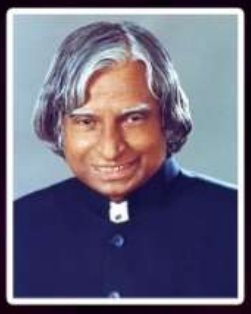
PHYSICAL SCIENCE

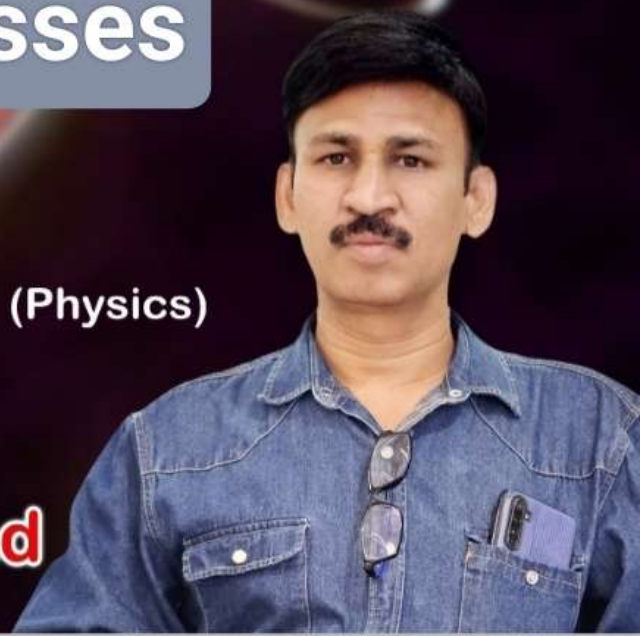


FORMATIVE ASSESSMENT - 1

Experiments/Lab activities/Activities and Projects

(2024 - 2025)

VIII, IX & X Classes



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8th CLASS

Experiments -1

Aim: Electrostatic force comes into play even when the bodies are not in contact.

Materials required: Two plastic straws, Thread, A sheet of paper,

Procedure: 1) Take equal lengths of two plastic straws.

2) Suspend one of the plastic straw from the edge of a table with the help of a piece of thread.

3) Now hold the other plastic straw in your hand and rub its free end with a sheet of paper.

4) Bring the rubbed end of the straw near the suspended straw.

5) Make sure that the two plastic straws do not touch each other.

6) We observed that, two straws are attracting each other.

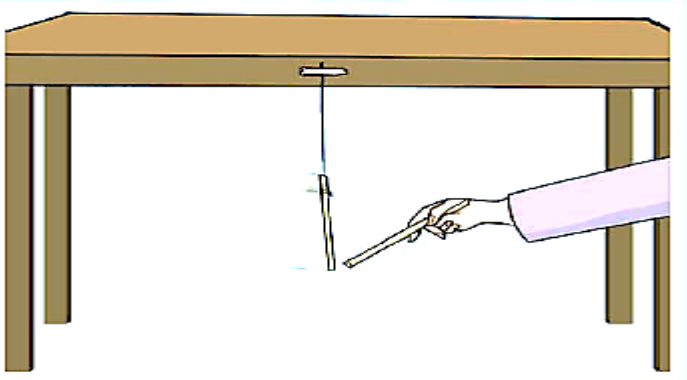
7) A straw is said to have acquired electrostatic charge after it has been rubbed with a sheet of paper. Such a straw is an example of a charged body.

8) Next, rub the free end of the suspended piece of straw with a sheet of paper.

9) Again, bring the piece of straw that was rubbed earlier with paper near the free end of the suspended straw.

10) We observed that, two straws are repelling each other.

11) Two plastic straws acquired same electric charge.



Conclusion: Electrostatic force comes into play even when the bodies are not in contact. The electrostatic force, therefore, is another example of a non-contact force.

Experiments -2

Aim: Pressure exerted by liquid at the bottom of the container depends on the height of its column.

Materials required: Transparent container, Water Ruler or measuring tape, Spring balance or pressure gauge, Stopwatch or timer

Procedure:

1) Place the transparent container on a flat surface.

