SCIENCE CAN

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SCIENCE CAN

CHEMISTRY LAB FUSION
80 EXPERIMENTS

8–14 years

STEAM
EDUCATIONAL PRODUCT

⚠ **WARNING** NOT SUITABLE FOR CHILDREN UNDER 8 YEARS. FOR USE UNDER ADULT SUPERVISION. CONTAINS SOME CHEMICALS WHICH PRESENTA HAZARD TO HEALTH. READ THE INSTRUCTIONS BEFORE USE, FOLLOW THEM AND KEEP THEM FOR REFERENCE. DO NOT ALLOW CHEMICALS TO COME INTO CONTACT WITH ANY PART OF BODY, PARTICULARLY THE MOUTH AND EYES. KEEP SMALL CHILDREN AND ANIMALS AWAY FROM EXPERIMENTS. KEEP THE EXPERIMENTAL SET OUT OF REACH OF CHILDREN UNDER 8 YEARS OLD. THIS TOY DOES NOT PROVIDE PROTECTION.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. WARNING! CHOKING HAZARD - SMALL PARTS, NOT SUITABLE FOR CHILDREN UNDER 3 YEARS.

CONTENTS

English

SAFETY INSTRUCTIONS

⚠ WARNING!

Not suitable for children under 8 years. For use under adult supervision. Contains some chemicals which presents hazard to the health. 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. Keep the experimental set out of reach of children under 8 years.

INCLUDED MATERIALS FOR EXPERIMENTS

Number	Name	Amount
1	Baking Soda	20 g
2	 Citric acid Causes severe eye irritation. Rinse thoroughly with clean water if eye contact occurs.	15 g
3	 Calcium hydroxide Causes serious eye damage. Causes skin irritation. May cause respiratory irritation. IN CASE OF EYE CONTACT: Rinse cautiously with clear water for several minutes. Remove contact lenses, if present. Continue rinsing. Contact a doctor or poison centre immediately. IN CASE OF SKIN CONTACT: Wash off with plenty of soap and water. Wear protective gloves / protective clothing / eye protection / face protection.	10 g
4	 Effervescent tablets Causes severe eye irritation. Rinse eyes thoroughly with clean water if eye contact occurs.	2.8 g
5	Red, yellow and blue colour pigments	0.05 g
6	pH Test Strips	3 Pcs
7	Balloon	2 Pcs
8	Transparent plastic card	2 Pcs

WHAT TO DO IN CASE OF IRRITATION CAUSED BY CHEMICALS

• IN CASE OF EYE CONTACT WITH CHEMICALS: Rinse thoroughly with clean water. Keep eye open if necessary. Consult a doctor or poison centre immediately.
• IN CASE OF SWALLOWING THE CHEMICALS: Wash out mouth with clean water. Drink fresh water. Do not induce vomiting. Consult a doctor or poison centre immediately.
• IN CASE OF INHALATION OF CHEMICALS: Move to fresh air.
• IN CASE OF SKIN CONTACT WITH THE CHEMICALS: Wash affected area with plenty of clean water for at least 10 minutes.
• If in doubt, seek medical advice immediately. Take the chemical and its container with you.
• Always consult a doctor in case of injury.

INSTRUCTIONS FOR SUPERVISORS

• Incorrect use of chemicals can lead to injuries and damage to health. Only carry out experiments that are listed in the instructions.
• This experiment set may only be used by children over the age of 8.
• As children's abilities vary within an age group, supervising adults should use their own judgement to decide which experiments are suitable and safe for children. The instructions allow supervisors to evaluate each experiment and decide whether it is suitable for a child.
• The supervising adult should discuss the warnings and safety information with the child/children before starting the experiment. Particular attention should be paid to the safe handling of acids, alkalis and flammable liquids.
• The area around the experiment should be flat and tidy and kept away from food storage. It should be well lit and ventilated and close to a water supply. A solid table with a heat-resistant top should be used as a base.

SAFETY RULES

• Keep small children, animals, and people without eye protection away from the experiment area.
• Always wear eye protection.
• Keep the experiment set out of the reach of children under 8 years of age.
• Clean all objects after use.
• Ensure that all containers are completely closed after use and stored properly.
• Ensure that empty containers are disposed of properly.
• Wash hands thoroughly after performing experiments.
• Do not use any equipment or objects for the experiments that were not supplied with the set or recommended in the instructions for use.
• Do not eat or drink in the area of the experiments.
• Avoid contact of chemicals with eyes or mouth.
• Do not replace food in the original container, dispose of immediately.

When disposing of chemicals, the national or local disposal regulations must be observed. Under no circumstances should chemicals be disposed of with waste water or household waste. Further information on correct disposal can be obtained from the responsible authority. For the disposal of packaging materials, use the collection containers at the collection points.

FIRST AID INFORMATION

• In case of contact with the eye: rinse the eye with plenty of water and keep it open if necessary. Seek medical help immediately.
• In case of ingestion: Rinse mouth with water, drink fresh water.
Do not induce vomiting. Seek medical attention immediately.
• In case of inhalation: Move the person to fresh air.
• In case of contact with skin and burns: Rinse the affected skin area with plenty of water for at least 10 minutes.
• If in doubt, seek medical attention without delay. Take the chemical with you along with the container.
• Always seek medical attention in case of injury.
• In case of accident due to improper use of the products resulting from the proposed experiments (ingestion, inhalation, penetration of the nose or ear canals): Seek medical attention immediately.
NOTE: Information on first aid can also be found separately below for specific experiments. Here you will find the telephone number of the nearest poison control center, which should always be available in an emergency.

POISON CONTROL CENTER-GB

TOXBASE is hosted by NPIS Edinburgh,
Royal Infirmary of Edinburgh,
Edinburgh, EH16 4SA.
To contact TOXBASE
admin: mail@toxbase.org
+441312421383

Get inspired by our experiments. Everything you need for your experiments that is not included in the set is written in **bold** in the experiment instructions.

HOW TO USE THE COLOR PIGMENTS:

EXPERIMENT 1: ANGRY RAISINS

After the experiment, dispose of all food used in the experiment.

Materials **5 raisins, carbonated lemonade**

Steps

1. Measure 150 ml of carbonated lemonade using the measuring cup and pour it into the flask.
2. Add the raisins to the flask one by one.
3. Observe the changes in the raisins.

Experiment Principle

The little bubbles in carbonated lemonade are actually carbon dioxide being released. When the raisins sink to the bottom of the bottle, the carbon dioxide from the lemonade sticks to their surface. The little bubbles act like life jackets for the raisins. The combined density of the raisins and bubbles is lower than that of water, causing them to rise to the surface. When the raisins reach the surface, the small carbon dioxide bubbles burst and the raisins sink again. From the outside, it looks as if the raisins are jumping up and down in the lemonade.

EXPERIMENT 2: FIREFIGHTING WITHOUT WATER

Ask an adult to help you light the candle. After the experiment, dispose of all food used in the experiment.

Materials **Baking soda, white vinegar, candle, lighter**

Steps

1. Light the candle and place it in the center of a plate.
2. Measure 20 ml of white vinegar with the measuring cup and add half a spoonful of baking powder to create lots of bubbles.
3. After 5 to 10 seconds, slowly tip the measuring cup over the candle (without pouring out the liquid) and observe the phenomenon.

Experiment Principle

Burning substances require oxygen, and if oxygen supply is cut off, the fire will stop. Baking soda and vinegar produce carbon dioxide, which is denser than air. When the cup is placed above the candle, it cuts off the oxygen supply, and the fire is extinguished. Fire extinguishers work on the same principle, using a chemical reaction to release large amounts of carbon dioxide gas, putting out the fire.

