

Amazing Discoveries!

Science Experiments for Kids

vol. 02

Name _____

Class _____

Amazing Discoveries! Science Experiments for Kids



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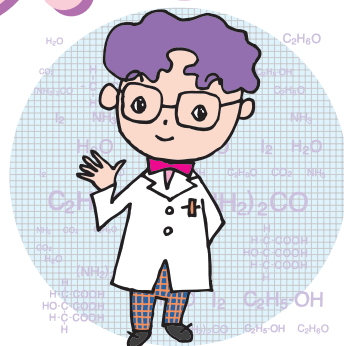
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Purose of this Booklet



Do you know what an "experiment" is?

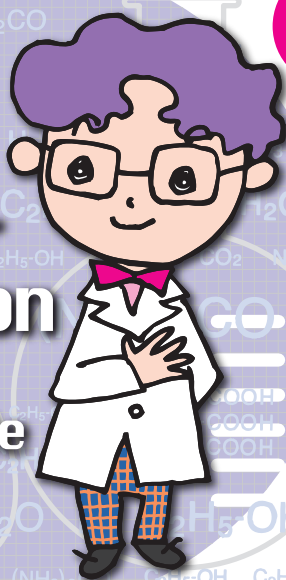
An experiment is something you do answer mysterious questions about the world.

This booklet is your easy, step-by-step guide to performing many exciting science experiments with the help of adults so that you can make amazing discoveries about the world around you!

Meet Your Teacher

Professor
Miyamon

Profile



Hi! My name is Miyamon. I am a junior high and high school science teacher. And I'm an expert at making amazing discoveries! So join me as, together, we conduct fun experiments to discover things you want to know. But one word of warning first. Scientific experiments can sometimes be a little dangerous. So let's make sure we do them with the utmost care and safety at all times. With that firmly in mind, let's go make some amazing discoveries.

Our Experiment Pals

Dropper



Silver



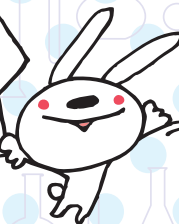
Tin



Dr. Miyamon



Tweezer



Hisser



Beaker



Flasko



Note to Adults

This booklet was created to give young learners a chance to engage in scientific experimentation to answer questions, solve problems and discover many wonders about the world under the supervision of Kaisei Junior & Senior High School teacher, Kazuhiro Miyamoto, Tokyo, Japan. The booklet is targeted toward children ages 5-6 and designed to allow them to conduct experiments with adults supervision and guidance. When conducting any of the experiments in this booklet, please make sure to observe the following rules.

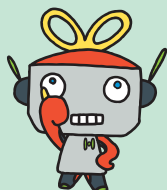
- 1) Always wear protective goggles when handling chemicals.
- 2) Always thoroughly wash away any chemicals that get on hands, clothes and other parts of the body.
- 3) Scissors or utility knives should be handled only by adults as part of the preparation prior to conducting the experiments with children.

Experiment 1

Let's Change the Color!

Date: (Day) _____, (Month) _____

1



Let's change the color of the water of red cabbage to different colors!



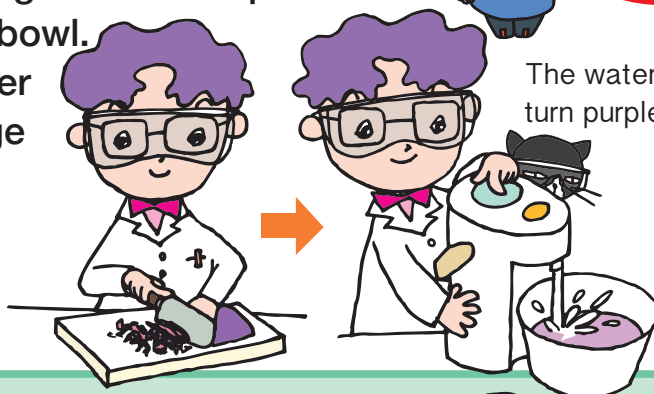
What to Prepare



Experiment Method

1

Cut the $\frac{1}{4}$ cabbage into small pieces and put them in the bowl. Pour boiled water until the cabbage pieces are submerged.



Attention!
Don't get burned

The water will turn purple.

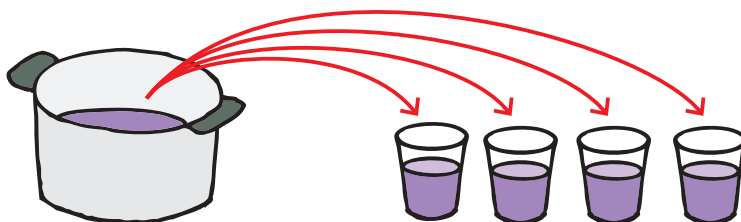
2

When the water cools down, use a strainer to separate the cabbage pieces.



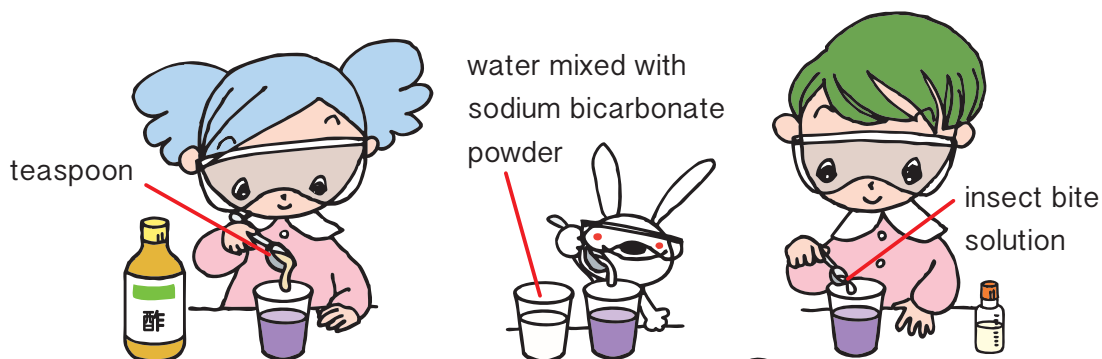
3

Pour the purple water into the 4 cups.



4

Pour one teaspoon vinegar in one cup, one teaspoon of water mixed with sodium bicarbonate powder in another and one teaspoon of the solution for insect bite in the third cup.



5

Compare the color of the water in the 4 cups.



What's Happening?

The purple color of the cabbage changes when it comes in contact with acid or alkali. If you change the composition of the solution from acidic → neutral → alkaline, the color will change from red to purple to blue to green. Make solutions of different color and compare their colors.
→ See P.28.



Experiment 2

Let's Make Flowers Bloom!

Date: (Day) _____, (Month) _____



2



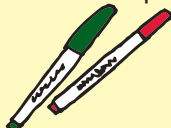
Make a flower bloom in a coffee filter by separating the colors of a water-based pen!

What to Prepare



coffee filter

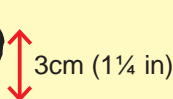
water-based pens



scissors



aluminum cup
(thick cup about
3cm (1 1/4 in) in
height)



ethanol for
disinfection



Experiment Method

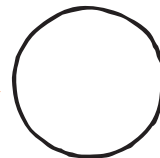
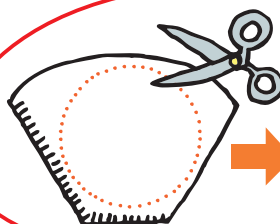
1

Cut a circle out of the coffee filter.

The diameter of the circle should be about 10cm (4 in).



cut
cut

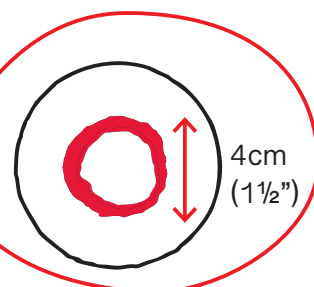


10cm
(4")

2

Using a water-based pen, draw a circle of about 4cm (1 1/2") diameter in the center of the circle.

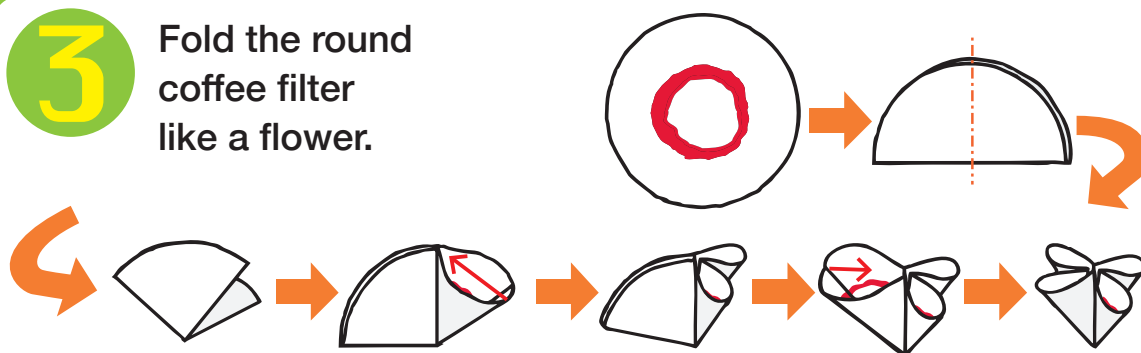
Make the line thick by drawing on it four or five times.



4cm
(1 1/2")

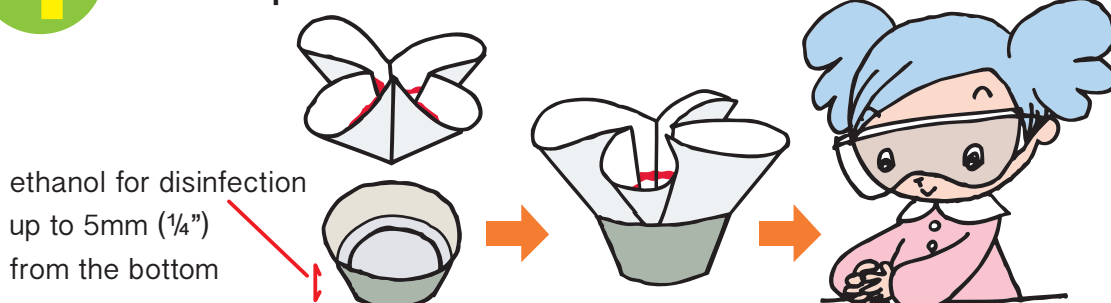
3

Fold the round coffee filter like a flower.