2) Fill the container with water, ensuring it is completely filled to the brim.

3) Use a ruler or measuring tape to measure the initial height (h1) of the water column from the base of the container to the surface of the water.

4) Attach the spring balance or pressure gauge to the bottom of the container, ensuring it is securely fastened.

5) Start the stopwatch or timer.

6) Observe and record the reading on the spring balance or pressure gauge, which indicates the pressure exerted by the liquid at the bottom of the container.

7) Measure the final height (h_2) of the water column after a specific time interval (Ex: 30 seconds).
8) Repeat steps 5-7 for different time intervals (Ex:1 minute, 2 minutes) while keeping the initial height constant.
9) Repeat steps 3-8 for different initial heights (h_1) by adding or removing water from the container.

S.No	h_1	h_2	$\Delta h = h_2 - h_1$

Conclusion: This experiment confirms that the pressure exerted by a liquid at the bottom of a container does depend on the height of its column.
By measuring the pressure at different heights and observing the corresponding changes, we can see a direct relationship between the two variables.

Experiments -3

Aim: Pressure exerted by liquid at the bottom of the container depends on the height of its column.

Materials required: Transparent glass or a plastic pipe, Water, A piece of thin sheet of rubber

Procedure:

1) Take a transparent glass tube or a plastic pipe.
2) The length of the pipe/tube should be about 25 cm and its diameter should be 5-7.5 cm.
3) Also take a piece of thin sheet of a good quality rubber, say, a rubber balloon.
4) Stretch the rubber sheet tightly over one end of the pipe.

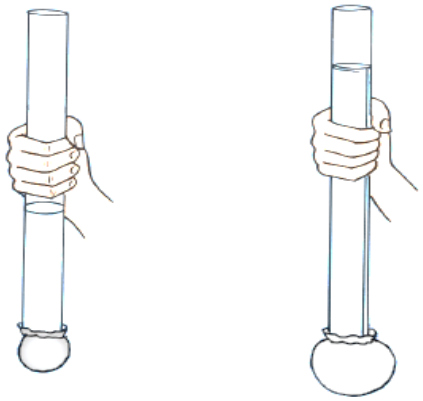


Fig. 1.14 : Pressure exerted by water at the bottom of the container depends on the height of its column

5) Hold the pipe at the middle, keeping it in a vertical position.
6) Ask one of your friends to pour some water in the pipe.
7) The rubber sheet bulges out.
8) Note also the height of the water column in the pipe.
9) Pour some more water.
10) Observe again the bulge in the rubber sheet and the height of the water column in the pipe. Repeat this process a few more times.
11) We will observe that the bulging of the rubber balloon increase with the increase in height of the liquid column.

Conclusion: Pressure exerted by liquid at the bottom of the container depends on the height of its column.

Experiment -4

Aim: Identifying a substance as coal experimentally.

Materials required: Sample suspected to be coal, Bunsen burner or a heat source, Ceramic crucible or a fire-resistant container, Test tubes and test tube holder, Hydrochloric acid (HCl), Water, Balance or scale, A source of ignition(matches or a lighter), Safety goggles and gloves.

Procedure:

Visual Examination:

1. Examine the sample's appearance. Coal is typically black or brownish-black and has a matte or dull luster.
2. Check for any layered or irregular texture on the surface.

Density Measurement:

1. Weigh the sample using a balance or scale to determine its mass.
2. Calculate the density by dividing the mass by the volume. If you don't know the volume, you can estimate it based on the sample's dimensions.
3. Compare the calculated density to typical coal densities, which are generally lower than most rocks and minerals.

Combustion Test:

1. Ignite a small piece of the sample using a Bunsen burner or a heat source.
2. Observe the flame color and characteristics. Coal typically burns with a yellow or orange flame, releasing carbon dioxide.
3. Note the odor and any visible ash left behind after burning.

Acid Reaction:

1. Place a small portion of the sample in a test tube.
2. Add a few drops of hydrochloric acid (HCl) to the sample.
3. Observe if there is any reaction. Coal should not react with the acid, indicating its organic nature.