EXPERIMENT 3: FLOATING DRAWING

Materials **Clean water, mirror, whiteboard marker (water-based), Bowl**

Steps

1. Draw a sketch on the mirror using the whiteboard marker.
2. Fill the bowl with water.
3. Use the pipette to place drops of water around the sketch so that it begins to float (do not drip too quickly or directly onto the sketch, as this will distort it).
4. Carefully dip one side of the mirror into the water so that the design is submerged, then slowly remove the mirror.

Experiment Principle

The ink in whiteboard markers contains a substance that reduces the adhesion between the ink and the surface. This substance is called a release agent. Release agents are usually oily substances such as liquid paraffin or esters. The release agent ensures that the ink can be easily removed from the writing surface, especially when wet or wiped off.

EXPERIMENT 4: COKE & SALT

After the experiment, dispose of all food used in the experiment.

Materials **Cola, table salt**

Steps

1. Measure 150 ml of cola using the measuring cup and pour it into the flask.
2. Sprinkle an appropriate amount of salt into the Petri dish and then add a spoonful to the flask (the reaction is strong, so you should place a cloth on the bottom of the flask).
3. Observe the reaction.

Experiment Principle

This experiment examines how carbon dioxide behaves differently in normal water and salt water. Cola contains ingredients such as sugar, carbonated water (carbon dioxide and water), and caramel. Adding salt to cola reduces the solubility of carbon dioxide, causing the carbon dioxide gas to escape quickly from the cola and form many bubbles.

EXPERIMENT 5: A PING PONG BALL IN FLOW

After the experiment, dispose of all food used in the experiment.

Materials **Clean water, Ping pong ball, Bowl**

Steps

1. Place the ping pong ball into the empty basin.
2. Pour water over the ping pong ball and observe that the ball is controlled by the water flow.

Experiment Principle

According to Bernoulli's principle, pressure is lower where water flows faster and higher where water flows slower. When the table tennis ball moves away from the center of the flow, the water below the ball is slower and the pressure is higher. Above the ball, the water is faster and the pressure is lower. This creates a difference in buoyancy pressure that pushes the ball back to the center.

EXPERIMENT 6: WATER-ABSORBING CUP

Ask an adult to help you light the candle.

Materials **Blue color pigment, clean water, candle, lighter,** Plate

Steps

1. Pour clean water into the plate (so that the bottom is covered), then add 5 drops of blue dye and stir well.
2. Light the candle and place it in the middle of the plate. Carefully cover the candle with the measuring cup and observe the phenomenon after a while.

Experiment Principle

There is air around us, and all substances in the air are subjected to atmospheric pressure. Burning requires oxygen, and when the measuring cup is placed over the burning candle, the oxygen inside the cup is used up, reducing the air pressure inside. The higher atmospheric pressure outside then pushes water into the cup. Additionally, the carbon dioxide produced by burning dissolves in the water, and thermal expansion and contraction also contribute to the pressure drop inside the cup, forcing more water to be pushed into the cup.

EXPERIMENT 7: DISTORTED TEXT

Materials **Clean water, marker pen, white paper,** Transparent water bottle (with lid)

Steps

1. Fill the bottle with clean water using the measuring cup and screw the cap on tightly.
2. Write a few words on the white paper with the felt-tip pen.
3. Hold the paper behind the bottle and watch how the image on the paper changes.

Experiment Principle

Light travels at different speeds in different materials. When light passes from one medium to another, its direction changes. This process is called refraction. When light passes from air into water, the medium changes, causing the light to refract. When the bottle is filled with water, the cylindrical column of water also acts like a curved lens, so that we see a reversed image of the words within a certain range.

EXPERIMENT 8: DANCING MATCHSTICKS

Ask an adult to help you light the matchsticks. Make sure that there is nothing flammable nearby.

Materials **2 matchsticks, modeling clay, lighter**

Steps

1. Shape the modeling clay into a rectangle and stick the first matchstick into one corner with the head facing up.
2. Place the second matchstick next to the first one so that the heads touch.
3. Light the matchsticks and watch as the second matchstick slowly flies up into the air as if it were dancing.

Experiment Principle

The high heat of the flame causes the iron in the match head to oxidize into iron(III) oxide (Fe_3O_4), the main component of magnets. Due to their magnetic properties, the match heads stick to each other.

EXPERIMENT 9: THE STRENGTH OF SALT WATER

After the experiment, dispose of all food used in the experiment.

Materials **Table salt, egg, clean water, Transparent plastic cup**

Steps

1. Pour 150 ml of clean water into the plastic cup and place the egg in it to see whether it sinks or floats.
2. Gradually add salt to the cup, stirring constantly (stop adding salt when the egg floats in the water).

Experiment Principle

Whether an object sinks or floats in a liquid depends on its density. The density of the egg is greater than that of pure water, so it sinks to the bottom. Salt water has a higher density than the egg, so the egg floats. If you gradually add salt to pure water, the density of the liquid increases until it matches the density of the egg. At this point, the egg floats in the liquid.

EXPERIMENT 10: MILK & LEMONADE

After the experiment, dispose of all food used in the experiment.

Materials **Milk, carbonated lemonade**

Steps

1. Measure 100 ml of lemonade using the measuring cup and pour it into the flask.
2. Clean the measuring cup, then measure 50 ml of milk and pour it into the flask. Stir well with the stirring rod.
3. Observe the change in the milk.

Experiment Principle

When you mix milk and lemoande, something interesting happens: Milk contains proteins that remain liquid at a certain pH level. Carbonated lemonade is slightly acidic. When they come together, the acid in the lemonade causes these proteins to precipitate out of the milk, which we call "protein denaturation."

EXPERIMENT 11: AIR CANNON

Ask an adult to help you light the candle.

Materials **Candle, Lighter, Scissors**

Steps

1. Cut the opening of the balloon with scissors and stretch the balloon over the wide end of the funnel to form an elastic membrane.
2. Light the candle and place it on a flat surface.
3. Hold the funnel about 15 cm above the candle flame. Pull back the elastic membrane, let it go, and observe the phenomenon.

Experiment Principle

Although air is invisible and intangible, it is still a real substance. 'Wind' is simply the movement of air. When the elastic membrane is pulled back and then released, the air in the funnel is compressed and shot out quickly from the narrow end. This creates a strong air current that blows out the candle. This is an air cannon, in which air acts like a 'projectile'. Large air cannons can be very powerful, almost like normal cannons.

EXPERIMENT 12: MAGICAL STRAW

Materials **Plastic water bottle (with cap), Straw, Sweater (or any wool material)**

Steps

1. Rub the straw back and forth on the sweater about 20 times at each end.
Place the straw flat on the closed water bottle.
2. Place your palms about 5 cm away from the straw on both sides (do not touch the straw).
3. Move your hands slowly back and forth and watch how the straw seems to follow the movements as if by magic.

Experiment Principle

When the straw is rubbed against the sweater, it acquires additional negative charges. When the uncharged palms come close to the charged straw, opposite charges accumulate on the palms, and the straw is attracted to the hands. This is called "static attraction."

EXPERIMENT 13: CURVED WATER

Materials **Clean water, transparent plastic cup, pin, wool sweater**

Steps

1. Use the needle to pierce a small hole near the edge of the plastic cup (make sure the hole is small).
2. Blow up the balloon, tie a knot in it, and rub it against a wool sweater about 20 times.
3. Fill the cup with water and hold it up—a small stream of water will now flow through the hole.
4. Hold the part of the balloon that has been rubbed against the wool sweater close to the stream of water and you will see how the water bends towards the balloon.

Experiment Principle

When you rub the balloon against the wool sweater, it becomes negatively charged. The small stream of water coming out of the hole is electrically neutral. When the negatively charged balloon comes closer, the neutral water molecules rearrange themselves so that their positively charged side is attracted to the balloon. Because opposite charges attract each other, the stream of water bends toward the balloon.