4

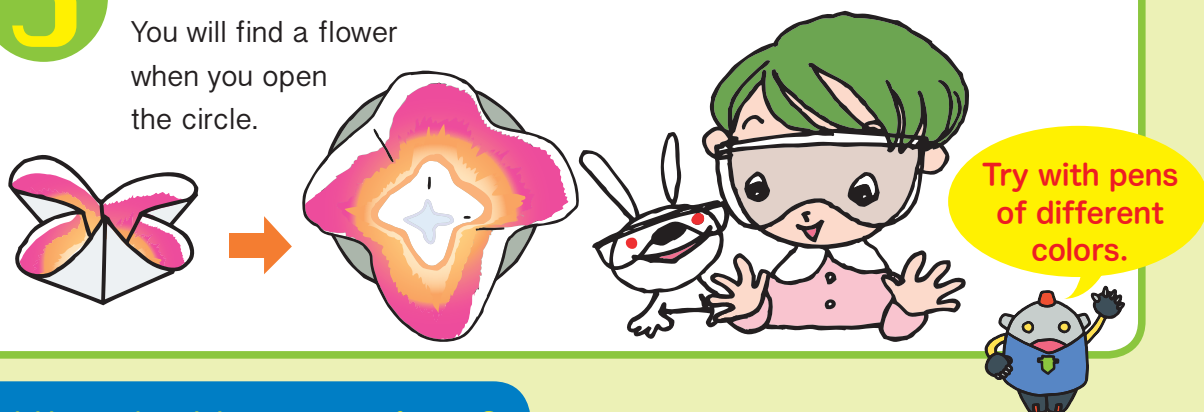
Pour ethanol for disinfection in the cup and put the filter from step 3 in it.



5

The colors will separate after some time.

You will find a flower
when you open
the circle.



What's Happening?

The colors of the pens are made by mixing different colors. In this experiment, we separate those colors using a coffee filter and ethanol for disinfection. When we put the coffee filter in the ethanol, the ethanol gets soaked into the filter and colors move. Some colors contained in the pen move more easily than others depending on the composition. This enables us to separate the colors. → See P.29



Experiment 3

Let's Make Slime!

Date: (Day) _____, (Month) _____



Let's make jelly slime
that's fun to touch!



3

What to Prepare



borax



measuring
spoon
(tablespoon)



hot water
of 40°C
(104°F)



laundry starch
with PVA



2 plastic cups



water



1 pair of disposable
chopsticks (split)



paints

Experiment Method

1

Fill one-fourth plastic cup
with laundry starch.

laundry starch

one-fourth cup

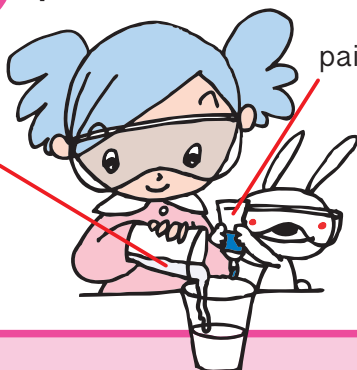


2

Add the same amount of water and a small amount of
paint. Mix well.

water

paint



This will be
the color of
the slime!



3

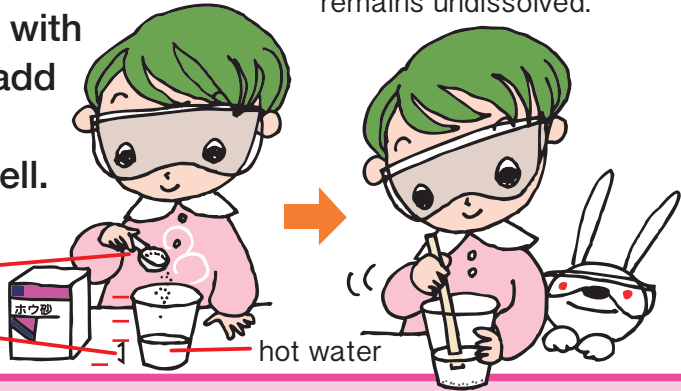
Take the other cup and fill one-third part with hot water. Then add one tablespoon borax and mix well.

It's all right if some borax remains undissolved.

1 tablespoon borax

one-third cup

hot water



4

Add the mixture prepared in step 3 to the cup in step 2. Mix well.



cup from
step 3

cup from
step 2



5

Keep repeating step 4 till the mixture becomes jelly.



Attention!

Don't forget to wash your hand well with water after touching the slime!



What's Happening?

Laundry starch is slightly sticky in texture. When we mix it with borax dissolved in water, we gradually get a jelly slime. We can also add color to the slime using paints. → See P.30



3

Experiment 4

Let's Make Bath Bomb!

Date: (Day) _____, (Month) _____



Let's make bath bomb that creates bubbles when put into water in the bath tub!



What to Prepare



citric acid



sodium bicarbonate powder



measuring spoon (tablespoon)



2 pudding cups



disposable chopsticks



ethanol for disinfection

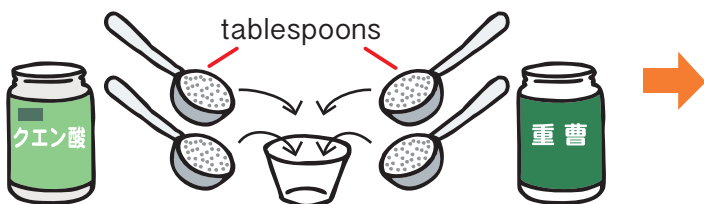


dropper

Experiment Method

1

Put 2 tablespoons of citric acid and 2 tablespoons of sodium bicarbonate powder in a cup and mix well using chopsticks.



2

Add 20 drops of ethanol for disinfection a few drops at a time while mixing.

ethanol for disinfection

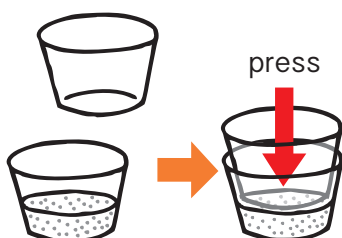


Break any lumps and mix well!!



3

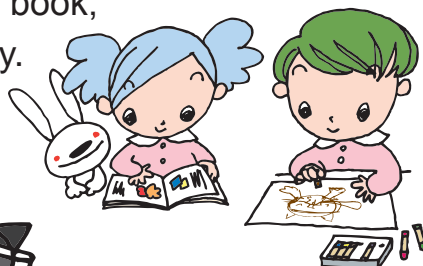
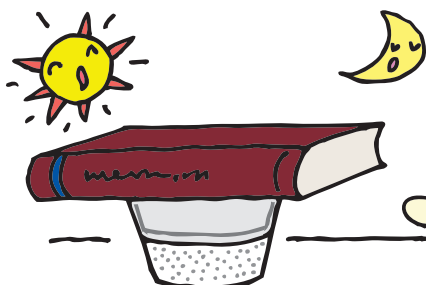
Put the other cup inside the first one and press well.



squeeze

4

Press with something heavy, like a book, and let the mixture solidify for a day.

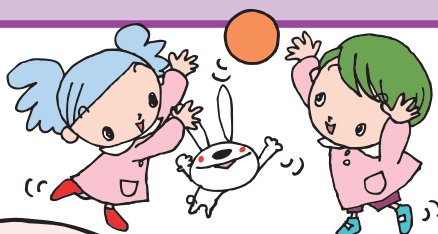


4

5

Remove from the cup and let the soap dry.

dry



Use it
in your
bath tub!



What's Happening?

We can make bath bomb by mixing citric acid with sodium bicarbonate powder and solidifying the mixture. Citric acid and sodium bicarbonate powder do not react with each other in powder form.

But, when we dissolve them in water, carbon dioxide gas is released, and reaction takes place. Carbon dioxide is used in bath bombs because it is considered to maintain body temperature. → See P.31



Experiment 5

Snowfall in a Cup

Date: (Day) _____, (Month) _____



Let's create white snowfall inside a cup!



What to Prepare



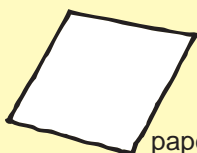
plastic bottle
(350ml
(12 fl oz.))



salt



water



paper



cup
(long and slender)

dehydrated ethanol



disposable
chopsticks

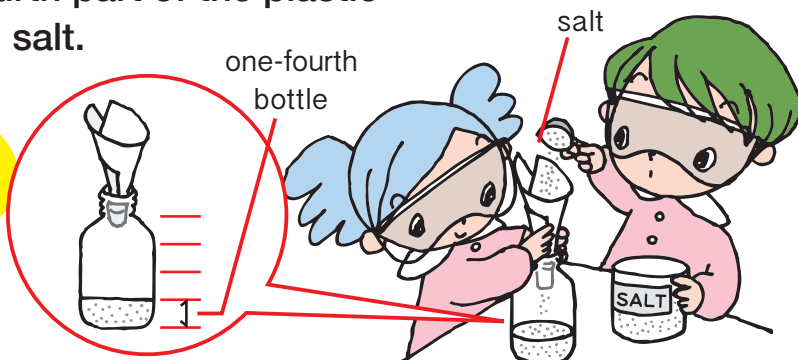
5

Experiment Method

1

Fill one-fourth part of the plastic bottle with salt.

You can pour the salt into the glass easily using a paper funnel!