Heating Test:

1. Heat a small sample of the material in a ceramic crucible or fire-resistant container.
2. Observe the material's behavior as it heats up: Coal will release volatile components, such as water vapor or gases, and may shrink in size.
3. Note any change in color or texture.
4. Coal will leave behind ash after heating.

Conclusion: Based on the results of the experiments and comparisons, determine whether the material is coal or another substance.

Experiment -5

Aim: Identifying inexhaustible and exhaustible natural resources experimentally

Materials required: Samples representing potential natural resources (e.g., water, sunlight, fossil fuel, soil), Containers or setups for experiments, Measuring instruments (e.g., measuring cups, thermometers, light sensors), Timer or clock

Procedure:

Part 1: Identification of Inexhaustible Natural Resources

Inexhaustible natural resources are those that are virtually unlimited in supply and can be replenished naturally over time. Here's how you can identify them experimentally:

1. Water (as an example):

a. Fill a container with water (a small basin or beaker).

b. Set up a simple experiment to measure the rate of water evaporation. You can use a thermometer to monitor the water temperature and a timer to record the time it takes for a noticeable decrease in water level due to evaporation.

c. Observe and record the results over a period of time (several days or weeks).

d. Conclude that water is an inexhaustible resource because it can be replenished through natural processes like the water cycle.

Part 2: Identification of Exhaustible Natural Resources

Exhaustible natural resources are finite and can be depleted over time. Fossil fuels like coal, oil, and natural gas are examples. Here's how you can identify them experimentally:

1. Fossil Fuel (as an example):

a. Take a small piece of coal, representing a fossil fuel resource.
b. Set up a simple experiment to simulate combustion (burning) of the coal. Place the coal in a controlled environment, such as a heat-resistant dish or crucible.
c. Ignite the coal using a heat source (e.g., a Bunsen burner or a candle) and observe the combustion process.
d. Record the time it takes for the coal to burn completely or to a significant extent.
e. Conclude that coal is an exhaustible resource because it can be depleted through consumption and combustion.

Conclusion: 1. Inexhaustible natural resources like water demonstrated a sustainable supply or the ability to replenish naturally over time.
2. Exhaustible natural resources like fossil fuels showed a finite supply and the potential for depletion through consumption.

Experiment -6

Aim: Simulated Distillation and Fractionation of Crude Oil

Materials required: A small sample of crude oil (representing the feedstock),A distillation apparatus (e.g., a simple distillation setup or a fractional distillation column), Heat source (e.g., Bunsen burner or hot plate), Collection flasks or test tubes, Thermometer, Water-cooling system (condenser or Liebig condenser), Fractionating column (if performing fractional distillation), Safety goggles and lab coat.

Procedure:

1. Sample Preparation:
a) Obtain a small sample of crude oil. This represents the feedstock that enters a real petroleum refinery.
b) If necessary, filter the crude oil to remove any solid impurities.
2. Setting Up the Distillation Apparatus:
a) Assemble the distillation apparatus. If you have a fractional distillation column, attach it to the setup.
b) Ensure that the distillation flask is clean and dry.
c) Attach the condenser to the distillation flask, and connect it to a water source for cooling.
d) Place a collection flask or test tube at the distillate outlet.
3. Heating and Distillation:
a) Begin heating the crude oil sample gently using the heat source (Bunsen burner or hot plate).
b) Record the temperature as it rises throughout the process.
c) As the temperature increases, different fractions of the crude oil will start to vaporize.
d) The lowest boiling fractions (such as gases and light naphtha) will condense and collect in the first collection flask or test tube.
e) Continue heating until you have collected several fractions representing different boiling ranges (e.g., gasoline, kerosene, diesel, etc.).
4. Observation and Data Collection:
a) Observe the different fractions collected and note their physical properties, such as color and viscosity.
b) Record the temperature ranges at which each fraction was collected.
c) Label each fraction according to its expected petroleum product (e.g., gasoline,

kerosene).
5. Safety Precautions:
a) Ensure proper ventilation in the laboratory.
b) Wear safety goggles and a lab coat.
c) Handle heating equipment with care to prevent accidents.
d) Use caution when working with open flames.
Conclusion: This simplified experiment demonstrates the concept of distillation and fractionation in petroleum refining, providing a basic understanding of how crude oil is separated into various useful products in a real refinery.