EXPERIMENT 14: ZERO-GRAVITY WATER

Materials **Clean water, glass cup, piece of paper, rubber band, toothpick**

Steps

1. Use a toothpick to poke lots of small holes in the piece of paper.
2. Fill the glass cup with water and place the paper over the opening of the cup. Secure it with a rubber band.
3. Hold the paper firmly with your hand, then turn the cup upside down and let go of your hand – the water will not run out!
4. Stick a toothpick into one of the holes, and the water will still not run out.

Experiment Principle

The air pressure is strong enough to counteract gravity and keep the water in the cup so that it does not overflow. In addition, water has surface tension, which acts like an elastic "skin." The water molecules on the surface attract the molecules below, so that the water remains in the cup even if a toothpick pierces the paper.

EXPERIMENT 15: DISAPPEARING FLOWERS

Ask an adult to help you when cutting with scissors.

Materials **Clean water, white paper, scissors, plastic bag, watercolor markers, water basin**

Steps

1. Cut the white paper slightly smaller than the plastic bag and draw beautiful flowers on it.
2. Put the painted paper in the plastic bag.
3. Fill the water basin with water.
4. Dip the bag vertically into the water basin and watch the flowers magically disappear.

Experiment Principle

Light travels in straight lines. However, when it passes from air into water, it changes direction and is refracted. This can confuse our eyes. Depending on the angle of view, objects in the water can disappear, creating the illusion that they are invisible.

EXPERIMENT 16: THE COIN THAT HOLDS WATER

Materials **1 coin, clean water**

Steps

1. Pour 20 ml of water into the measuring cup.
2. Carefully add drops of water to the surface of the coin using the pipette.
3. Observe how the water droplet on the coin gets bigger and bigger.
4. Keep adding water until the droplet finally overflows.

Experiment Principle

The reason the coin can hold so much water is due to surface tension. Water molecules at the surface experience an inward force due to the difference in molecular density inside and outside the droplet. This force holds the water together, allowing it to form a dome-like shape on the coin without immediately spilling over.

EXPERIMENT 17: THE COTTON SWAB CANOE

Materials **Dish soap, clean water, plate, cotton swab**

Steps

1. Fill a plate with clean water so that the cotton swab can float.
2. Use the pipette to add a little dish soap to the Petri dish.
3. Dip one end of the cotton swab into the dish soap.
4. Break the cotton swab in half and place it in the water—watch how it moves forward on its own!

Experiment Principle

The movement of the cotton swab is caused by dish soap, which contains surfactants. These substances break down fat and reduce surface tension in water. As soon as the cotton swab soaked in dish soap is dipped into the water, it pulls the water forward behind it due to the lower surface tension.

EXPERIMENT 18: FILTERING WITH PAPER TOWELS

Materials **Muddy water, paper towel**

Steps

1. Pour 100 ml of dirty water into the measuring cup.
2. Fold a paper towel into a long strip. Place one end in the cup and hold the other end over an empty Petri dish.
3. Watch how the water rises up the paper towel and drips into the dish. The water is now much clearer than before.

Experiment Principle

Paper towels contain many tiny capillaries that cause a phenomenon known as capillary action. The liquid in these tiny channels forms a curved surface that pulls the rest of the liquid upward. Since larger particles in the muddy water cannot travel as easily through the capillary action, the water that reaches the empty bowl appears much clearer.

EXPERIMENT 19: SEPARATING WATER AND OIL

Ask an adult to help you when cutting with scissors.

Materials **Blue color pigment, cooking oil, clean water**

Steps

1. Pour 5 ml of clean water into the test tube and add one drop of blue pigment.
2. Pour cooking oil into the Petri dish. Use the pipette to take 3 ml of oil and add it to the test tube.
3. Stir the mixture with the stirring rod, place the test tube back in the test tube holder and leave it to stand.
4. Observe the changes in the test tube.

Experiment Principle

Under normal conditions, oil and water do not mix because they have different molecular sizes, densities, and viscosities. Since water is denser than oil, the oil floats on top of the water.

EXPERIMENT 20: MIXING WATER AND OIL

Materials **Blue color pigment, cooking oil, clean water, dish soap**

Steps

1. Pour 5 ml of clean water into the test tube and add a drop of blue pigment. Add a small amount of dish soap using the pipette.
2. Pour cooking oil into the Petri dish. Use the pipette to collect 3 ml of oil and add it to the test tube.
3. Stir the mixture with the stirring rod, place the test tube back in the test tube rack, and leave it to stand.
4. Observe the changes in the test tube.

Experiment Principle

Dishwashing liquid acts as an emulsifier, breaking the oil down into tiny droplets and preventing them from recombining. This distributes the oil evenly throughout the water, making it look as if the two liquids have mixed.

EXPERIMENT 21: WATER-CONDUCTING CORD

Materials Yellow color pigment, **clean water, adhesive tape, cotton string**

Steps

1. Cut a piece of cotton string about 25 cm long.
2. Secure both ends of the string with tape to the inside of the measuring cup and the piston.
3. Pour 100 ml of clean water into the measuring cup and add three drops of yellow pigment.
4. Moisten the cotton string and make sure that both ends stay in place. Hold the measuring cup in your right hand, keep the string taut, and tilt it at a 45-degree angle. Slowly pour out the water. It will flow along the string into the flask without spilling.

Experiment Principle

Liquids such as water have a property called surface tension. This ensures that the molecules at the surface stick together and the liquid takes up as little space as possible. When water runs along the cotton string, the water molecules are attracted to the molecules of the string because they attract each other. This attractive force causes the water to stick to the string and flow along it without dripping.

EXPERIMENT 22: HOMEMADE PLAYDOUGH

After the experiment, dispose of all food used in the experiment.

Materials Blue color pigment, **cooking oil, flour, table salt, clean water, Plate**

Steps

1. Put two drops of blue pigment and 10 ml of clean water into a test tube.
2. Measure 5 ml of cooking oil in another test tube.
3. Measure 50 ml of flour with a measuring cup and put it on a plate.
4. Add a small amount of salt to the Petri dish. Use the sample spoon to add a spoonful of salt to the flour.
5. Pour the liquids from both test tubes into the flour and knead the mixture until it forms a dough. (If necessary, add small amounts of water to adjust the consistency.)

Experiment Principle

Cooking oil is added to the dough to prevent it from sticking and to make it easier to shape. Salt helps slow down the evaporation of water, keeping the dough soft and pliable for longer.

EXPERIMENT 23: THE MYSTERIOUS BOTTLE

Ask an adult to help you when cutting with scissors.

Materials Blue color pigment, **clean water, plastic bottle, Nadel**

Steps

1. Fill a plastic bottle completely with water and add three drops of blue coloring so you can see it better.
2. Screw the cap on tightly so nothing can leak out.
3. Use a needle to poke several small holes in the bottle–the water won't leak out!
4. Unscrew the cap, and the water will squirt out of the holes.

Experiment Principle

The surface tension of the water forms a thin film over the small holes, preventing it from escaping. When the bottle is closed, the internal pressure is lower than the external air pressure, which keeps the water inside. When the cap is removed, air flows in, equalizing the pressure and breaking the surface tension, allowing the water to escape.

EXPERIMENT 24: CLIMBING WATER

Materials Red color pigment, **clean water, two transparent plastic sheets**

Steps

1. Pour 150 ml of water into the measuring cup, add 3 drops of red food coloring, and stir evenly.
2. Press the two plastic sheets together and dip their bottom edges into the colored water.
3. Watch how the water slowly climbs up between the sheets.

Experiment Principle

The small gap between the two plastic sheets allows the water to rise, demonstrating how water can flow through tiny spaces or pores. This phenomenon is known as capillary action. In everyday life, capillary action can be observed, for example, in paper towels, which absorb liquid because their porous structure allows the liquid to migrate upward.