2

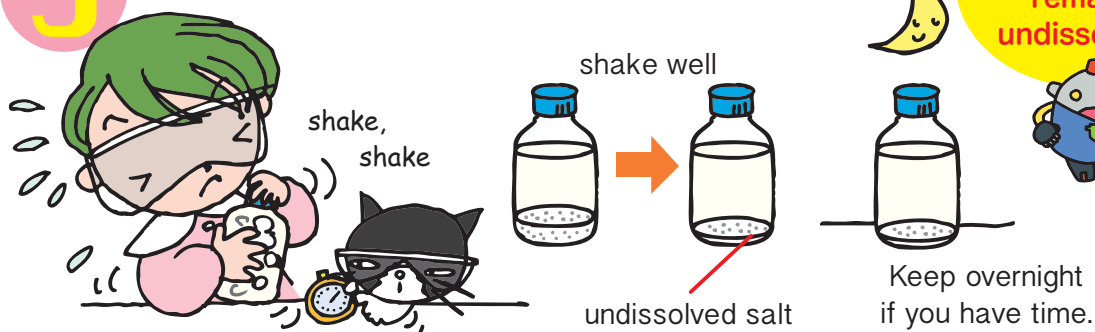
Pour water into three-fourth part of the plastic bottle.



3

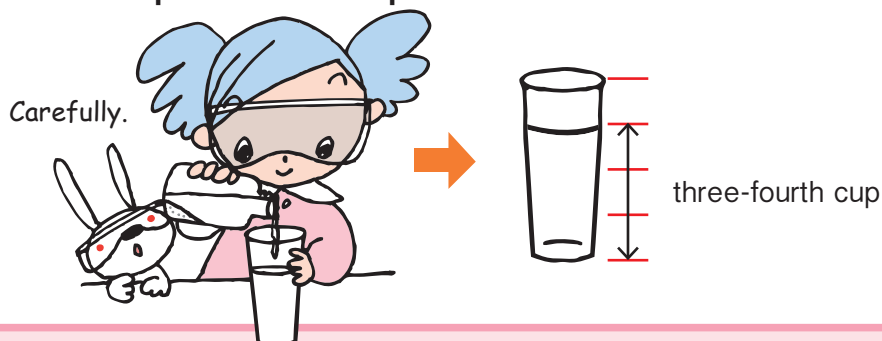
Shake the plastic bottle well for 2-3 minutes.

It's all right if some salt remains undissolved!



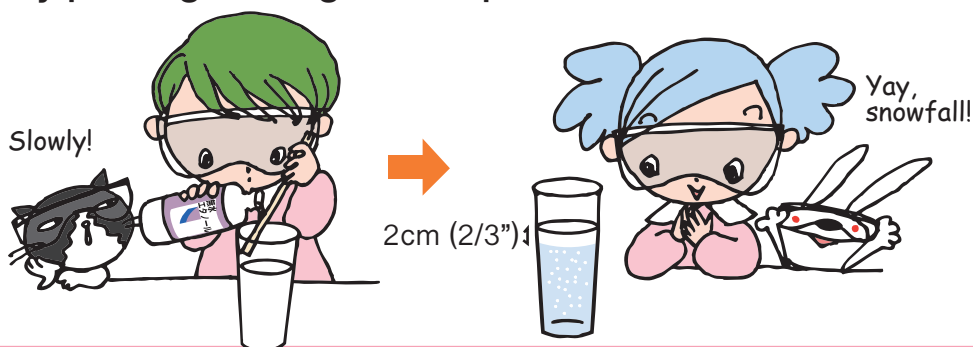
4

Pour the clear layer of the liquid in step 3 to fill three-fourth part of the cup.



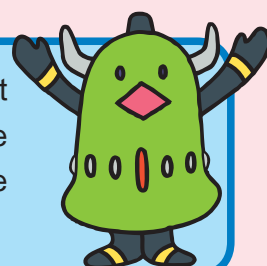
5

Add about 2cm (2/3 in) of dehydrated ethanol to the cup by pouring it along the chopsticks.



What's Happening?

Salt will come out when we add dehydrated ethanol to saturated salt solution. This salt falls down from the boundary between the dehydrated ethanol and the saturated salt solution and looks like snowfall. → See P.32



Experiment ⑥

Experiments with Kitchen Detergent

Date: (Day) _____, (Month) _____



Let's do an experiment using mild kitchen detergent and oil!



What to Prepare



fork



chili oil



cup



kitchen detergent

black pepper



bowl

6

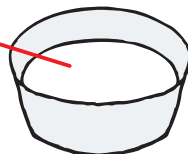
Experiment Method

Experiment 1

1

Pour water in a bowl and sprinkle some black pepper on it.

water



2

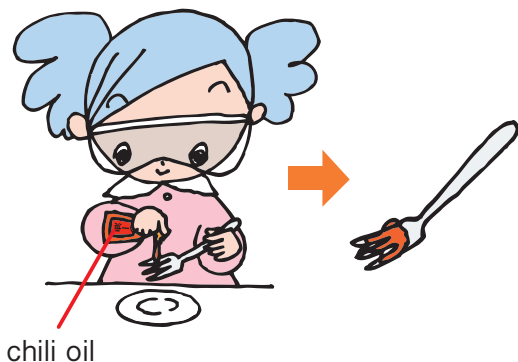
Add 1-2 drops of detergent in the middle



Experiment 2

3

Take a small amount of chili oil on a fork.



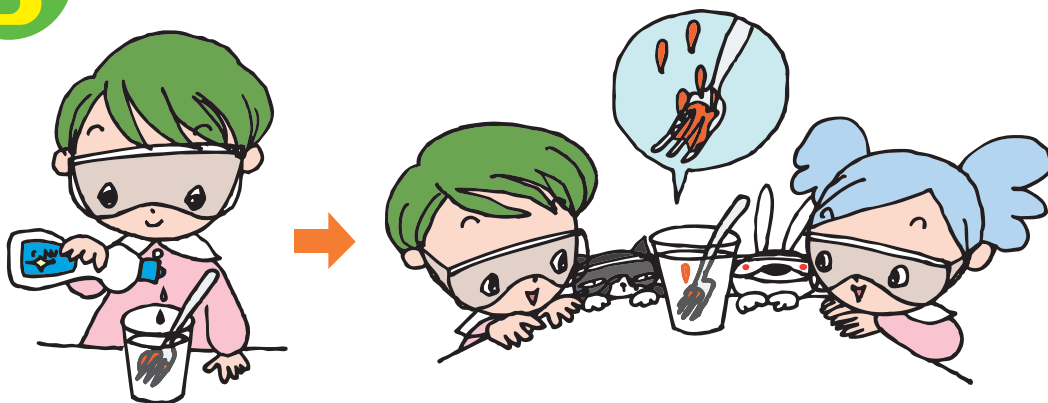
4

Pour water in a cup and put the fork in it.



5

Add a few drops of detergent and watch.



6

What's Happening?

In Experiment 1, when we add the kitchen detergent after sprinkling black pepper in the middle of the water, the black pepper will move to form a circle along the edge. Kitchen detergents work to remove oil. In Experiment 2, you can see the oil rise up in the spherical shape.

→ See P.33



Experiment 7

Let's Make Big Marshmallows!

Date: (Day) _____, (Month) _____



Let's inflate candy packets
and puff up marshmallows!

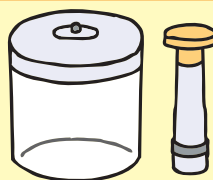


What to Prepare

marshmallows



a packet of
candies



vacuum storage container
and pump set

Experiment Method

Experiment 1

7

1

Put the candy packet in the
vacuum storage container.

candy
packet



2

Use the pump to remove air from the container.

Use the
pump.

Pump,
pump



The packet
will swell!

3

Let air into the container again.



Swoosh



The candy packet returns to its original size.

Experiment 2

4

Fill one-third part of the vacuum storage container with marshmallows.



5

Use the pump to remove air from the container.

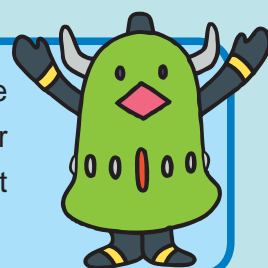


Marshmallows fluff up.



What's Happening?

Using the pump on the vacuum storage container reduces the air in the container and air pressure decreases. When we do the same after putting a packet of candy or marshmallows in the container, the packet swells, and the marshmallows fluff up. → See P.34



Experiment ⑧

Vanished Picture Reappears

Date: (Day) _____, (Month) _____



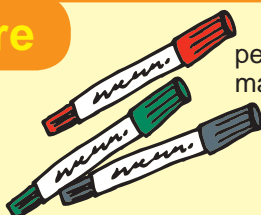
Draw on a plastic cup using a permanent marker and put it in water to see the drawing disappear and reappear.



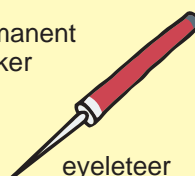
What to Prepare



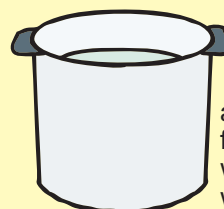
2 plastic cups



permanent marker



eyelet



a pot filled with water

Experiment Method

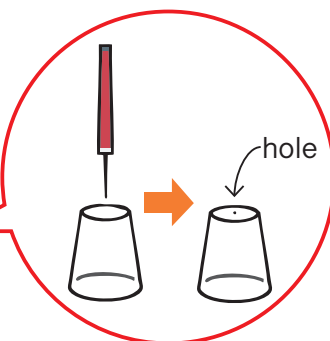
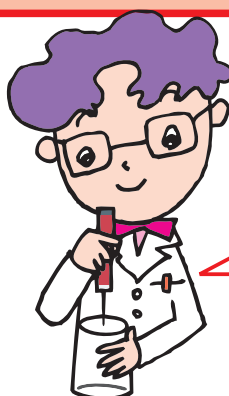
1

Make a hole in the center of the bottom of a plastic cup.