Project – 1

Title of the Project: **Formation of Petroleum: Nature's Liquid Gold**

Aim of the project: Formation of Petroleum

Hypothesis: Petroleum, often referred to as "liquid gold," is a valuable natural resource that powers our modern world.

Introduction: Understanding how petroleum forms is essential to appreciate its significance. Petroleum originates from organic materials buried deep within the Earth and undergoes a transformation over millions of years, ultimately resulting in the formation of this precious resource.

1. **Source Material:** Petroleum primarily originates from the remains of ancient marine organisms such as plankton and algae. These microorganisms accumulated at the bottom of ancient oceans and seas.
2. **Deposition:** Over time, layers of sediment accumulated on top of these organic remains. The pressure from these layers compressed the organic material, causing it to become buried deeper within the Earth's crust.
3. **Heat and Pressure:** As the organic material sank deeper into the Earth's crust, it encountered increasing heat and pressure. This combination of high temperatures and pressure initiated a process called "diagenesis," which transforms the organic material into a waxy substance called kerogen.
4. **Cooking Process (categenesis):** Further burial and increased temperature transform kerogen into hydrocarbons. This process, known as catagenesis, involves the cracking of long-chain hydrocarbons in kerogen into shorter and more complex hydrocarbons like oil and natural gas.
5. **Migration:** Once formed, petroleum tends to migrate through porous rock layers, seeking reservoirs where it can accumulate. The movement of petroleum is driven by buoyancy and geological structures.
6. **Trapping:** Petroleum is usually found in reservoirs trapped beneath impermeable rocks, like shale or salt domes. These geological traps prevent the oil and gas from escaping to the surface.
7. **Maturation:** Over millions of years, petroleum continues to mature, with some components breaking down into natural gas, while others remain as liquid crude oil.
8. **Exploration and Extraction:** To access petroleum, exploratory drilling is conducted to locate and extract it from reservoirs deep underground.
9. **Conclusion:** The formation of petroleum is a remarkable geological process that takes millions of years. It begins with the accumulation of organic material from ancient marine life, undergoes heat and pressure-driven transformations, and ultimately leads to the creation of valuable oil and gas deposits. Understanding this process is crucial for efficient petroleum exploration and the sustainable management of this vital natural resource.

PROJECT REPORT

Name of the project:
Class : 8th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 8th class physical science book.

Project – 2

Title of the Project: Collect information on *Various Constituents of Petroleum and their Uses*

Aim of the project: Various Constituents of Petroleum and their Uses

Hypothesis: Petroleum is a complex mixture of hydrocarbons and various other compounds.

Introduction: Petroleum, often referred to as "liquid gold," is a valuable natural resource that powers our modern world. Understanding how petroleum forms is essential to appreciate its significance.

1. Petroleum Gas in Liquid Form(LPG)

Use: Fuel for home and Industry

2. Petrol

Use: Motor fuel, Aviation fuel, Solvent for dry cleaning

3.Kerosene

Use: Fuels for stove, Lamps and for Jet aircrafts

4. Diesel

Use: Fuel for heavy motor vehicles, Electric generators

5. Lubricating oil

Use: Lubrication

6. Paraffin wax

Use: Ointments, Candles, Vaseline etc.

7. Bitumen

Use: Paints, Road surfacing

Conclusion:

PROJECT REPORT

Name of the project:
Class : 8th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 8thclass physical science book.

Project – 3:

Title of the Project: **The function of major thermal power plants in India.**

Aim of the Project: Collect information on major thermal power plants.

Hypothesis: Generate electric energy from thermal energy

Introduction: The functioning of major thermal power plants in India involves a series of steps and processes to generate electricity from thermal energy. Here's a general overview of how these power plants operate.

