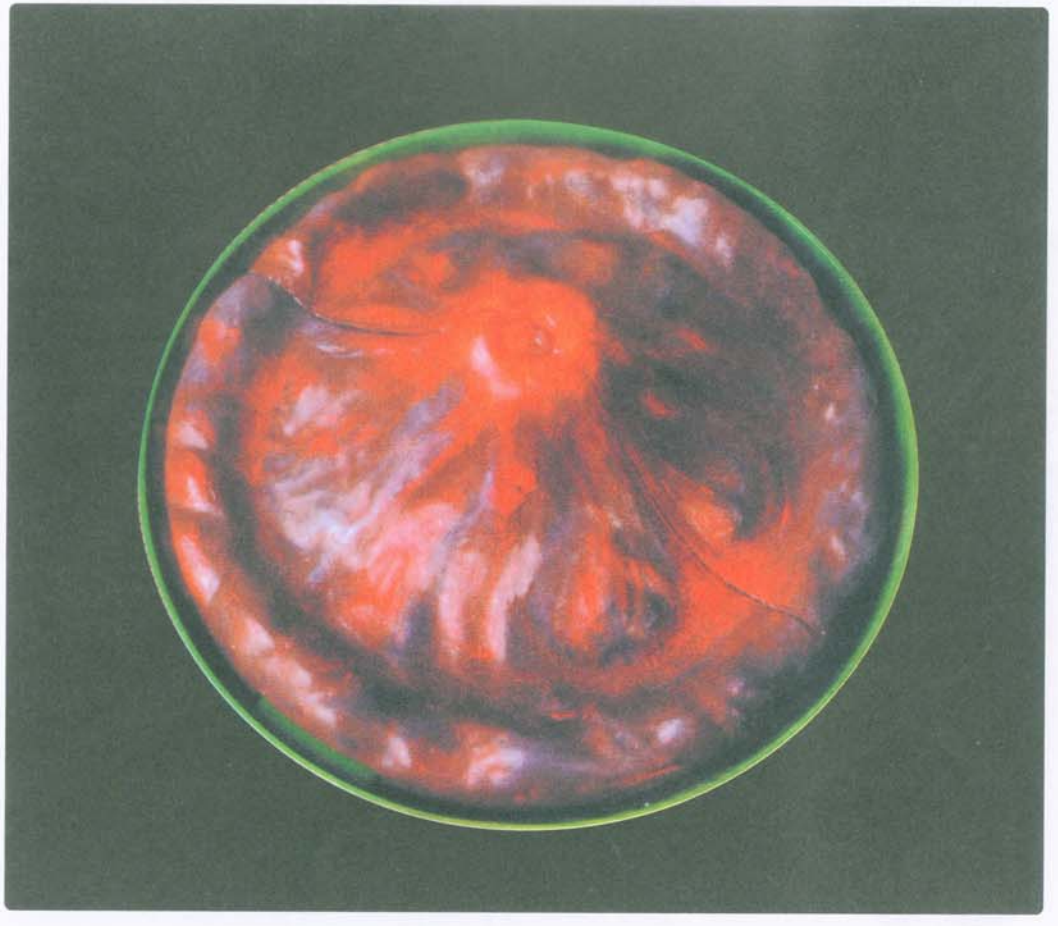


use the sponge to add texture to your volcano...

Activity 3

This activity demonstrates a volcano while it is dormant (not erupting).
Open the battery compartment in the base of the volcano and insert 2 AA batteries.
Make sure they are inserted correctly and close the compartment. Wait till the evening, turn off the lights in the room and switch on the volcano light. If you look into the volcano you will see how an active volcano looks from the air before it erupts.



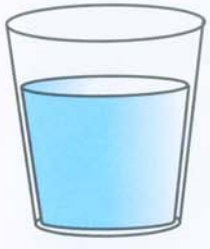


Activity 4



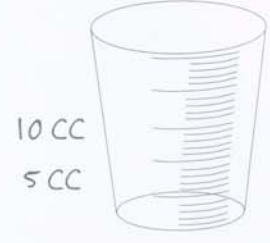
You are ready to demonstrate your first Volcanic Eruption.
Prepare your working surface by covering the table with old newspapers.