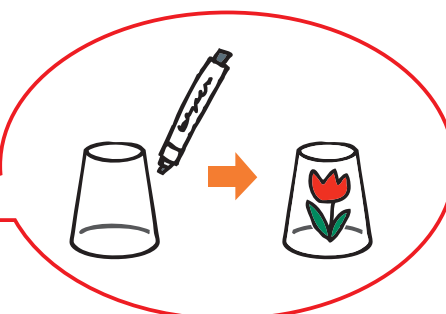
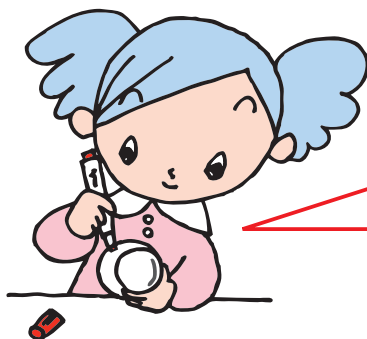
Attention!

Ask an adult to make the hole for you!



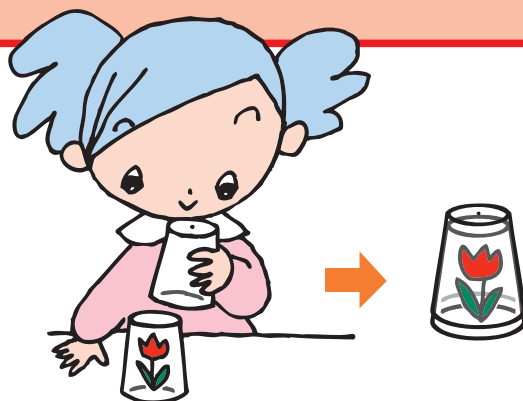
2

Take the other plastic cup, turn it upside down, and make a drawing on it with the permanent marker.



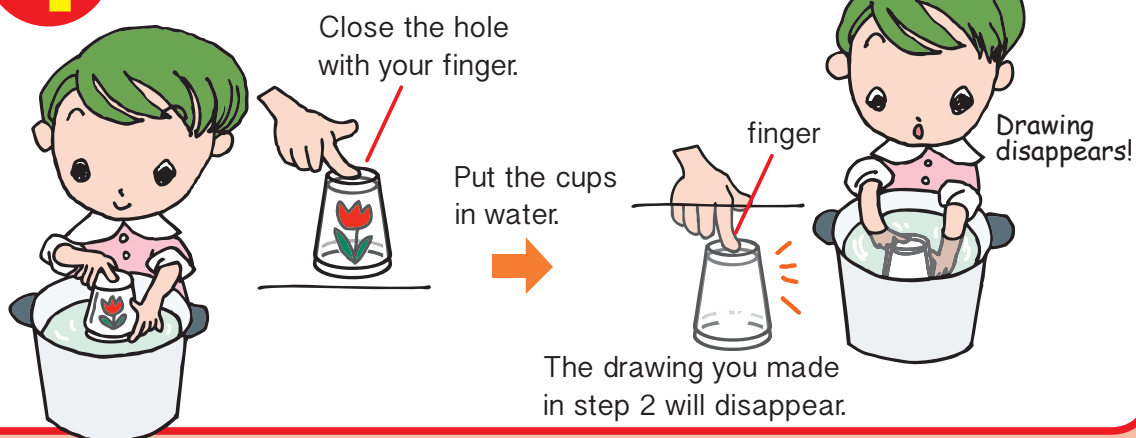
3

Cover the cup with the drawing using the cup with the hole.



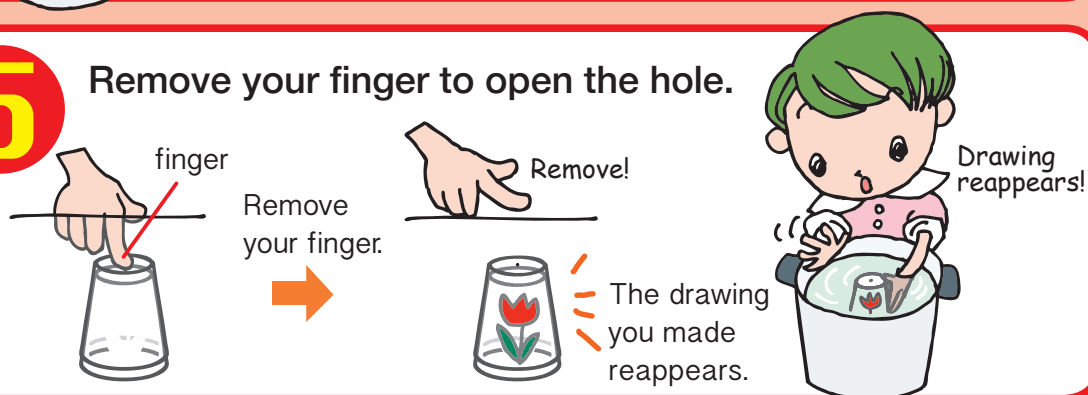
4

Close the hole with your finger and put the cups in water.



5

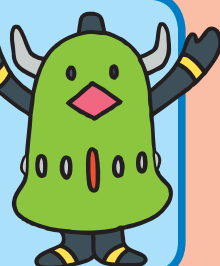
Remove your finger to open the hole.



8

What's Happening?

When we put one cup over the other, close the hole and put them in the water, a layer of air is formed between the two cups. This layer of air reflects light and the drawing on the cup disappears. When we remove our finger from the hole, water enters between the two cups and the drawing reappears. → See P.36



Experiment 9

Shining in Black Light

Date: (Day) _____, (Month) _____



Let's throw black light on drawing made with laundry detergent!



What to Prepare



laundry detergent
(containing fluorescent
bleach)

cup



water

measuring spoon
(teaspoon)



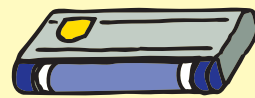
brush



disposable
chopsticks



paper



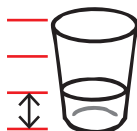
black light

Experiment Method

1

Mix half teaspoon laundry detergent in one-third cup water.

half teaspoon

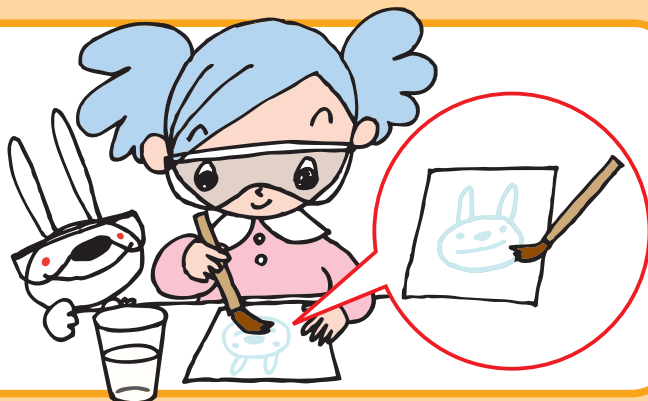


one-third cup



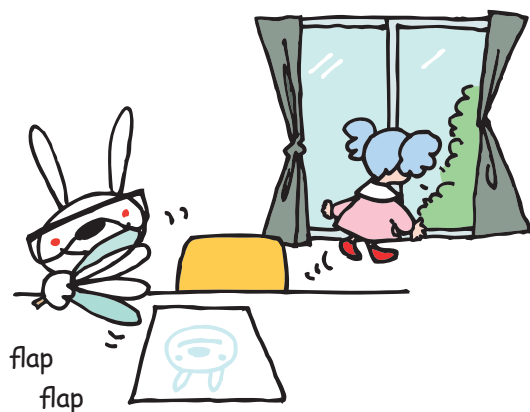
2

Dip the brush well in the water from step 1 and make a drawing on the paper.



3

Dry the paper.



4

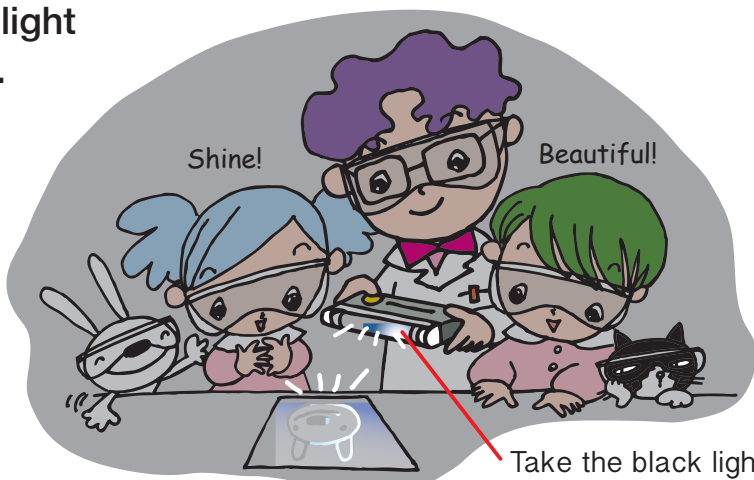
Make the room dark.



5

Throw black light on the paper.

Don't keep looking at the rays from the black light for long.



Take the black light close to the paper.

9

What's Happening?

Laundry detergents contain substances (fluorescent bleach) that shine in ultraviolet rays. Black light emits weak ultraviolet rays. That is why the drawing made with the mixture of laundry detergent and water shines when black light is thrown on it. → See P.37



Experiment 10

Let's Make a Kaleidoscope!

Date: (Day) _____, (Month) _____



Let's make a kaleidoscope using mirror sheet that bends freely!