1. Fuel Supply:
   - Thermal power plants primarily use coal, natural gas, or oil as fuel sources.
   - The fuel is transported to the power plant site and stored in large stockpiles or storage tanks.
2. Combustion Process:
   - The fuel is burned in a combustion chamber, typically within a boiler, to produce high-temperature and high-pressure steam.
3. Steam Generation:
   - Water is heated to produce steam using the heat generated from the combustion process.
   - The high-pressure steam is directed to a steam turbine.
4. Steam Turbine:
   - The steam turbine is connected to a generator.
   - As the high-pressure steam flows through the turbine, it causes the turbine blades to rotate.
5. Electricity Generation:
   - The rotation of the turbine drives the generator, which converts mechanical energy into electrical energy.
   - This electricity is then transmitted to the grid for distribution to consumers.
6. Cooling:
   - The steam exiting the turbine is condensed back into water in a condenser.
   - Cooling water, often from a nearby river or cooling tower, is used to reduce the temperature of the steam.
7. Steam Cycle:
   - The water, now in liquid form, is returned to the boiler to repeat the steam generation cycle.
   - This closed-loop system ensures efficient use of water.
8. Emissions Control:
   - Thermal power plants employ various technologies to control emissions of pollutants, such as sulfur dioxide (SO2), nitrogen oxides (NOx), and particulate matter.
   - Technologies like flue gas desulfurization (FGD) and selective catalytic reduction (SCR) help reduce air pollution.
9. Ash Handling:
   - In coal-fired power plants, ash is produced as a byproduct of combustion.
   - Ash handling systems collect and transport the ash to ash ponds or for disposal.
10. Environmental Compliance: -
    - Power plants must adhere to environmental regulations and obtain necessary permits to operate.
    - Regular monitoring and reporting of emissions and compliance with emission limits are essential.
11. Maintenance and Upkeep: -
    - Thermal power plants require regular maintenance to ensure safe and efficient operation.

- Planned shutdowns or outages are scheduled for maintenance activities.

12. Modernization and Efficiency Improvements: -
    - Power plants may undergo upgrades and improvements to enhance efficiency and reduce emissions.
    - These upgrades may include adopting cleaner technologies and improving fuel efficiency.
13. Grid Integration: -
    - Electricity generated at thermal power plants is integrated into the national or regional grid for distribution to consumers.

Conclusion: It's important to note that while the general process remains consistent, the specific operations of thermal power plants can vary depending on factors such as the type of fuel used (coal, natural gas, or oil), the size and capacity of the plant, and the technology employed. Additionally, there is a growing emphasis on cleaner and more efficient technologies in the Indian power sector to reduce environmental impacts and increase energy efficiency.

PROJECT REPORT

Name of the project :
Class : 8th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 8th class textbook

9th CLASS

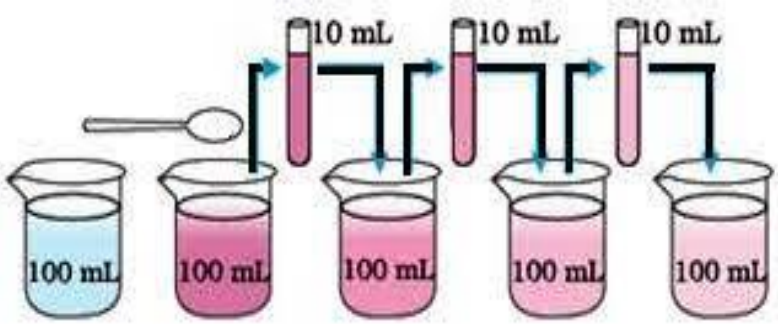
Experiments -1

Aim: Testing that the particles of matter are very small.

Materials required: Transparent measuring beakers, Potassium permanganate crystals, Water, Spoon, Test tubes

Procedure:

1) Take 2–3 crystals of potassium permanganate and dissolve them in 100 mL of water.
2) Take out approximately 10 mL of this solution and put it into 90 mL of clear water.
3) Take out 10 mL of this solution and put it into another 90 mL of clear water.
4) Keep diluting the solution like this 5 to 8 times.
5) The water remains coloured till the last dilution.
6) This experiment shows that just a few crystals of potassium permanganate can colour a large volume of water (about 1000L).