1. First check that you have inserted the 2 AA batteries and closed the battery holder properly.
2. Prepare the chemicals; fill the measuring cup to the 10 mark with Bicarbonate of soda, and pour it into the chamber. Take the Citric acid, and fill your measuring cup to the 5 mark. Add this to the Bicarbonate of Soda in the chamber and mix well with your measuring spoon.
3. Close the chamber with the top; make sure it is closed well.
4. Take a glass of water and using your measuring spoon add a small measure of coloring to the water.
5. Make sure that the tap on the hose is closed and then pour the coloured water into the water column.
6. Take the base marked A and fit it onto that part of the base which is slightly raised where it covers the sound module and battery holder.
7. Put your safety goggles on.
8. Switch on the sound effects and the light.
9. Open the tap and let the water run until it stops; then close the tap. You can stand the water column on a box or some books to get the water to flow better.

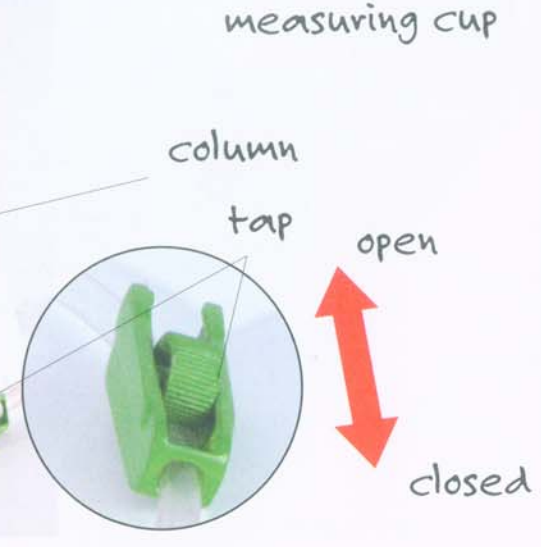


water

coloured water

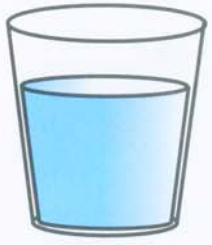


measuring cup



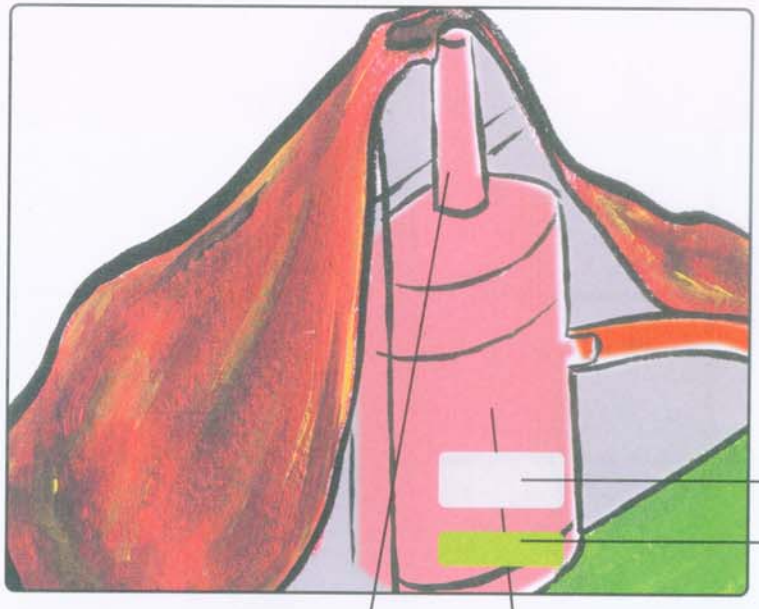
Activity 5

After you have tried this with half of the volcano, refill the chamber, fit the other half into the base and repeat as you did before.