EXPERIMENT 25: VISCOUS LIQUIDS

Materials Yellow color pigment, **clean water, starch**

Steps

1. Add 3 drops of yellow food coloring to 20 ml of water and stir well.
2. Add about 8 spoonfuls of starch to the Petri dish.
3. Slowly pour the colored water into the starch while stirring constantly. If the mixture becomes too runny, add more starch and continue stirring until it has a thick, ice-like consistency. Your non-Newtonian fluid is ready!

Experiment Principle

A non-Newtonian fluid behaves differently from normal fluids. Its thickness, i.e. how easily or heavily it flows, changes depending on how you move or press it. If you move it slowly, it can be thicker, and if you move it quickly, it becomes thinner. Normal fluids always remain the same thickness, no matter how you move them. Non-Newtonian fluids can also be found in nature, for example in blood, cells, and mucus.

EXPERIMENT 26: FIREPROOF PAPER CUP

Ask an adult to help you light the candle.

Materials **Clean water, paper cup, candle, Plate**

Steps

1. Pour about 100 ml of water into a plate and place a lit candle in the middle.
2. Pour about 150 ml of water into a paper cup and hold the cup over the candle flame.
3. Observe that the paper cup does not catch fire.

Experiment Principle

The ability of a paper cup to hold boiling water without burning is due to heat transfer. At standard atmospheric pressure, water boils at 100°C, while paper ignites at a temperature higher than 100°C. As the water absorbs heat from the flame, its temperature remains constant at 100°C even after reaching the boiling point. This prevents the paper from reaching its ignition temperature, allowing the cup to remain intact.

EXPERIMENT 27: EASY ROLY-POLY FIGURE

Ask an adult to help you when cutting with scissors.

Materials **DIN A4 paper sheet, double-sided tape, eggshell, modeling clay, scissors**

Steps

1. Leave the bottom half of an eggshell intact and fill the bottom with modeling clay, pressing it down firmly (the clay should fill more than half of the shell).
2. Stick double-sided tape to one corner of the A4 paper, roll it into a cone shape, and cut off the excess so that it matches the widest diameter of the eggshell.
3. Place the cone over the eggshell and cover the exposed modeling clay completely.
4. Your roly-poly figure is now finished – give it a gentle push and watch it wobble but never fall over.

Experiment Principle

A toy that is heavier at the bottom and lighter at the top will usually stand better. When the figure is upright, the heaviest point is at the bottom, which makes it stable. When you tilt the toy, the point at which the toy maintains its balance moves upward. This movement ensures that the toy always tips back to an upright position because there is a kind of "restoring force" that brings it back into balance. That's why the figure always stays upright, no matter how hard you push it to the side.

EXPERIMENT 28: THE BOTTLE THAT "SWALLOWS" A BALLOON

Ask an adult to help you when experimenting with hot water.

Materials Balloon, **hot water, cold water, paper cup, bottle (with a lid)**

Steps

1. Pour hot water into the bottle (make sure the temperature is below 75 °C to prevent deformation).
2. Close the bottle cap and wait 3 minutes for the bottle to heat up.
3. Quickly pour out the hot water, place the balloon over the bottle opening, and place the bottom of the bottle in a paper cup filled with cold water.
4. Watch as the balloon is sucked into the bottle.

Experiment Principle

When the air in the bottle is heated, it expands. As soon as the balloon is placed over the opening of the bottle, the total amount of gas remains unchanged. When the air cools, its volume decreases, causing the pressure in the bottle to drop. Since the external air pressure is now higher, it pushes the balloon into the bottle.

EXPERIMENT 29: PINHOLE CAMERA PROJECTION

Ask an adult to help you when cutting with scissors.

Materials **Transparent plastic film, paper cups, scissors, candle, toothpicks, double-sided adhesive tape, black felt-tip pen**

Steps

1. Color the inside of the paper cup completely black with a black felt-tip pen. Then use a toothpick to poke a small hole in the center of the bottom of the cup.
2. Stick double-sided tape around the rim of the paper cup and attach the plastic sheet to it (the plastic sheet should be larger than the opening of the cup).
3. Light the candle in a dark environment and hold the cup with the hole facing the flame.
4. Watch how the candlelight is projected onto the plastic sheet and how the image changes when you move the cup.

Experiment Principle

Pinhole imaging is based on the principle that light travels in a straight line. The resulting image is inverted and reversed. A smaller pinhole creates a clearer image but reduces brightness.

EXPERIMENT 30: SIMPLE DART EXPERIMENT

Ask an adult to help you when cutting with scissors.

Materials **Double-sided tape, small paper strip, cotton swab, clay, scissors**

Steps

1. Remove the cotton wool from both ends of the cotton swab.
2. Cut a strip of paper (8 cm long and 1.5 cm wide) and stick double-sided tape to one end.
3. Attach the paper strip to one end of the cotton swab, roll it up slightly, and cut the free end into a fish fin shape. Throw the cotton swab horizontally and note the direction it flies.
4. Attach a small piece of clay to the other end of the cotton swab and throw it again, noting any differences.

Experiment Principle

The center of gravity is the point at which the entire weight of an object is concentrated. If you add modeling clay to the front of the dart, the center of gravity shifts forward. This ensures that the dart always flies so that the tip lands first when you throw it.

EXPERIMENT 31: PAINTING ON EGGSHELLS

After the experiment, dispose of all food used in the experiment.

Materials **White vinegar, cotton swab, egg**

Steps

1. Pour an appropriate amount of white vinegar into the measuring cup and dip a cotton swab into it.
2. Draw patterns on the eggshell with the vinegar-soaked cotton swab (for best results, apply the vinegar several times to ensure a sufficient reaction).

Experiment Principle

White vinegar reacts with the calcium carbonate in the eggshell, causing it to dissolve and the shell to become thinner in the painted areas.

EXPERIMENT 32: CIRCULATING WATER

Ask an adult to help you when cutting with scissors.

Materials **Paper cup, straws, scissors, clay, cotton string**

Steps

1. Take two straws and cut the ends at an angle so that they can be connected.
2. Poke two small holes in the bottom of a paper cup and insert the straws. Seal all gaps with modeling clay.
3. Poke two more holes in the top of the cup, lining them up with the bottom holes, and thread a cotton string through them to form a handle.
4. Hold the cup by the string and pour water into it—the cup will start spinning as the water flows out.

Experiment Principle

The spinning motion occurs due to Newton's Third Law: every action has an equal and opposite reaction. As the water exits the straws, it exerts a force (action), and the cup experiences an opposite force (reaction), causing it to rotate.

EXPERIMENT 33: SHAPE DETERMINES BUOYANCY

Materials **Clean water, modeling clay, Water basin**

Steps

1. Take a small piece of modeling clay and shape it into a ball.
2. Shape the same amount of modeling clay into a small boat.
3. Place both shapes in the water basin and compare how they float.

Why does the boat float while the ball sinks?

Experiment Principle

Whether an object floats or sinks depends on how heavy it is and how much water it displaces. The more water an object displaces, the stronger the upward force exerted by the water. If this buoyancy is greater than the weight of the object, it remains afloat and floats. However, if the weight is greater than the buoyancy, the object sinks.

EXPERIMENT 34: STRING TELEPHONE

Ask an adult to help you when cutting with scissors.

Materials **2 paper cups, scissors, tape, cotton string**

Steps

1. Cut a piece of cotton string about 30 cm long.
2. Glue the ends of the string to the bottom of each paper cup.
3. Your homemade string telephone is ready! Try using it to call a friend.

Experiment Principle

Sound is produced by vibrations and can travel through solids, liquids, and gases. In this experiment, the cotton string transmits sound waves between the two cups. Sound cannot travel in a vacuum.

EXPERIMENT 35: THE SINGING RUBBER BAND

Materials **Paper cup, cotton swab, rubber band**

Steps

1. Break the cotton swab in half and poke a small hole in the center of the bottom of the paper cup.
2. Tie one end of the rubber band to the center of another intact cotton swab and thread the other end through the hole in the cup so that the cotton swab is attached to the bottom of the cup.
3. Pull on the unattached end of the rubber band and stretch it to different lengths. Pluck the rubber band to produce different sounds from the cup.