7) So we conclude that there must be millions of tiny particles in just one crystal of potassium permanganate, which keep on dividing themselves into smaller and smaller particles.
8) The same activity can be done using 2 ml of Dettol instead of potassium permanganate.
9) The smell can be detected even on repeated dilution.

Conclusion: The particles of matter are very small. They are small beyond our imagination.

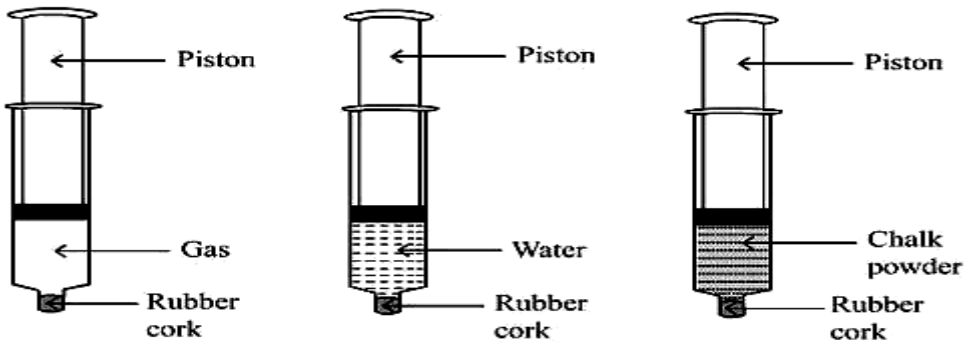
Experiments -2

Aim: The gases are highly compressible as compared to solids and liquids.

Materials required:

Procedure:

1) Take three 100 mL syringes and close their nozzles by rubber corks, as shown in Figure



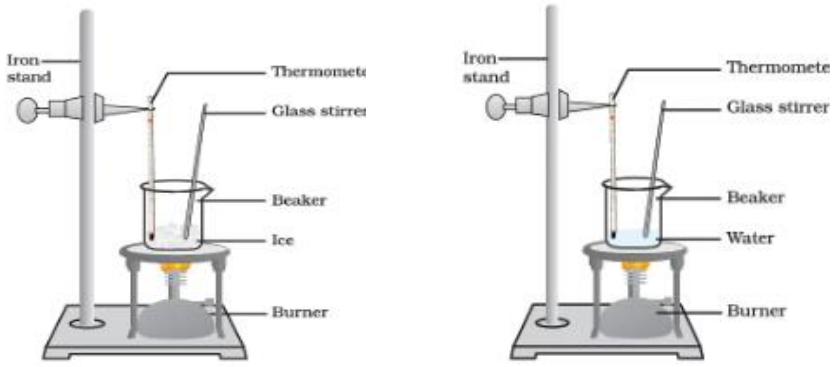
2) Remove the pistons from all the syringes.
3) Leaving one syringe untouched, fill water in the second and pieces of chalk in the third.
4) Insert the pistons back into the syringes. You may apply some vaseline on the pistons before inserting them into the syringes for their smooth movement.
5) Now, try to compress the content by pushing the piston in each syringe.
6) The piston was pushed in easily in the syringe in which nothing except air was filled.
7) Gases can be compressed easily.

Conclusion: We have observed that gases are highly compressible as compared to solids and liquids.

Experiments -3

Aim: The state of matter is affected by changing temperature.
Materials required: Beaker, Laboratory thermometer, Ice, Burner, Glass rod
Procedure:

1) Take about 150 g of ice in a beaker and suspend a laboratory thermometer so that its bulb is in contact with the ice, as in Figure.



2) Start heating the beaker on a low flame.
3) Note the temperature when the ice starts melting.
4) Note the temperature when all the ice has converted into water.
5) The ice melts at 0^0C. All the ice gets conversion from solid to liquid state.
6) Now, put a glass rod in the beaker and heat while stirring till the water starts boiling.
7) Keep a careful eye on the thermometer reading till most of the water has vaporised.
8) The water starts boiling at 100^0C and gets converted into vapours at the same temperature.