water

coloured water



bicarbonate of soda

citric acid

chamber top

chamber

ingredients into the chamber:

bicarbonate of soda

citric acid

Activity 6

Now that you know how to do this, try using other materials for making the Volcano.
Use some Baking Powder instead of Bicarbonate of Soda, and instead of using the Citric acid fill the column with either lemon juice or vinegar. Decide which gives you better results.
It's a good idea to make a note of the amounts used for future reference.

volcano notes

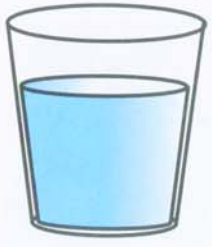
material/amounts					material/amounts				
Bicarbonate of Soda	Mark10								
Baking Soda									
Citric Acid	Mark 5								
Vinegar									
Lemon Juice									
Results	Very Good								

Activity 7

You can make different types of eruptions. The ones we have made up to now are like the "Fountain erupting" volcanoes. We will try and make a "Stromboli eruption" which cascades over the sides of the volcano rather than shooting straight up.

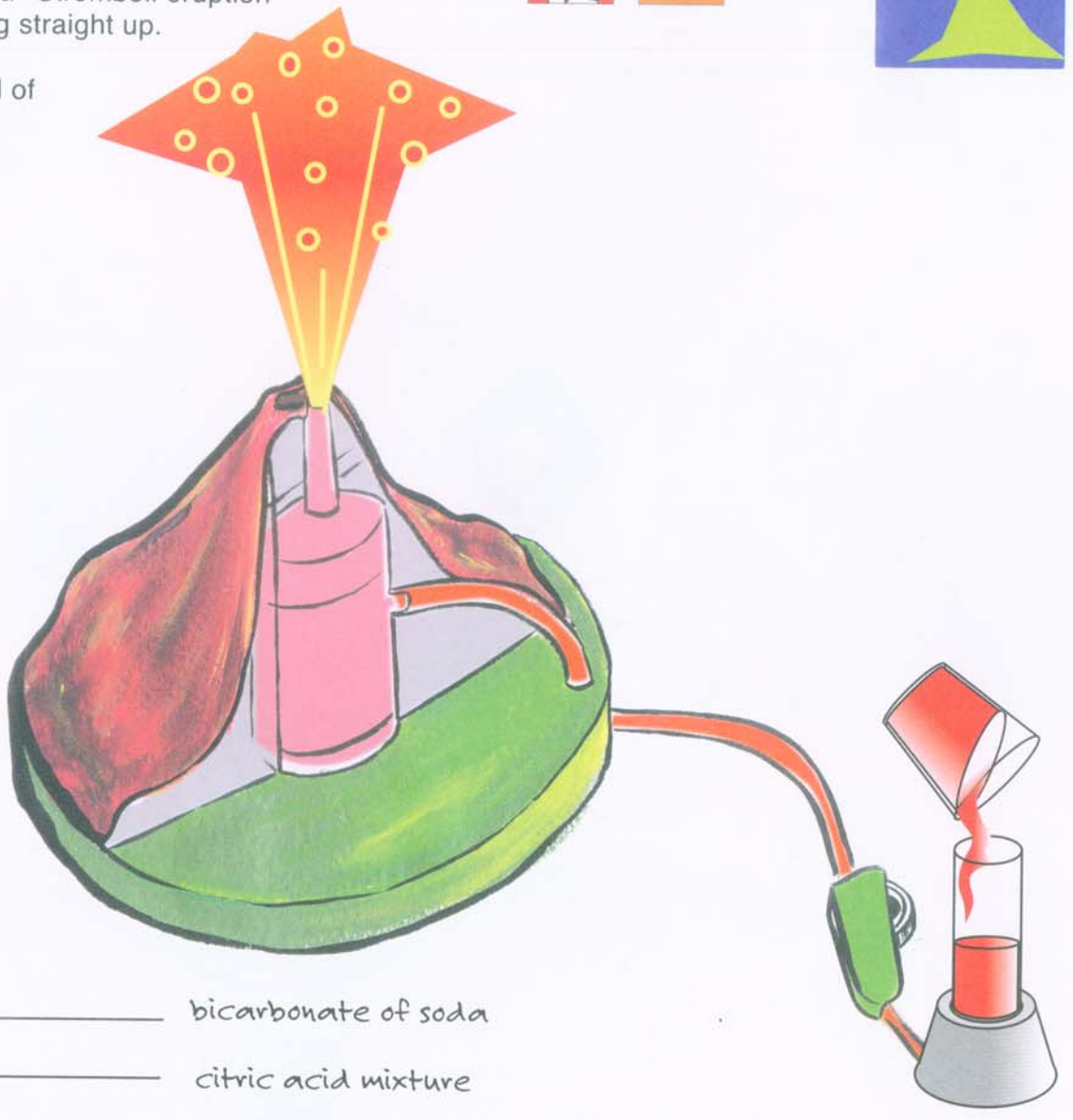
Use the same mixture of chemicals as before but add a spoon full of washing powder into the mixture.