Experiment Principle

Sound is produced by vibrations. The pitch depends on the frequency of the vibrations: the tighter the rubber band is stretched, the higher the frequency and the higher the pitch. The looser the band, the lower the frequency and the deeper the pitch.

EXPERIMENT 36: THE MISCHIEVOUS PAPER BALL

Materials **Plastic water bottle, tissue paper**

Steps

1. Crumple the tissue paper into two balls of different sizes.
2. Place the bottle flat on the table and place the small paper ball in the bottle opening.
3. Blow air into the bottle from above and observe the movement of the paper ball.
4. Place the larger paper ball in the bottle opening and blow air into the bottle again. Watch the movement of the larger paper ball.

Experiment Principle

Since the bottle is already filled with air, adding more air causes it to overflow. The air cannot enter the bottle, but creates a vacuum at the bottle opening. According to Bernoulli's principle, the faster the air flows, the lower the pressure. The air flowing out of the straw has a lower pressure than the air in the bottle, so the paper ball is not sucked in, but pushed out by the air in the bottle.

EXPERIMENT 37: THE MAGIC WATER BAG

Materials **Clean water, plastic bag, pencil**

Steps

1. Fill the plastic bag with a little clean water (not too much, as the plastic bag is thin).
2. Sharpen the pencil and carefully turn it in the plastic bag. Observe the result.

Experiment Principle

The pencil has a smooth, even surface, and the plastic bag is elastic. When the pencil pierces the bag, the bag wraps tightly around the pencil and seals it. This keeps the plastic bag closed and prevents water from escaping.

EXPERIMENT 38: WATER DISPLACEMENT VOLUME MEASUREMENT

Materials **Blue color pigment, clean water, stones, Plate**

Steps

1. Fill the bottle with water and add 3 drops of blue food coloring. Stir well and place on a plate.
2. Drop the stones into the bottle so that the water overflows from the bottle.
3. Pour the water from the plate into the measuring cup to measure the volume of the stones.

Experiment Principle

When an object is submerged in water, the water flows over it. The volume of the displaced water corresponds to the volume of the submerged object.

EXPERIMENT 39: THE FLOATING PING PONG BALL

Materials **Ping pong ball, Hair dryer**

Steps

1. Hold the hair dryer with the nozzle facing upwards and switch it on.
2. Place the table tennis ball over the nozzle and let it go. You will see the ball float in the air.
3. Slowly tilt the hair dryer to the left or right, and the ball will float with it without falling.

Experiment Principle

This experiment uses the Bernoulli principle. The faster the air flows, the lower the pressure. The air flowing around the ping pong ball creates lower pressure, causing the ball to float in the air and counteract the ball's gravity.

EXPERIMENT 40: DIY SPINNING TOP

Ask an adult to help you when cutting with scissors.

Materials **Scissors, colored markers, cardboard, cotton swabs, pencil, double-sided tape, modeling clay**

Steps

1. Mark the center of the cardboard and align it with the center of the bottom of the bottle. Draw a circle around the bottom of the bottle.
2. Cut out the circle and draw a spiral pattern on it with colorful markers.
3. Poke a small hole in the center of the cardboard, remove the cotton wool from the cotton swab, and stick double-sided tape to the center of the cotton swab.
4. Stick the cotton swab into the hole in the cardboard and stick some modeling clay to the underside of the spinner.
5. Your homemade spinner is now ready.

Experiment Principle

When you spin the top, the forces acting on its various parts remain in dynamic equilibrium for a short time, allowing the top to continue spinning. When you look at the spiral design on the top, your eyes experience an optical illusion. All objects have inertia, which is the natural tendency to resist changes in motion.

EXPERIMENT 41: MAGIC CAN

Materials **Clean water, 1 soda can**

Steps

1. Place a can filled with water at a slight angle on a table. The can will not remain upright.
2. Try the same thing with an empty can; it will also not remain upright.
3. Fill the empty can about a quarter full with water.
4. Place the can at a slight angle on the table again; now it will remain upright.

Experiment Principle

When a can is empty or full, it has a high center of gravity, which means that it is difficult to balance and cannot stand upright. The center of gravity and the point where the can rests are difficult to align. However, when you fill the can with water, the center of gravity shifts downward and aligns with the point where the can rests. This makes it much easier to balance the can on its side.

EXPERIMENT 42: ESCAPE OF PEPPER POWDER

During the experiment, make sure that you do not inhale the pepper powder and that it does not get into your eyes.

Materials **Pepper powder, water, dish soap, Plate**

Steps

1. Fill the plate with water and sprinkle the pepper powder evenly over the surface.
2. Dip the stirring stick in dish soap and place it in the middle of the water.
3. Observe the movement of the pepper powder.

Experiment Principle

The pepper powder moves away because water has a special property called surface tension. This surface tension causes the powder to float on the surface of the water. However, when dish soap is added to the water, it breaks the surface tension and the powder quickly moves from the center of the water to the edges.

EXPERIMENT 43: BALLOON MAGIC CUP

Ask an adult to help you light the candle.

Materials **Balloon, paper, lighter, Glass cup**

Steps

1. Blow up the balloon and tie it tightly.
2. Light the paper and place it in the glass beaker.
3. Once the fire has gone out, cover the beaker with the balloon (wait about one minute).
4. Remove the balloon and watch what happens.

Experiment Principle

The paper burns the oxygen in the cup and heats the air, causing it to expand. When the balloon is placed over the cup, the air inside cools and contracts. This creates a vacuum that pulls the balloon tightly against the cup.

EXPERIMENT 44: EXPERIENCING BUOYANCY

Materials Red and yellow color pigment, **clean water, rubber band, Bottle with cap, water basin**

Steps

1. Fill a bowl halfway with water and add five drops of red pigment. Stir well.
2. Add five drops of blue food coloring to a bottle filled with water.
3. Secure the bottle cap with a rubber band. Lift the bottle by the rubber band to see how heavy it is.
4. Dip the bottle into the bowl of water and feel how the weight decreases as the rubber band gets shorter.

Experiment Principle

The Archimedes principle states that an object immersed in water experiences an upward buoyant force. This force is equal to the weight of the water displaced by the object. This is why the object feels lighter in water, because the buoyant force reduces the weight of the object.

EXPERIMENT 45: BOTTLE RACE

Materials **Sand, clean water, 2 plastic bottle of the same size**

Steps

1. Fill two bottles with the same weight of water and sand.
2. Place the bottles on a sloping surface and let them roll down.
3. Observe which bottle moves faster.

Experiment Principle

Sand creates more friction with the bottle than water. Since the grains of sand also rub against each other, the movement slows down. Water has less friction, so it moves faster than sand.

EXPERIMENT 46: DANCING PAPER STRIP

Ask an adult to help you when cutting with scissors.

Materials **Paper strip, scissors**

Steps

1. Cut a 5 cm wide strip from a sheet of A4 paper.
2. Hold the paper close to your lower lip and blow air onto it.
3. Direct the airflow towards your feet and watch how the paper rolls upwards instead of falling down.

Experiment Principle

According to Bernoulli's principle, faster air causes lower pressure. When you blow air over the paper, the air above it moves faster and the pressure decreases. The higher pressure under the paper pushes it upward, causing the paper to curl.

EXPERIMENT 47: LEMON FIRE BREATH

Ask an adult to help you light the candle. Get an adult to help you cut the lemon. After the experiment, dispose of all food used in the experiment.

Materials **Lemon (or other citrus fruits), candle, lighter**

Steps

1. Cut off a piece of lemon peel or peel an orange.
2. Light the candle and squeeze the lemon peel to spray the juice toward the candle flame.
3. Watch the candle flame.