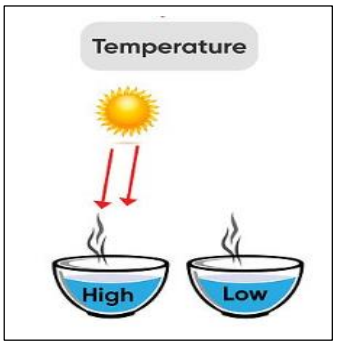
Conclusion: On increasing the temperature of solids, the kinetic energy of the particles increases.Due to the increase in kinetic energy, the particles start vibrating with greater speed. The energy supplied by heat overcomes the forces of attraction between the particles. The particles leave their fixed positions and start moving more freely. The state of matter is affected by changing temperature.

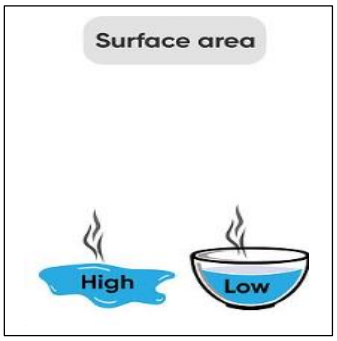
Experiments -4

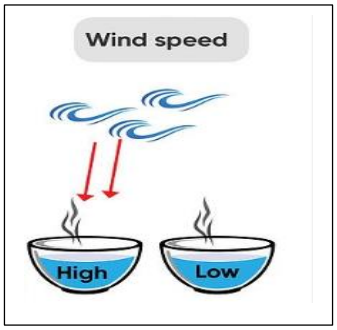
Aim: Evaporation depends on temperature, surface area and speed of wind.
Materials required: Test tube, China dish, Fan, Thermometer
Procedure:

1) Take 5 mL of water in a test tube and keep it near a window or under a fan.
2) Take 5 mL of water in an open china dish and keep it near a window or under a fan.

3) Take 5 mL of water in an open china dish and keep it inside a cupboard or on a shelf in your class.
4) Record the room temperature.







5) Record the time or days taken for the evaporation process in the above cases.
6) Repeat the above three steps of activity on a rainy day and record your observations.
7) Evaporation will be fastest from the china dish kept near window.
8) The evaporation increases with temperature, surface area of the container and speed of wind.

Conclusion: Evaporation depends on temperature, surface area and speed of wind.

Project – 1:

Title of the Project: Collect information on the effect of evaporation on daily Life situations.

Aim of the Project: To study the effect of evaporation on daily life situations.

Hypothesis: Evaporation is a cooling process and surface phenomena.

Evaporation: Evaporation is a surface phenomenon. Particles from the surface gain enough energy to overcome the forces of attraction present in the liquid and change into the vapour state.

The rate of evaporation depends upon the surface area exposed to the atmosphere, the temperature, the humidity and the wind speed.

The effect of evaporation on daily life situations: -

1. Drying Clothes under The Sun:
One of the most common real-life examples of evaporation is drying of clothes under the sun. When the wet clothes are put under the sun, they get heated up resulting in the evaporation of water particles present in wet clothes; making the clothes dry.

2. **Ironing of Clothes:**
The hot iron evaporates the water vapors present in the fabric of clothes, which help to iron the clothes well.

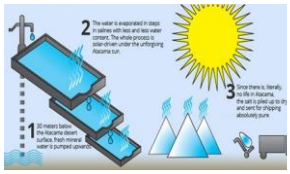
3. **Cooling Down of Hot Tea and Other Hot Liquids:**
Isn't it a magic as to how a hot cup of tea or any hot liquid cools down after some time? It's all possible because of the evaporation. Heat loss happens as the water evaporates resulting in the cooling down of the tea and other such beverages.

4. **Wet Floors:**
How does the wet floor dries up? Where does the water go away? The simple answer is that the water is evaporated because of the heat and making the floor completely dry.

5. **Melting of Ice Cubes:**
When the ice cubes are taken out of the refrigerator for having drinks, we all must have noticed that after some time the ice cubes melt and take the form of the liquid. It changes its shape from solid to liquid.

It all happens because of the increased temperature outside the refrigerator that evaporates the water, resulting in the change of shape of the ice cubes.