spoon full of washing powder



water

coloured water



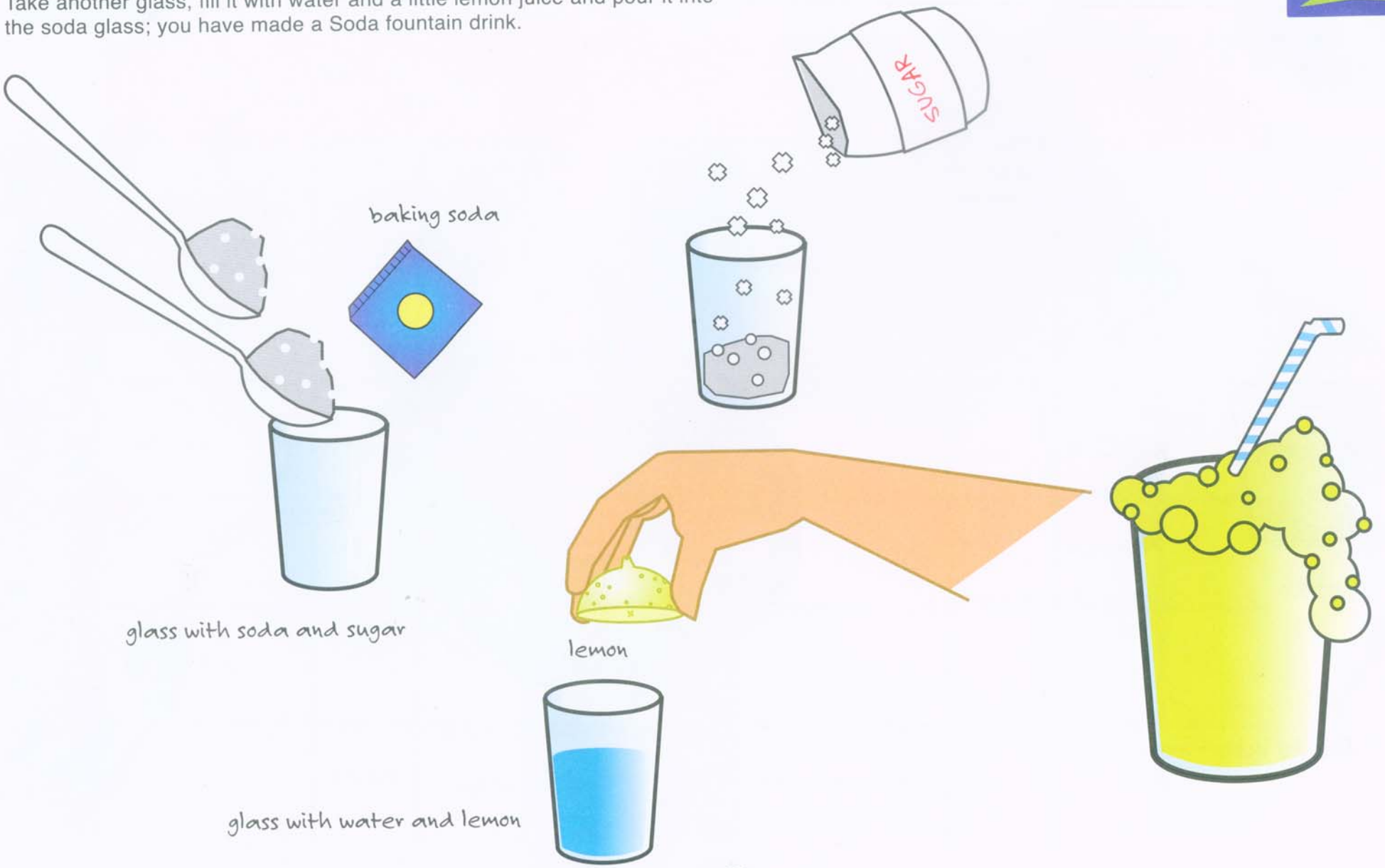
ingredients into the chamber:

bicarbonate of soda

citric acid mixture

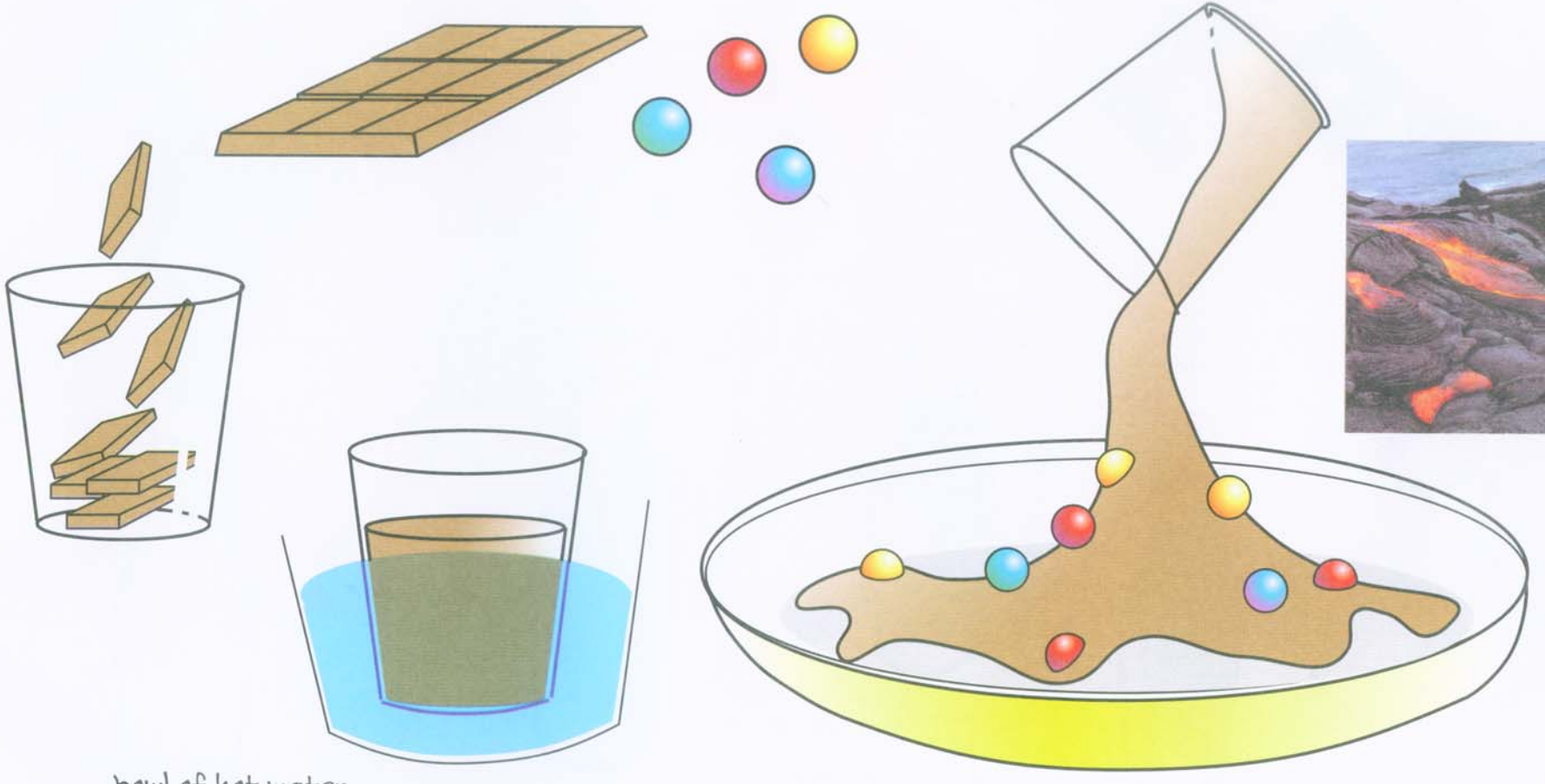
Activity 8

If you can find baking soda (only use baking soda for this)
put two large spoons 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.



Activity 9

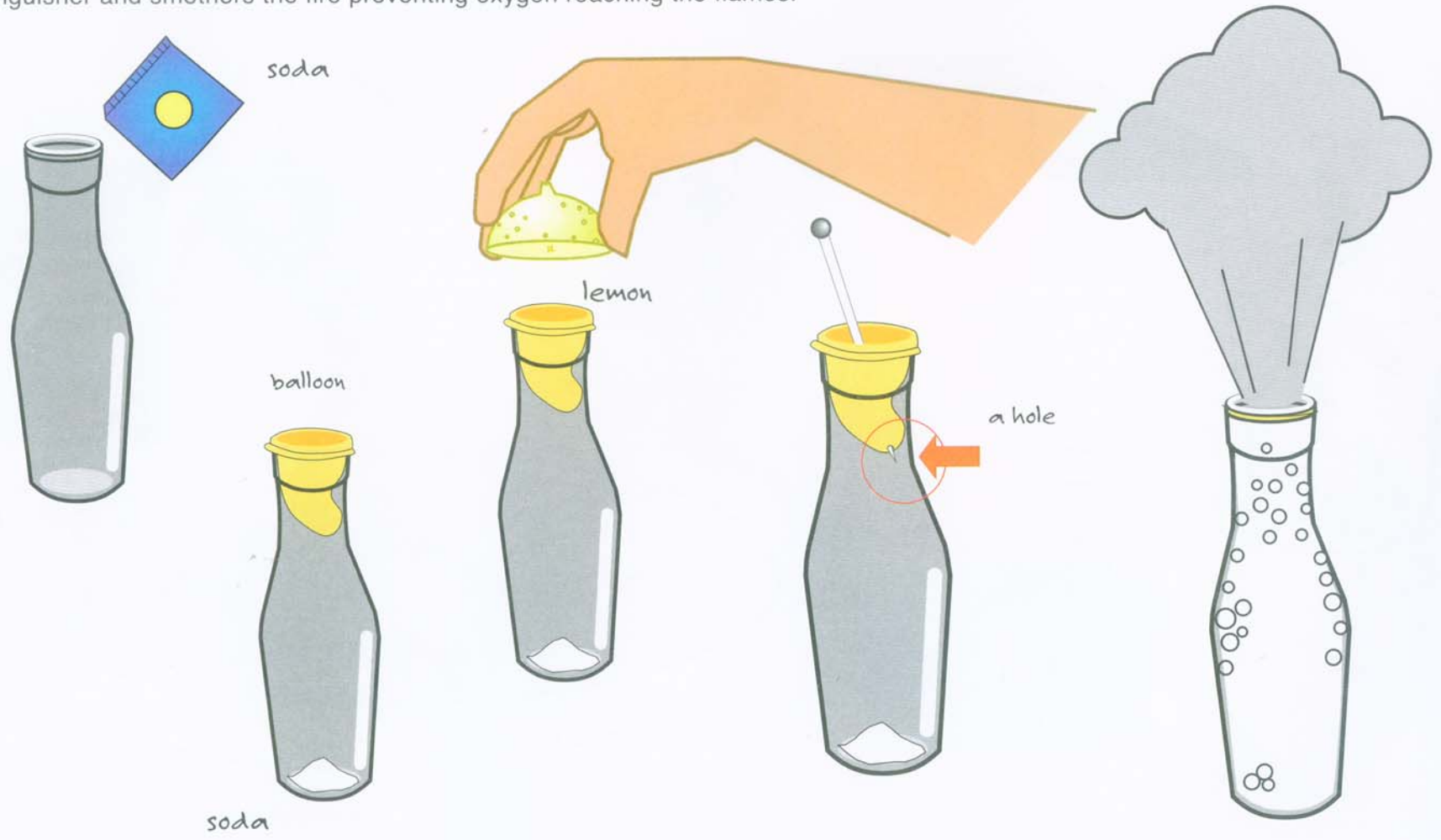
This is a simple and sweet way to show you how lava looks and flows.
Find a few different types of small sweets and put them on a plate. Take a bar of chocolate and break it up into small pieces.
Put the chocolate into a glass and place the glass into a bowl of hot water and see if it melts the chocolate.
If it does not ask a grown up help you 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.