What to Prepare

mirror sheet



scissors



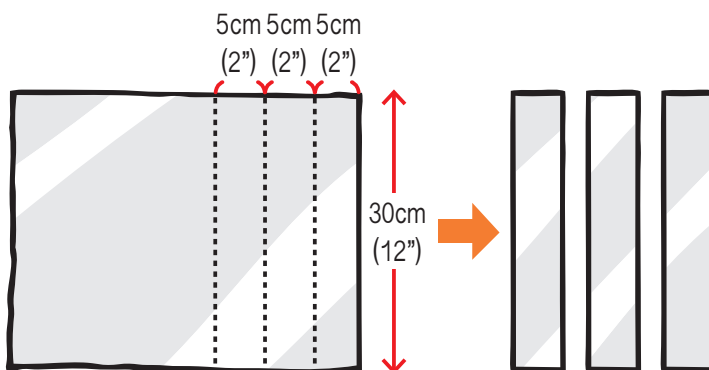
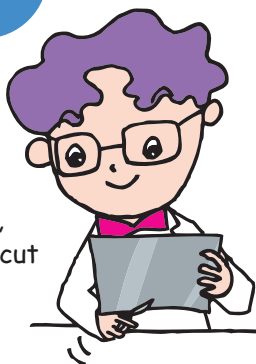
cellophane tape

Experiment Method

1

Cut three 30cm (12 in) x 5cm (2") pieces of the mirror sheet.

cut,
cut



2

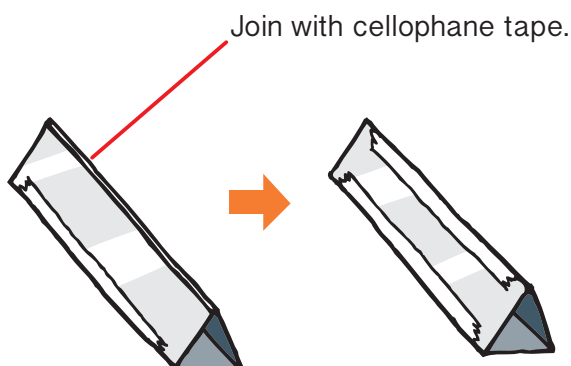
Join the three pieces together with cellophane tape.

cellophane tape



3

Make a triangular pipe and join the ends together with cellophane tape.



4

Look at colorful things through the pipe.



Attention!
Don't look directly at the sun.

What's Happening?

Mirror sheet bends freely and reflects things from different angles. We can make a kaleidoscope by cutting three 30cm (12 in) x 5cm (2") pieces of the mirror sheet and joining them together. We see beautiful geometric patterns when we look through the kaleidoscope.

→ See P.38



Experiment 11

The Magic of Static Electricity

Date: (Day) _____, (Month) _____



Let's move an aluminum foil boat with static electricity!



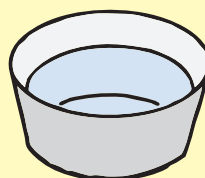
What to Prepare



straw (thick)



tissue paper



bowl filled with water

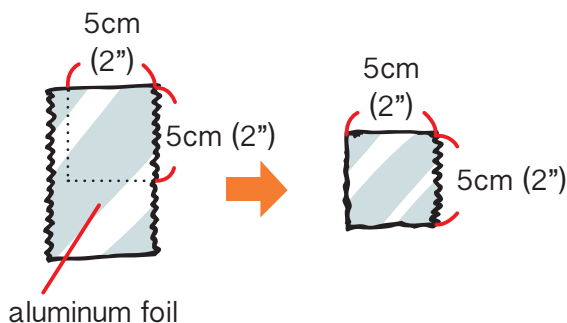


aluminum foil (about 5cm (2 in) x 5cm (2 in))

Experiment Method

1

Cut a roughly 5cm (2 in) x 5cm (2") piece of aluminum foil.



aluminum foil

2

Make a boat with the piece of aluminum foil.



boat

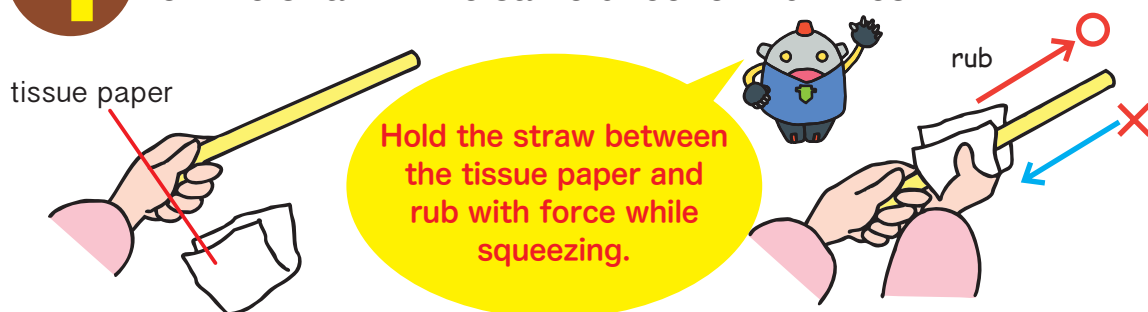
3

Float the aluminum foil boat in water.



4

Hold the straw by one end and rub the tissue paper on the straw in the same direction 20 times.



5

Take the straw close to the aluminum foil boat.

The boat starts moving toward the straw.



What's Happening?

Static electricity is accumulated when we rub the straw with tissue paper. We use this static electricity to move the aluminum boat floating on water. When we take the straw with static electricity close to the aluminum foil boat, the boat starts moving toward the straw.

→ See P.39



CO₂
H₂

NH₃

C₂H₅-OH

H
H-C-COOH
HO-C-COOH
H-C-COOH
H

C₂H₆O



Let's do an experiment!



Yes!

Yes!

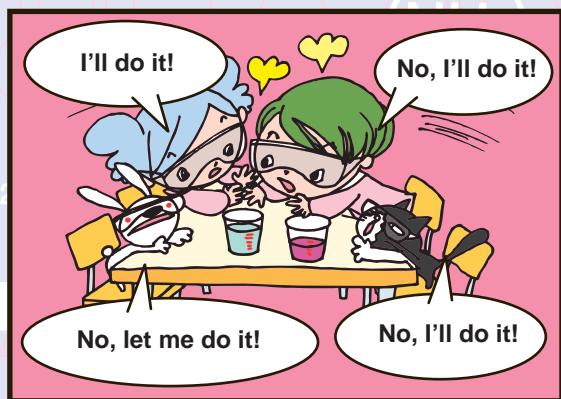
Let's have fun together!

(NH₂)₂CO

C₂H₅-OH

C₂H₅-OH

C₂H₆O

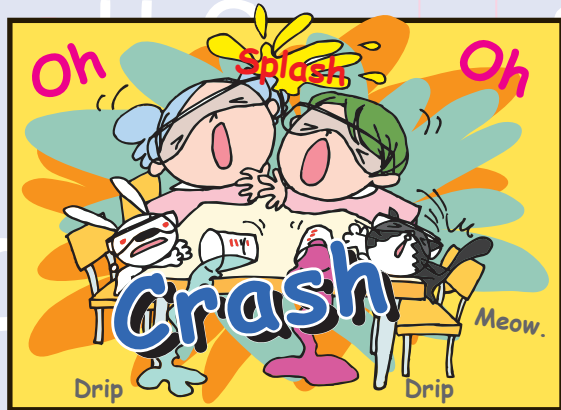


I'll do it!

No, I'll do it!

No, let me do it!

No, I'll do it!



Oh

Splash

Oh

Crash

Meow.

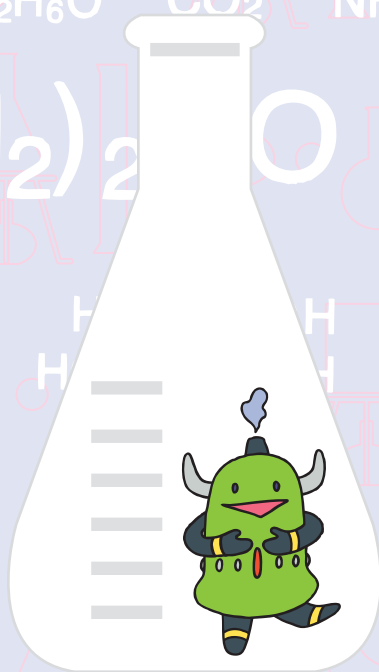
Drip

Drip

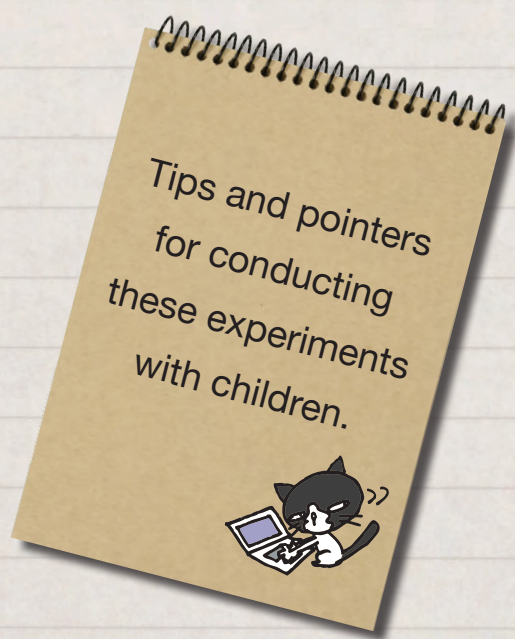
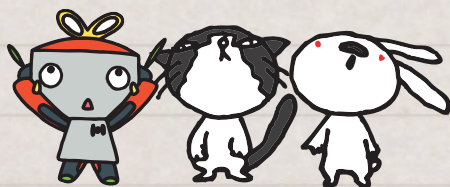


Don't fight.
It's dangerous!

Let's do the experiments together and have fun!



User Guide for Guardians and Instructors





Experiment 1

Let's Change the Color!

Let's change the color of the water of red cabbage to different colors!

Tips for a Successful Experiment

We request adults to do step 1 because it requires using a knife and boiled water. Also note that the colored water from the red cabbage spoils fast. So, keep it in the refrigerator and use as soon as possible.

Experiment Explanation

Red cabbage contains a pigment called anthocyanin. When we mix this pigment with water and change the composition of the resulting solution from acidic → neutral → alkaline, then the color changes from red → purple → blue → green.

Red cabbage has purple pigment when it is neutral. Cooking vinegar contains acetic acid and its acidic nature turns the red cabbage water into red. Sodium bicarbonate powder becomes slightly alkaline when mixed with water and changes the color to blue. Insect bite solution containing ammonia is more alkaline than sodium bicarbonate powder. Therefore, it becomes green. However, if you use a small quantity, the color will turn bluish green.