Experiment Principle

Citrus peels contain natural oils and other flammable substances. If you squeeze the peel near a candle flame, the oils will ignite and produce bright, flickering flames accompanied by crackling noises.

EXPERIMENT 48: BALLOON AND PAPER SCRAPS

Materials **Balloon, wool sweater, paper scraps**

Steps

1. Blow up the balloon and tie it tightly.
2. Rub the balloon on clothing or other fibers, then hold it close to the paper scraps and observe the result.

Experiment Principle

The friction between the balloon and the fabric generates static electricity. This electricity causes the balloon to attract the paper scraps, almost like a magnet.

EXPERIMENT 49: OXIDIZING APPLE

After the experiment, dispose of all food used in the experiment. Get an adult to help you cut the fruits.

Materials **1 apple, 1 lemon, clean water, fruit knife, plastic wrap, Basin**

Steps

1. Fill the bowl with water and cut the lemon in half.
2. Cut the apple into four pieces.
3. Dip one piece of apple completely into the water, wrap another piece in plastic wrap, brush another piece with lemon juice, and leave the last piece untreated.
4. Wait about half an hour and observe the changes in the apple pieces.

Experiment Principle

The color change in apples happens because they react with the air, which is called oxidation. Water and plastic wrap block the air and slow down this reaction. Lemon juice helps by slowing down a substance in apples that is responsible for the color change, keeping the apples fresh and colorful for longer.

EXPERIMENT 50: ORANGE EXPLOSION

After the experiment, dispose of all food used in the experiment. Get an adult to help you cut the orange.

Materials **Balloon, orange peel (or other citrus fruit)**

Steps

1. Blow up the balloon and tie it tightly.
2. Take a piece of orange peel and press it towards the balloon so that the juice squirts onto the surface of the balloon.
3. Observe how the balloon reacts.

Experiment Principle

Orange peel contains natural oils such as limonene, which act as solvents. Balloons are made of rubber, and because similar substances mix well together, the limonene in the oil dissolves the rubber of the balloon. This creates tiny holes in the balloon, causing it to burst.

EXPERIMENT 51: BUBBLING SPINACH

After the experiment, dispose of all food used in the experiment.

Materials **Clean water, spinach leaves**

Steps

1. Cut the stems of the leaves in half.
2. Measure 150 ml of clean water using the measuring cup.
3. Dip all the spinach leaves into the water.
4. Blow air vigorously into the ends of the stems and observe the leaves.

Experiment Principle

When air is blown from the end of the stem toward the leaves, many small bubbles appear on the surface. This happens because spinach leaves have small openings called stomata. These function like tiny windows through which gases can enter and exit. Stomata are important for photosynthesis and the evaporation of water in plants.

EXPERIMENT 52: SHARP STRAW

After the experiment, dispose of all food used in the experiment.

Materials **Raw potato, Straw**

Steps

1. Take a straw, hold it firmly and try to stick it into the potato. The straw will bend but will not penetrate the potato.
2. Hold one end of the straw with your thumb and push the other end into the potato with force.
3. Observe how the straw easily penetrates the raw potato.

Experiment Principle

If you hold one end of the straw closed with your thumb and stick it into the potato, the air inside the straw is compressed. The deeper you stick the straw into the potato, the more pressure builds up inside the straw, making it stiffer and less likely to bend. This allows the straw to pierce the potato.

EXPERIMENT 53: STRAW FLUTE

Materials **Clean water, Straw**

Steps

1. Measure 150 ml of clean water using the measuring cup.
2. Cut about one-third of the way into the straw with a pair of scissors, without cutting all the way through.
3. Bend the cut part of the straw and dip one end into the water.
4. Blow into the other end, adjusting the height of the straw as you do so.
5. Squeeze the straw while blowing to make music.

Experiment Principle

When air flows through the cut part of the straw, it hits the inner walls of the lower part and creates a vortex that produces resonance and sound. The pitch depends on the size of the resonance chamber. When you lift the straw, the chamber becomes larger and the sound becomes deeper. When you push the straw down, the chamber becomes smaller and the sound becomes higher. The depth of the straw in the water also changes the sound.

EXPERIMENT 54: BOILING BALLOON

Ask an adult to help you light the candle.

Materials **Clean water, candle, lighter**

Steps

1. Blow up the balloon with your mouth.
2. Attach the inflated balloon to the tap and fill it with water until the lower part of the balloon is filled with water.
3. Light a candle and hold the lower part of the water-filled balloon over the flame. You will notice that the balloon does not burst, even though the lower part turns black and the water temperature rises.

Experiment Principle

Water has a high capacity to store heat, which means it can absorb a lot of heat. When the balloon is heated, the water inside absorbs the heat, cools the balloon, and prevents it from becoming too hot. This prevents the balloon from bursting.

EXPERIMENT 55: STRONG CHOPSTICKS

After the experiment, dispose of all food used in the experiment.

Materials **Rice, chopstick, plastic bottle**

Steps

1. Using a funnel, fill a plastic bottle with rice until it is full.
2. Insert a chopstick vertically into the bottle as far as possible and shake the bottle to press the rice down firmly.
3. Press the ends of the chopstick together and pull it out (if it cannot be pulled out, repeat step 2).

Experiment Principle

Friction occurs when two uneven surfaces rub against each other, for example between grains of rice, between the rice and the bottle, or between the rice and the chopsticks. When you squeeze the rice, the friction between the grains and the chopsticks becomes so strong that they act as a single unit. If you now apply an upward force, you can lift the entire bottle.

EXPERIMENT 56: DIVING PING PONG BALL

Materials **Clean water, ping pong ball, glass cup, Basin**

Steps

1. Fill the basin halfway with water.
2. Place the table tennis ball in the water and press it down onto the bottom with your hand. Lift your hand and observe the movement of the ball.
3. Now place a glass upside down on top of the table tennis ball. Press down on the glass and observe the movement of the ball.

Experiment Principle

When you push the ping pong ball into the water, the buoyancy of the water is stronger than the weight of the ball, which is why it floats. However, when you cover the ball with an upside-down glass, the air in the glass pushes the water out and creates a vacuum. The vacuum causes the ball to be pushed down.

EXPERIMENT 57: WALL WALKING

Materials **Coin**

Steps

1. Place a coin in the balloon.
2. Blow up the balloon and tie the opening tightly.
3. Carefully shake the coin in the balloon, moving it in one direction and observing the rapid circular motion of the coin.

Experiment Principle

Centripetal force is the force that keeps an object on a circular path, and it always pulls toward the center of the circle. In this case, gravity and the elastic force of the balloon work together to create centripetal force. This force keeps the coin in the balloon on a curved path so that it can move around inside the balloon.

EXPERIMENT 58: THE MAGICAL PAPER BRIDGE

When experimenting with the glass, be careful that it does not fall and break.

Materials **Sheet of A4 paper, 3 glass cups**

Steps

1. Place two glass cups on the table, leaving a small gap between them.
2. Place a sheet of paper on top of the two glasses and place a third glass in the middle of the paper.
You will see that the paper cannot support the weight of the glass and the top glass falls down.
3. Now fold the paper like an accordion (with several folds) and place it flat between the two glasses. Then place the third glass back on top of the paper.

Experiment Principle

A single sheet of paper has very little load-bearing capacity and cannot support a glass cup that is much heavier than itself. However, when the paper is folded, the weight of the cup is distributed across the folds, preventing the cup from falling.

EXPERIMENT 59: PAPER FLOATING ON WATER

Materials **Clean water, paper**

Steps

1. Fill the flask with water so that the water level is slightly above the rim.
2. Place the white paper over the opening of the flask and make sure that it is completely soaked with water so that there are no gaps between the paper and the flask.
3. Carefully press the paper down with one hand while turning the flask upside down with the other hand. Observe the paper.