bowl of hot water

Activity 10

Make a fire extinguisher. Put some baking soda into a small bottle.
Take a small balloon, put it 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 tooth pick. 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.

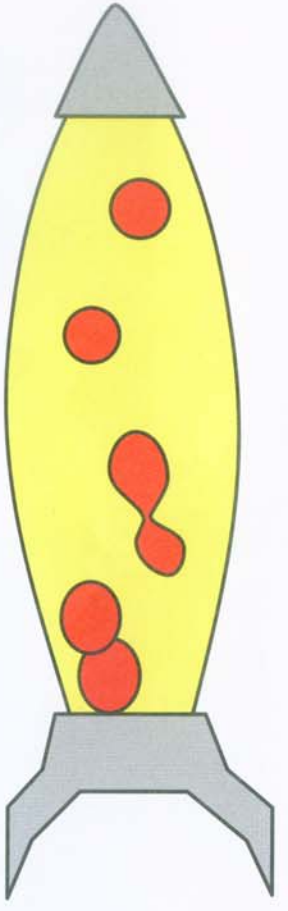


Activity 11

Have you ever seen a Lava Light? We are going to make something very similar.
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 until the glass is nearly full.
You will see that the oil stays on top, it will not mix with the water. Try stiring 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.

coloured water

water with oil

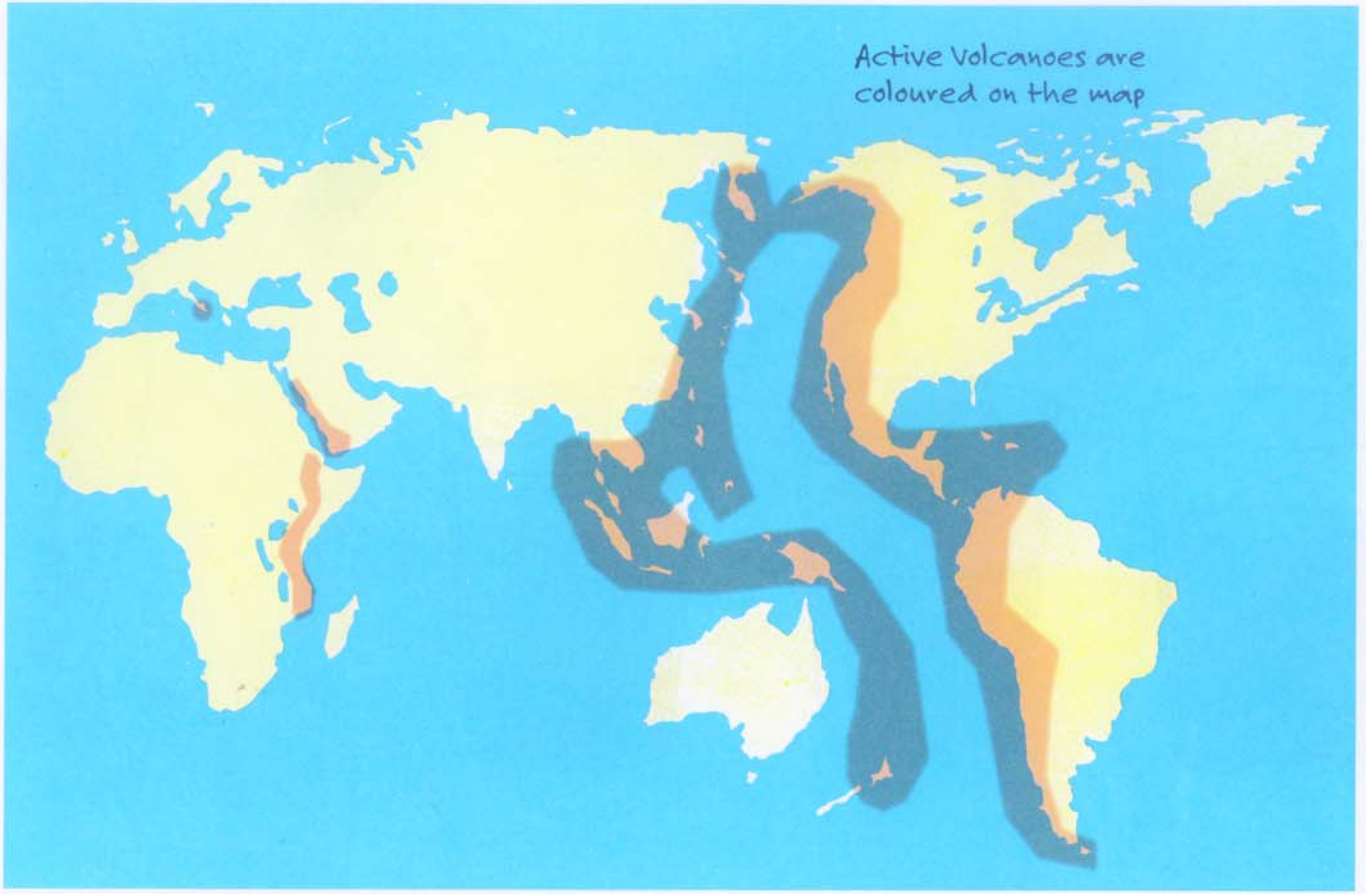


Activity 12