■ Precautions for using insect bite solution mixed with ammonia

Do not smell ammonia directly because it has a pungent smell. It does not give out a strong odor if kept in an eyedrop container. We recommend using this method if children are going to use ammonia. Take due care when opening the cap with a flathead screwdriver.

Demonstration Experiment

You may use hydrochloric acid and sodium hydroxide solution if you wish to change the color more. Hydrochloric acid is found in acidic toilet detergents. The color of the liquid will turn more reddish because hydrochloric acid is strongly acidic. Sodium hydroxide solution is strongly alkaline. Therefore, the color of the liquid will change to yellow. Because hydrochloric acid and sodium hydroxide solution are strongly acidic and alkaline, they should only be used in demonstration experiments by adults.

Attention!

Do not use chlorinated strongly alkaline detergents. A poisonous chlorine could form if the chlorinated strongly alkaline detergent gets mixed with an acidic solution when processing the solutions after the demonstration.



Experiment 2

Let's Make Flowers Bloom!

Make a flower bloom in a coffee filter by separating the colors of a water-based pen!

Tips for a Successful Experiment

Please make sure that the part of the coffee filter that is colored does not get submerged in the ethanol for disinfection when the filter is put in the cup. The color of the pen will begin to melt in the ethanol if the filter is submerged. The height of the ethanol should be about 5mm ($\frac{1}{4}$ in), whereas the diameter of the circle you draw should be roughly 4cm ($1\frac{1}{2}$ in). However, it may be difficult for children to draw the circles. Therefore, draw circles of radius 2cm ($\frac{2}{3}$ in) (diameter 4cm ($1\frac{1}{2}$ in)) beforehand using compass or other tools, and ask the children to trace the line using the pens.

Plastic cups can be cut to a height of 3cm (1 in) for using in this experiment. However, the cut edge of the cup may be sharp and dangerous, so seal the edges with plastic tape.

Experiment Explanation

When you put the coffee filter in ethanol, the ethanol will get soaked upwards rapidly. The color on the coffee filter will also start moving. Most pen colors are made by mixing several colors together. Those colors will get separated depending on how much they can move due to their composition. Separating content in this way is known as paper chromatography.

You can also use filter paper instead of coffee filter and water instead of ethanol for disinfection for this experiment. Because the way colors separate will change if the liquid in which they are soaked is different, try to check it out.

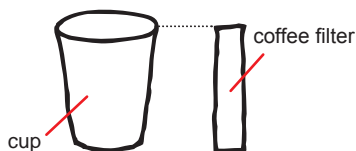
Demonstration Experiment

Cut the coffee filter into strips and examine how the colors separate.

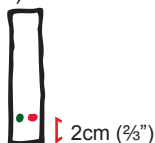
What to Prepare coffee filter, water-based pen, disposable chopsticks, cellophane tape, ethanol for disinfection, plastic cup

Experiment Method

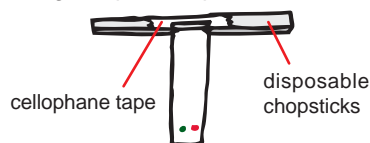
① Cut the coffee filter into strips.



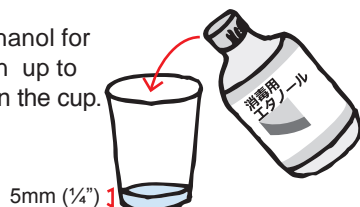
② Put dots with the water-based pens 2cm ($\frac{2}{3}$ in) from the bottom of the strip.



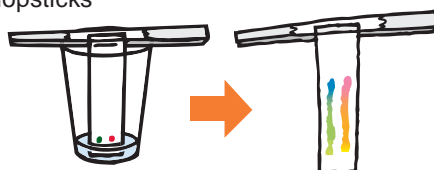
③ Stick the strip to the chopsticks using cellophane tape.



④ Pour ethanol for disinfection up to 5mm ($\frac{1}{4}$ in) in the cup.



⑤ Place the chopsticks of the cup and wait for some time.





Experiment 3

Let's Make Slime!

Let's make jelly slime that's fun to touch!

Tips for a Successful Experiment

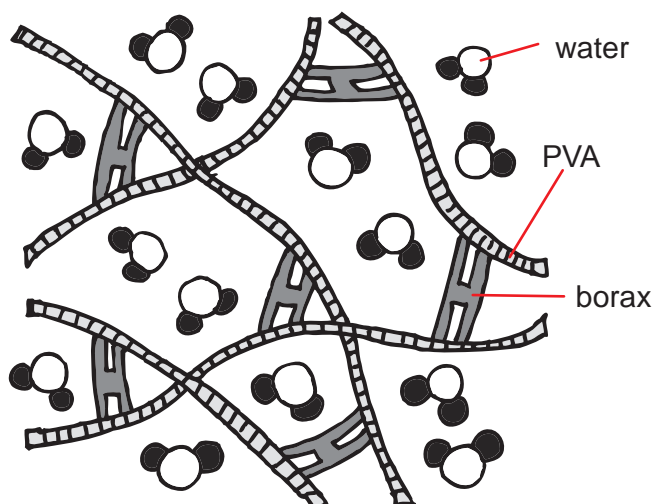
There are many types of laundry starch. Use laundry starch containing PVA (polyvinyl alcohol) for making slime. You can purchase it from the supermarket or other stores. Borax is available at drug stores.

You can make softer slime by using more water and harder slime by using less water in step 2. In step 3, the reason for dissolving borax using hot water is to dissolve as much borax as possible. Therefore, we have used an excessive amount of borax, to the extent that some of it remains undissolved.

Experiment Explanation

PVA comprises long chains of multiple molecules. That is why laundry starch is slightly sticky. When we add borax solution to it, the borax gets attached between the long chains of polyvinyl alcohol, creating a mesh of molecules. Water molecules get stuck in the mesh and this leads to loose bonds. This makes the slime, which almost entirely comprises of water, jelly and flexible.

■ Model diagram of slime



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Experiment 4

Let's Make Bath Bomb!

Let's make bath bomb that creates bubbles when added to water in the bath tub!

Tips for a Successful Experiment

Ethanol for disinfection is added to make citric acid and sodium bicarbonate powder solidify more easily. Please note that pouring too much ethanol will make the mixture difficult to solidify.

Citric acid and sodium bicarbonate powder can be found in the kitchen cleaning sections in stores. For making bath bomb, however, please use the purer forms that can also be used in medicines or food, instead of those meant for cleaning.

Experiment Explanation

Citric acid and sodium bicarbonate powder will not react with each other if you mix them in powdered form. However, they will react if you dissolve them in water first. Carbon dioxide gas is released when they react with each other.

You can also use cookie molds instead of pudding cups to make bath bombs of different shapes. You can also add perfumes to make good fragrant.

Bath bomb available in the market uses fumaric acid instead of citric acid to solidify the bomb well. For this reason, foam of a reasonable size is formed when they are put into water. The bath bomb made in this experiment is not hard enough and, therefore, reacts quickly while forming big bubbles when put into water.



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Experiment 5

Snowfall in a Cup

Let's create white snowfall inside a cup!

Experiment Explanation

Please use dehydrated ethanol. The experiment will not work out well with ethanol for disinfection because it contains substances other than ethanol as well. The key is to create properly saturated salt solution in which no more salt can be dissolved. We use a large amount of salt in this experiment. That is why some salt may remain undissolved and settle at the bottom of the plastic bottle even if you shake the bottle well after mixing salt and water. It is even better to keep the solution overnight to get perfectly saturated salt solution.

Experiment Explanation

Ethanol dissolves easily in water. When we add ethanol to salt solution, the ethanol dissolves in the water and prevents salt from dissolving fully. This causes the salt to separate. The separation begins at the boundary between saturated salt solution and ethanol, creating a snowfall-like effect.

Alcohol fuel can also be used in this experiment instead of dehydrated ethanol. The way the "snowfall" takes place differs for different types of alcohols. Try it out for yourself.

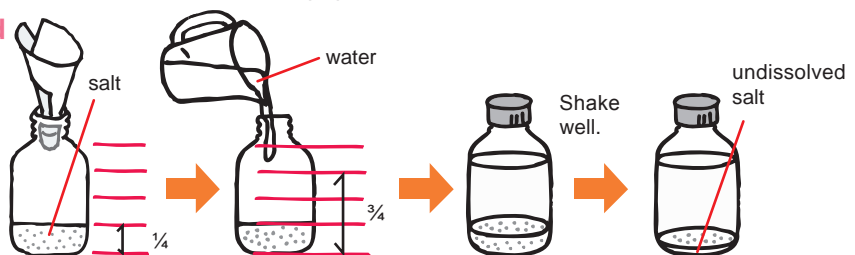
Bonus Experiment : Glittering Letters

Let's write glittering letters using saturated salt solution!

What to Prepare saturated salt solution, black paper, brush

Experiment Method

① Make saturated salt solution.



② Dip the brush well in the saturated salt solution and write on the black paper. Dip the brush well in the salt water again and trace the letters. Repeat two times.



③ Let the paper dry for a few hours.



When you write something with saturated salt solution and let it dry, the undissolved salt separates in the form of tiny crystals. When light shines on these tiny crystals, they reflect the light and the letters glitter.

In step ②, write the letters once and trace over them two more times. This will create more crystals and the letters will glitter even more.



Experiment 6

Experiments with Kitchen Detergent

Let's do an experiment using mild kitchen detergent and oil!

Experiment Explanation

When pouring the mild detergent, try your best to make the detergent fall where the chili oil is. This will make it easier to separate the oil.