Experiment Principle

Due to the air pressure, the pressure in the piston is lower when it is filled with water, while the air pressure on the paper is stronger than that in the piston. This means that the downward force of the water is balanced by the upward force of the air pressure, preventing the water from falling down.

EXPERIMENT 60: THE SECRET OF THE ORANGE

After the experiment, dispose of all food used in the experiment.

Materials **2 Oranges, Clean Water, Basin**

Steps

1. Fill the basin halfway with clean water.
2. Place an orange in the water and watch it float on the surface.
3. Take the orange out, peel it, and put it back in the water. The orange will now sink to the bottom.
4. Compare the peeled and unpeeled oranges by placing both in the water. The peeled orange sinks slightly to the bottom.

Experiment Principle

An object in a liquid experiences both upward and downward pressure from the liquid, which causes buoyancy. Buoyancy depends on the density of the liquid and the volume of liquid displaced. If the buoyant force is greater than the weight of the object, it floats; otherwise, it sinks. The orange peel contains air bubbles that displace a large volume of water, creating a buoyancy force that is greater than the weight of the orange, causing it to float. However, when the peel is removed, the displaced volume decreases, making the buoyancy force smaller than the weight of the fruit, causing it to sink.

EXPERIMENT 61: THE HALF-FULL WATER TRICK

Materials **Clean water**

Steps

1. Fill the measuring cup with water.
2. Slowly tilt the measuring beaker to pour the water into the flask until the diagonal line between the bottom and the rim of the measuring beaker matches the water level.
3. Read the amount of water in the measuring cup. You will find that it is exactly half the amount of water that was in the measuring cup when it was full.

Experiment Principle

The measuring cup is shaped like a cylinder. If the diagonal line between the base and the rim of the beaker matches the water level, the beaker is exactly half full.

EXPERIMENT 62: TOOTHPICK STAR

Materials **Clean water, toothpicks, Plate**

Steps

1. Bend each toothpick in the middle, but do not break it. Leave the bottom ends connected.
2 Arrange the five bent toothpicks on the plate in a ray shape.
3. Measure 50 ml of clean water in the measuring cup
4. Use a pipette to put a drop of water in the center of the toothpick star and observe what happens.

Experiment Principle

Toothpicks consist of fibers that function like tiny tubes. When they get wet, the fibers absorb water at the breaking point and expand. This causes the toothpicks to straighten up and, thanks to the surface tension of the water, they move away from each other and form a star shape.

EXPERIMENT 63: COTTON THREAD WALTZ

Ask an adult to help you when cutting with scissors.

Materials **Straw, cotton thread, scissors**

Steps

1. Cut a piece of cotton thread that is about twice as long as the straw.
2. Thread the cotton thread through the narrow end of the straw and pull it out again on the other side.
3. Tie the ends of the thread together and cut off the excess.
4. Hold the straw with the narrow end pointing downwards, blow vigorously through the straw and watch the cotton thread twist.

Experiment Principle

According to Bernoulli's principle, the pressure in a liquid (such as air) decreases the faster it flows. If you blow air through the straw, the air inside moves faster and the pressure there becomes lower than that of the outside air. As a result, the outside air pushes the cotton thread through the straw and makes it spin.

EXPERIMENT 64: STRONG COTTON THREAD

After the experiment, dispose of all food used in the experiment.

Materials **Ice cube, table salt, cotton thread, Plate**

Steps

1. Place an ice cube on the plate and then place the cotton thread in the center of the ice cube so that the thread is as close to the ice as possible.
2. Put a small amount of salt in the Petri dish, then use the measuring spoon to take half a spoonful of salt and sprinkle it evenly on the spot where the cotton thread meets the ice cube (do not use too much salt, otherwise it will not work).
3. Wait 1 minute and then carefully lift the cotton thread. You will see how the ice cube lifts.

Experiment Principle

Salt lowers the freezing point of water, which makes ice melt more easily. If a small amount of salt is sprinkled around the cotton thread, the ice melts a little. However, the melted water freezes again due to the low ambient temperature and the cotton thread becomes trapped in the ice cube.

EXPERIMENT 65: HOMEMADE SHOWER

Materials **Clean water, bottle with a cap**

Steps

1 Fill a mineral water bottle with water and screw the lid on tightly.
2 Poke a circle of small holes in the bottom of the bottle with a large needle. The water will not leak out.
3. Now, open the lid and observe how the water slowly runs out.

Experiment Principle

When the bottle cap is tightly closed, the pressure inside the bottle is lower than the air pressure outside, so that no water can escape. However, when the cap is opened, the bottle connects with the outside air and the water flows out due to gravity.

EXPERIMENT 66: WATERPROOF PAPER

Materials **Clean water, sheet of A4 paper, Basin**

Steps

1 Fill the bowl with enough water so that the water level is higher than the cup.
2. Fold the A4 paper four times and place it on the bottom of the cup.
3. Turn the cup upside down and press it firmly into the water so that the bottom is completely submerged.
4. Take the cup out of the water and you will see that the paper inside has not become wet.

Experiment Principle

The cup contains air, and when the open side is immersed bottom down in the water, the air in the cup forms a barrier between the paper and the water. This prevents the paper from getting wet.

EXPERIMENT 67: STANDING EGG

After the experiment, dispose of all food used in the experiment.

Materials **Egg, granulated sugar**

Steps

1. Try to place the egg vertically on the table. It will not stay upright.
2. Put a small amount of granulated sugar in the Petri dish and take half a spoonful with the sample spoon. Sprinkle the sugar on the table.
3. Place the bottom of the egg on the sugar on the table and adjust the center of gravity of the egg. The egg will miraculously stay upright.

Experiment Principle

The base of the egg and the granulated sugar on the table together form a stable support structure that increases the contact surface between the egg and the table. This surface is flat. As the center of gravity of the egg is exactly aligned with the pivot point of the support structure, the egg can stand upright.

EXPERIMENT 68: FLYING SAUCER IN WATER

Ask an adult to help you when cutting with scissors.

Materials **Dishwashing liquid, clean water, white paper, pen, scissors, Plate**

Steps

1. Draw a spiral pattern on a small piece of paper.
2. Cut along the spiral line to create a spiral "flying saucer".
3 Fill the plate halfway with water.
4. Place the small piece of paper in the water and wait until it has completely settled.
5. Pour a sufficient amount of washing-up liquid into the test tube, draw up the liquid with the pipette and drop a drop of washing-up liquid into the center fold of the paper. Observe the movement of the paper.

Experiment Principle

Water has a surface tension. Detergent is a surfactant that quickly reduces the surface tension of water. When detergent is dripped into the center of the paper, it spreads quickly along the spiral grooves and reduces the surface tension in these grooves. Because of the spiral shape of the paper and the difference in surface tension, the paper begins to spin around its center.

EXPERIMENT 69: LOST CHARACTERS

Materials **Clean water, white paper, pen**

Steps

1. Write a letter in the middle of the paper with the pen.
2. Fill the cup with water and place the paper behind it. Then look at the letter from the front through the cup.
3. Look at the paper from an oblique angle above the cup and you will see that the letter has disappeared.

Experiment Principle

When light passes from one medium to another at a certain angle, it is refracted and reflected. The beaker filled with water acts like a convex lens in the horizontal direction. When light enters the cup vertically, it is refracted in a horizontal direction, making the image appear upright and enlarged. However, if the light enters the cup at an oblique angle, it is completely reflected on the surface of the water, so that the figure disappears from a certain angle when viewed from above.

EXPERIMENT 70: SMILING EGG

Ask an adult to help you light the candle.

Materials **Boiled egg, white vinegar, glass cup, candle, lighter**

Steps

1. Light the candle with a lighter and drip wax onto the eggshell to draw a smiley face.
2. Place the egg in the glass beaker and pour white vinegar over it until the egg is completely covered.
3. Leave the egg to soak in the vinegar for 12 hours
4. After 12 hours, remove the egg from the vinegar and carefully rub off the eggshell. Rinse with clean water.
5. You will notice that the smiley face has remained intact from the eggshell.