You can try this with other materials that dissolve and are heavier than the oil, try sugar, you can keep adding salt or sugar as long as you like.

Activity 13

Make a log and follow the news and every time you here of a Volcanic eruption mark it on your map in this manual.

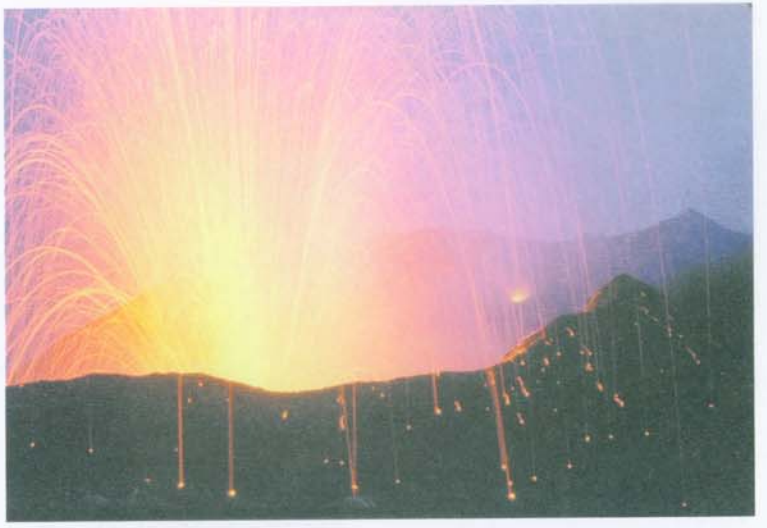


If you are fascinated by the subject of volcanoes we can recommend that you look up on the internet the following site: www.usgs.gov/gip/volc/environments.html

Various views of active volcanoes

Images of volcanoes by courtesy of U.S. GEOLOGICAL SURVEY

Various views of active volcanoes



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Various views of active volcanoes

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