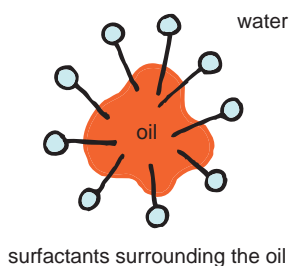
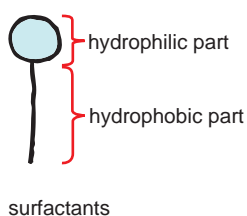
Experiment Explanation

When we pour a few drops of detergent in water, the detergent forms a thin film on the surface and expands rapidly. This drives the black pepper to the edge of the container.

Chili oil is a condiment made by extracting the spicy components of red pepper and other spices into vegetable oil. Chili oil is colored and, therefore, makes it easy to see the oil stain being removed.

The oil stain on the fork will not go away simply by dipping the fork in water. However, when we add detergent, the oil starts moving up in the form of small spherical droplets.

Detergents contain surfactants, which help remove oil stains. The surfactant molecules comprise of parts that dissolve easily in water (hydrophilic group) and parts that dissolve easily in oil (hydrophobic group). Because oil does not dissolve in water, oil stains are difficult to remove with water. However, when the hydrophobic part of the surfactants surrounds the oil, the hydrophilic group turns toward the water and oil starts to dissolve in water. This helps remove oil stains using water. The oil droplets rise upward because oil is lighter than water.



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Experiment 7

Let's Make Big Marshmallows!

Let's inflate candy packets and puff up marshmallows!

Tips for a Successful Experiment

Strengths is required to use the vacuum storage container pump. Adults should help the children who are not able to use it properly.

Experiment Explanation

Vacuum storage containers help prevent oxidation of foodstuff by reducing the amount of air in the container. They help store food and enable us to make pickles and other items in shorter time. They can be purchased from DIY stores and other stores.

When we move the vacuum storage container pump, the air inside the container decreases. This reduces the pressure of gases in the container. When the pressure of gases in the container is reduced after putting a packet of candy in it, the packet swells because the pressure of gases in its surroundings falls while the pressure of gases inside the packet remains the same. The same thing happens when we climb a mountain with a packet of candies. Marshmallows contain a lot of air in them. When we reduce the pressure of gases in the container after putting marshmallows in it, the marshmallows fluff up because the pressure of gases in their surroundings falls while the pressure of gases inside them remains the same.

Demonstration Experiment 1 : Decompression Boiling

Hot water boils without being heated.

What to Prepare

vacuum storage container and pump set, transparent heat-resistant cup, hot water (hot water of 90°C (194°F) or above in a heating pot), mild kitchen detergent, tissue paper, work gloves

Experiment Method

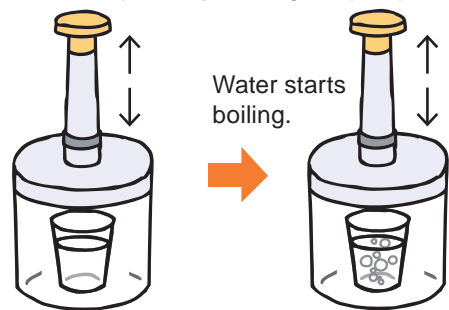
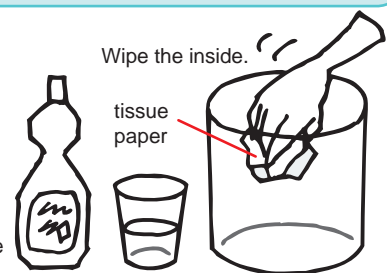
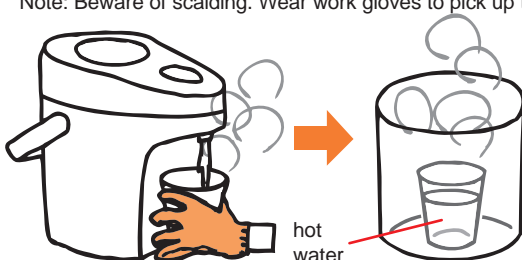
① Mix one part mild detergent and ten parts water. Wipe the inside of the vacuum storage container.

*To ensure that the inside of the container does not cloud with steam.

② Pour hot water in the cup and put it in the vacuum storage container.

Note: Beware of scalding. Wear work gloves to pick up the cup.

③ Decompress by moving the pump.



Demonstration Experiment 2 : Experiment Using Canned Coffee

Coffee that came out of the can and goes back in.

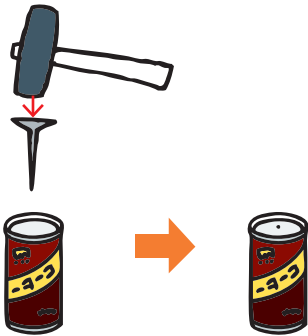
What to Prepare

vacuum storage container and pump set, canned coffee*, nail, hammer, transparent cup

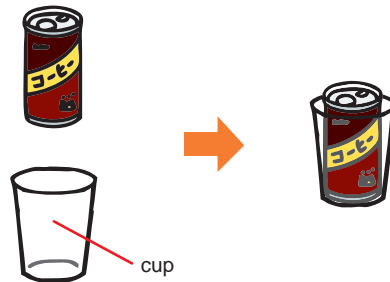
* If the can is too tall, it may not fit into the container.

Experiment Method

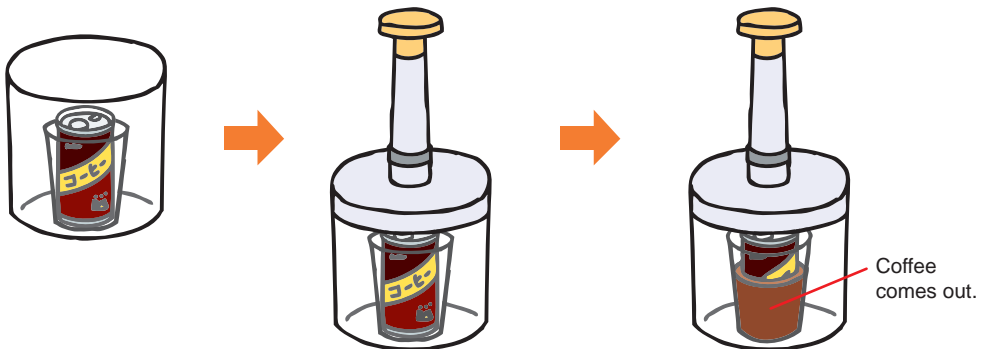
① Make a hole at the bottom of the coffee can using a nail and a hammer.



② Put the coffee can in the cup.

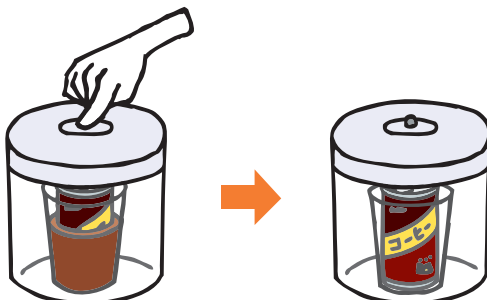


③ Put the cup with the can in the vacuum storage container. Move the pump to decrease pressure.



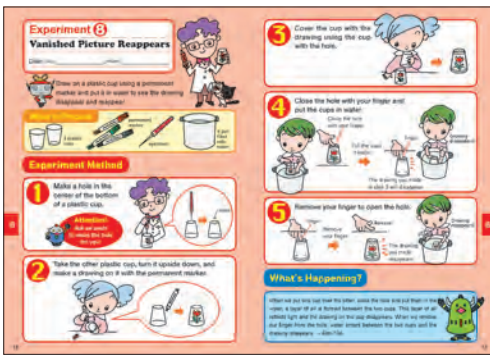
* Coffee from the can comes out in the cup.

④ Let air back into the vacuum storage container.



* Coffee goes back into the can.





Experiment 8

Vanished Picture Reappears

Draw on a plastic cup using a permanent marker and put it in water to see the drawing disappear and reappear.

Tips for a Successful Experiment

The important point in this experiment is to make a hole in the cup and close it properly with one's finger. When we put the cups in the water with the hole closed, a layer of air is formed between the two cups. When we remove our finger from the hole, water enters between the two cups. If the drawing does not disappear and reappear, then cut a small piece of cellophane tape, make it round and stick it between the two cups. This will make it easier for the air and water to enter between the cups.

Experiment Explanation

A layer of air is formed between the two cups when we put the cups in the water while closing the hole with our finger. This layer of air reflects light, making the drawing disappear. When we remove our finger from the hole, water enters between the two cups and a layer of water is formed. The layer of water does not reflect light, making the drawing reappear.

Bonus Experiment : Grow Flowers on a Withered Tree!

Add motion to the changes with a small trick.

What to Prepare 2 plastic cups, permanent marker, eyeleteer, pot

Experiment Method

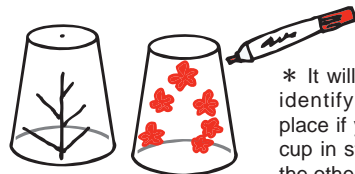
① Draw a tree on a cup.



② Make a small hole at the bottom of the cup.



③ Draw flowers on the other cup at the places that correspond with branches in step ②.



* It will be easier to identify the correct place if you keep the cup in step ② inside the other cup.

④ Cover the cup without the hole using the cup with the hole.

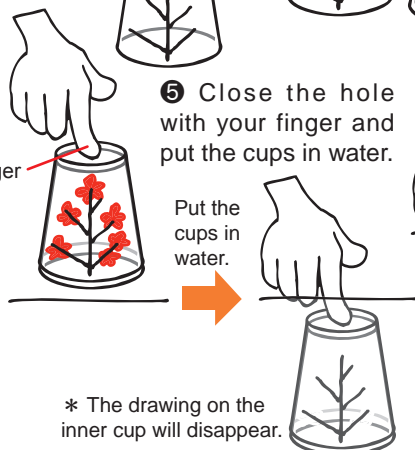
Cover.



finger

⑤ Close the hole with your finger and put the cups in water.

Put the cups in water.



* The drawing on the inner cup will disappear.

⑥ Remove your finger to open the hole.



Remove your finger.

* The drawing on the inner cup will reappear.