Experiment Principle

The main component of eggshells is calcium carbonate, which reacts with the acetic acid in vinegar to form calcium acetate and carbon dioxide gas. The main component of candle wax is kerosene, which does not react with acetic acid. The parts of the eggshell that are not covered with wax begin to dissolve and release small bubbles of carbon dioxide. The wax-covered areas of the eggshell do not react with the acetic acid, which preserves the smiley face.

EXPERIMENT 71: SELF INFLATING GLOVE

Ask an adult to help you when cutting with scissors.

Materials **Clear water, 1 rubber glove, plastic bottle, scissors, Basin**

Steps

1. Cut off the bottom of the plastic bottle with scissors.
2. Carefully put the rubber glove over the open end of the plastic bottle (be careful not to tear the glove). As soon as it is firmly in place, push the glove into the bottle.
3. Fill a basin two-thirds full with clear water.
4. Slowly dip the plastic bottle into the water with the open side down and observe what happens to the glove.

Experiment Principle

The plastic bottle is filled with colorless, odorless air. When the bottle is immersed in water, the water penetrates the bottle, forcing the air inside into the rubber glove, which inflates. When you lift the bottle again, the water flows out of the bottle and the air flows back into the bottle, deflating the glove.

EXPERIMENT 72: WATER FLOWERS

Ask an adult to help you when cutting with scissors.

Materials Blue color pigment, **clear water, scissors, sheet of DIN A4 paper, colored pen, Plate**

Steps

1. Cut the DIN A4 paper into several small pieces. Draw the outlines of flowers on each piece with colored pencils and color them in
2. Carefully cut along the outlines of the flowers.
3. Fold the petals one by one towards the center.
4. Pour some clear water into the plate (enough to cover the bottom) and add three drops of blue color pigment. Stir well with the stirring rod.
5. Carefully place the folded paper flowers on the surface of the water and watch what happens next.

Experiment Principle

Paper consists of many plant fibers. When water penetrates these fibers, they expand, causing the paper to open along the fold lines. This effect is reminiscent of flowers blooming on water

EXPERIMENT 73: HIDDEN TEXTS

Ask an adult to help you light the candle.

Materials **White vinegar, white paper, cotton swab, candle, lighter**

Steps

1. Pour 5 ml of vinegar into the test tube.
2. Dip a cotton swab into the vinegar and write a word of your choice on the white paper.
3. Let the paper air dry and the writing will disappear
4. Light the candle and hold the paper near the flame (about 0.5 cm above the outer flame).
5. Observe how the text gradually reappears.

Experiment Principle

White vinegar is colorless. When it is applied to the paper and then dried, the writing becomes invisible. When the vinegar-soaked paper is heated over a candle, the vinegar carbonizes the fibres of the paper, turning it brownish-red. In this way, the previously invisible writing becomes visible.

EXPERIMENT 74: SEVEN COLORS OF SUNLIGHT

Materials **Clear water, white paper, mirror, Plate**

Steps

1. Put about 1-2 cm of clean water in the plate.
2. Prepare a sheet of white paper.
3 Place the mirror at an angle in the water.
4. Turn the mirror until you see the rainbow light on the paper (the experiment should be carried out in a bright place).

Experiment Principle

Sunlight consists of many different colors, which together form white light. These colors are red, orange, yellow, green, blue, indigo and violet. Each of these colors behaves a little differently when it passes through water and is therefore broken down into individual colors. The mirror reflects the light back so that we can see the seven colors on the paper.

EXPERIMENT 75: DISAPPEARING SUGAR

Materials **Sugar, warm water**

Steps

1. Fill the measuring cup with warm water.
2. Fill the Petri dish with sugar.
3. Use the sample spoon to add sugar from the Petri dish to the measuring beaker, stirring constantly with the stirring rod.
4. Observe the changes in sugar and water.

Experiment Principle

Water consists of molecules that have very small 'gaps' that cannot be seen with the naked eye. When sugar dissolves, its molecules fit exactly into these gaps in the water molecules and take up very little space. This is why it looks as if the sugar simply disappears when it dissolves.

EXPERIMENT 76: LET THE PAPER CUPS FLY

Materials **2 paper cups**

Steps

1. Put the two paper cups together (do not press them too tightly together).
2. Hold the paper cups in your hands.
3 Blow vigorously into the gap where the cups are standing together.
4. Observe how the paper cups fly up.

Experiment Principle

When we blow air into the gap between the two paper cups, the air displaces the air inside the cups and creates pressure. This pressure ensures that the inner cup is pushed out of compression, causing the cups to fly away.

EXPERIMENT 77: MUSICAL BOTTLES

Materials **Clear water, 3 glass cups, chopsticks**

Steps

1. Take three identical glass beakers.
2 Using the measuring cup, pour 50 ml, 100 ml and 150 ml of clear water into one of the cups.
3. Tap the rim of each beaker with a chopstick with equal force and listen to the different sounds.

Experiment Principle

The glass cups and the water vibrate at different frequencies, depending on how much water is in the beaker. The more water there is, the slower the cup vibrates and the sound becomes deeper. The less water in the beaker, the faster the beaker vibrates and the higher the pitch.

EXPERIMENT 78: THE SHRINKING CAN

Be careful when experimenting with hot water.

Materials **Boiling water, cold water, emtpy soda can, cloth, Basin**

Steps

1. Fill a basin halfway with cold water.
2 Pour boiling water into the empty can until it is about three quarters full.
3. After about 10 seconds, wrap the can in a cloth and pour out the boiling water.
4. Quickly turn the can upside down and place it upside down in the bowl of cold water (ice water is even more effective).
5. Observe how the can contracts.

Experiment Principle

The steam from the boiling water displaces some of the air inside the can and the remaining air is heated. When the can is immersed in the cold water, the steam condenses into water droplets and the hot air cools and contracts. As the opening of the can is sealed by water, the air pressure inside drops. This creates a pressure difference between the inside and outside of the can, causing it to be compressed by the external air pressure.

EXPERIMENT 79: BURNING UNDERWATER CANDLE

Ask an adult to help you light the candle.

Materials **Clear water, round short candle, lighter, glass cup, Basin**

Steps

1 Pour most of the water into a bowl.
2 Light the candle with a lighter.
3. Place the lit candle on the surface of the water and let it float.
4. Place the glass cup over the candle and slowly press it down. Observe that the candle "sinks" to the bottom of the bowl when the glass cup is pressed down and continues to burn for a while before it goes out. You will also notice that the water level in the bowl rises.

Experiment Principle

The glass cup does not create a vacuum but is filled with air. When the cup contacts the water surface, it forms a sealed environment. The air inside the cup displaces the water, lowering the water level inside the cup. The candle continues burning with the limited air inside. As the air occupies space, the water level in the basin rises.

EXPERIMENT 80: THE DISAPPEARING EGG YOLK

After the experiment, dispose of all food used in the experiment.

Materials **Raw egg, cooking oil, 2 glass cups**

Steps

1. Crack the egg and separate the yolk and egg white into two different glass cups.
2. Stir the contents of each cup thoroughly with the stirring rod.
3. Add a suitable amount of cooking oil to each cup.
4. Leave the cups to stand for a while after stirring and observe them. The glass cup with the egg whites will show a clear separation, with the oil floating on top of the egg whites. However, no oil will be visible in the cup with the egg yolk.

Experiment Principle

The reason why the oil disappears in the egg yolk cup is that the egg yolk contains a powerful substance called lecithin. This substance helps to distribute the oil evenly. The egg white has no lecithin, so it cannot mix the oil and it remains separate and sinks to the bottom of the cup.