Experiment 9

Shining in Black Light

Let's throw black light on drawing made with laundry detergent!

Tips for a Successful Experiment

Use laundry detergent containing fluorescent bleach. Some papers may contain fluorescent materials to give a whiter appearance. For this experiment, use paper that does not contain fluorescent materials. If you use paper containing fluorescent materials, then it will end up shining along with the drawing when you throw black light on it.

Black light emits weak ultraviolet rays that have almost no harmful effects on human body. However, avoid staring at the black light or throwing it on the skin for a long time.

Experiment Explanation

Black light emits weak ultraviolet rays. Ultraviolet rays can make fluorescent materials shine. Some laundry detergents contain fluorescent materials (fluorescent bleach) to make clothes look whiter. That is why, when we throw black light on a drawing made using water mixed with laundry detergent, the drawing shines. Some clothes use fluorescent materials too and may shine in black light.

Bonus Experiment : Let's Find Fluorescent Materials!

Fluorescent materials that shine under ultraviolet rays are contained in postcards and bills too, apart from laundry detergents. This is done to help separate mail in post offices and prevent forgery of currency notes. They are also used in fluorescent pens.

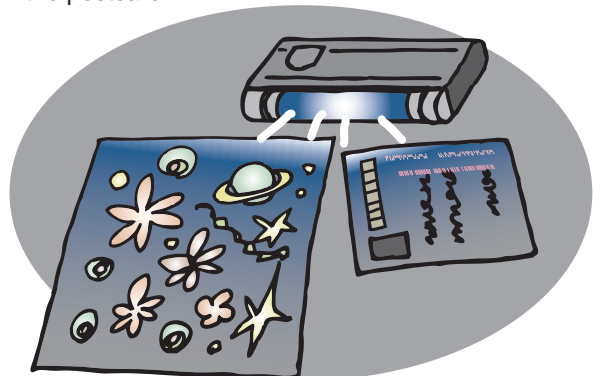
What to Prepare black light, postcard, fluorescent pens, paper

Experiment Method

① Draw a picture on the paper with fluorescent pens.



② Make the room dark and throw black light of the paper with the fluorescent pen drawing and the postcard.





Experiment 10

Let's Make a Kaleidoscope!

Let's make a kaleidoscope using mirror sheet that bends freely!

Tips for a Successful Experiment

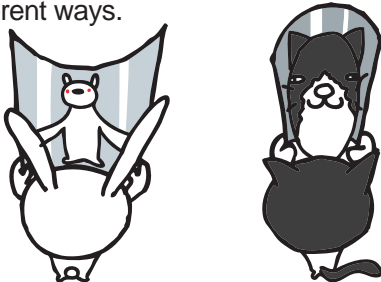
Mirror sheet can be purchased from DIY stores and other stores. Things with bright colors will give more beautiful designs when seen through the kaleidoscope.

Experiment Explanation

Make a pipe by joining three 30cm (12 in) x 5cm (2 in) pieces of the mirror sheet with cellophane tape. The kaleidoscope is ready. Scenes will look like patterns when seen through it.

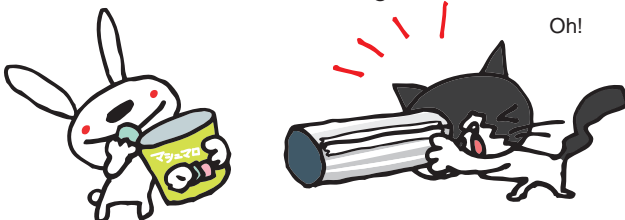
Bonus Experiment : Make Your Face Thinner or Fatter

By bending a roughly 30cm (12 in) x 30cm (12 in) piece of mirror sheet lengthwise or widthwise, you can make your face look thinner, fatter or even reversed. You can see your face in different ways.



Bonus Experiment : Easier Kaleidoscope

If you want to make a kaleidoscope easily without making a triangular pipe with the mirror sheet, then you can simply make a round pipe from a roughly 30cm (12 in) x 20cm (8 in) piece of mirror sheet and look through it!



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Experiment 11

The Magic of Static Electricity

Let's move an aluminum foil boat with static electricity!

Tips for a Successful Experiment

The important point in this experiment is to rub the straw well with tissue paper to accumulate static electricity.

If the aluminum foil boat does not move when you take the straw close to it, then try the experiment again after rubbing the straw with tissue paper and accumulating more static electricity. It is easier to accumulate static electricity in thicker straws, such as those used for tapioca drinks.

Experiment Explanation

All substances are made of atoms. Atoms comprise of a nucleus that contains positive electrical charge and electrons that contain negative electrical charge. Normally, the electrical charges do not appear outside the substances because a balance is maintained between the positive and negative electrical charges. When we rub a straw with tissue papers, the electrons from the tissue paper are transferred to the straw. This makes the straw accumulate negative electrical charge. On the other hand, the tissue paper accumulates positive electrical charge because of a shortage of electrons.

When we take the straw with negative electrical charge close to the aluminum foil, the electrons in the aluminum foil are repelled by the negative electrical charge accumulated in the straw. Therefore, positive electrical charge appears at the place where the straw is brought close to the aluminum foil. This is known as electrostatic induction. The negative electrical charge accumulated in the straw and the positive electrical charge created by electrostatic induction attract each other, pulling the straw and aluminum foil toward each other.

Bonus Experiment : Chase a Japanese One Yen Coin!

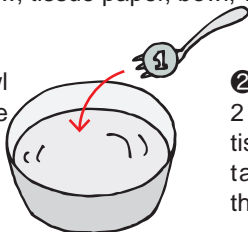
When you float a Japanese one yen coin, which is made of aluminum, on water and take a straw with static electricity close to it, the one yen coin moves away from the straw.

What to Prepare straw, tissue paper, bowl, water, Japanese one yen coin, fork

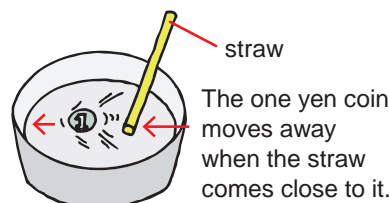
Experiment Method

- Put water in the bowl and float a Japanese one yen coin on it.

* It is easier to make the coin float by using a fork.



- Rub the straw 20 times with tissue paper and take it close to the coin.



Experiment Explanation

When you take the straw with negative electrical charge close to the Japanese one yen coin, the static electricity attracts the water, creating a small wave. In other words, a small wave is created between the straw and the one yen coin, and the one yen coin goes down the slope of the wave because of its own weight. That is why the one yen coin moves away from the straw.

What is "Science Workshops for Kids?"

Science Workshops for Kids are science experiment classes for children to learn about the wonders of science and develop a thirst for learning!

We hold science experiment classes in kindergartens and elementary schools near Group business sites.



1

Who are the teachers?

Our employees visit your school to teach you how to do science experiments.



2

What will we do?

We will select an experiment from "Amazing Discoveries! Science Experiments for Kids" each time and try it with everyone in the class.



3

Will we work in groups?

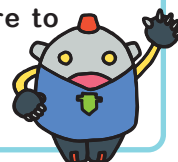
Yes, we will try various experiments in groups of 4-5 children.





4 What do we need?

We will arrange for all things that are not available in your school. Make sure to wear the protective glasses when using chemicals.



5 What if the experiment does not go well?

Experiments may not go well on the first attempt. But, there no need to worry. Let's try different ways again and again till we succeed.



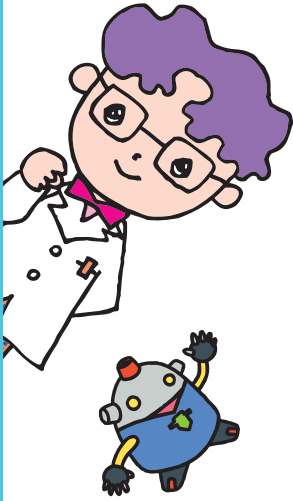
6 Can we try the experiments at home too?

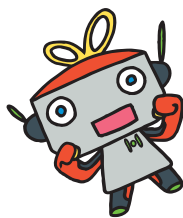
Yes, you can carry out the experiments for which materials are available at home. Do try together with your parents.



We hope this will make you all fond of science.

Free Drawing Space



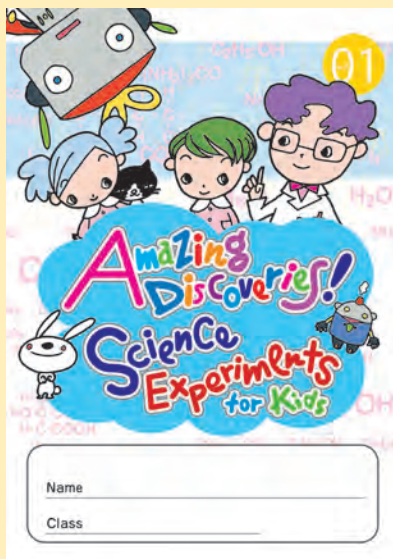


Amazing Discoveries!

Science Experiments for Kids

Vol.1

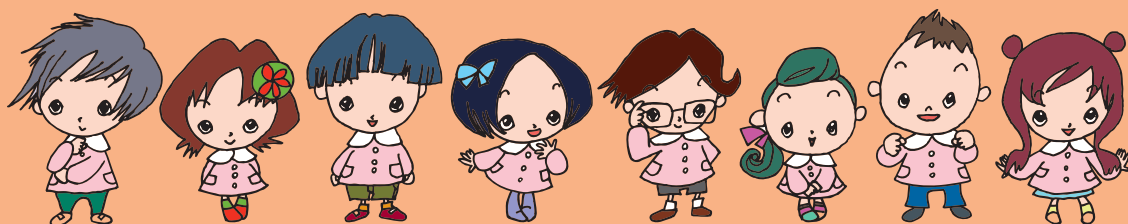
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Showa Denko Materials
encourages children's
curiosity in science

**Amazing Discoveries!
Science Experiments for Kids Vol.2**

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Educational Material

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