6. Preparation of Common Salt:

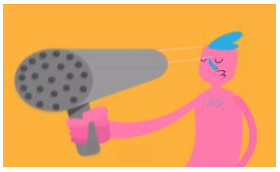


Preparation of common salt is also a widespread example of the evaporation. The seawater goes under the evaporation, which results in the formation of salt crystals.

7. Evaporation of Nail Paint Remover:

The acetone present in the nail paint remover takes the heat of our bodies and evaporates.

8. Drying of Wet Hair:

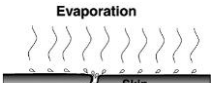


Going for some urgent work? Need to dry your hair immediately? The only possible immediate solution is drying up of hair with the hairdryer. The water vapor of wet hair evaporates due to the heat of the sun or heat of the hairdryer.

9. Drying up of Different Water Bodies:

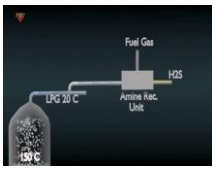
The water from different water bodies mostly get dried up during the hot summers and gets refilled only after rain. So, what do you think? What happened here? Well, here also it's evaporation.

10. Evaporation of Sweat from Body:



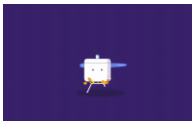
On a hot summer day, the sweat from the skin evaporates due to the high temperature of the environment, taking a little bit of body heat. Thus, it results in the cooling effect.

11. Distillation Process:



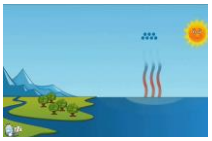
Distillation is a process in which the different components of the liquid is separated by the boiling and the condensation. Thus, in this process too, the evaporation performs the main role.

12. Working of a Pressure Cooker:



During cooking, a lot of heat is produced inside a pressure cooker, and with its whistle, the steam comes out by evaporation; making a perfect dish for us.

13. Brings Rain:



The initial stage under the water cycle process is evaporation. The other process like condensation, sublimation, precipitation, transpiration, runoff, and infiltration comes after the evaporation process. So, if evaporation is not there then this water cycle would remain incomplete.

Conclusion: Evaporation is a natural phenomenon that occurs in liquids. Evaporation is a part of human life.

PROJECT REPORT

Name of the project :
Class : 9th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 9th class textbook

Project – 2

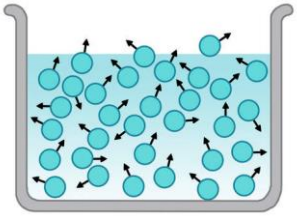
Title of the Project: Evaporation and Factors Affecting Evaporation

Aim of the Project: To study the process of evaporation and factors affecting evaporation.

Hypothesis: Evaporation is a cooling process and surface phenomena.

Evaporation: Evaporation is a surface phenomenon. Particles from the surface gain enough energy to overcome the forces of attraction present in the liquid and change into the vapour state.

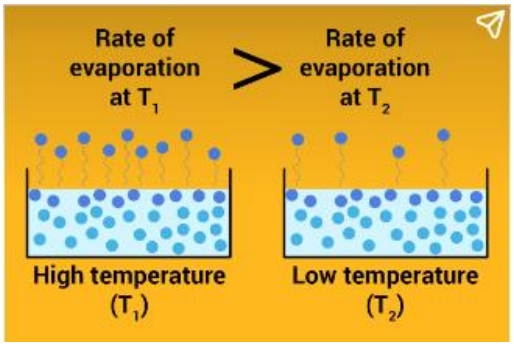
The rate of evaporation depends upon the surface area exposed to the atmosphere, the temperature, the humidity and the wind speed.



Each of these factors affecting evaporation have been explained in detail below.

1) Temperature

When the temperature of the liquid (water, in this case) is increased, it results in an increase in the kinetic energy of the individual molecules that constitute the liquid. This increase in energy makes it easier for the liquid molecules to overcome the intermolecular forces of attraction (that holds the liquid together) and escape into the atmosphere as a gas. It can be noted that the temperature of the surrounding can also contribute towards faster evaporation since hot environments can transfer their heat to the liquid.



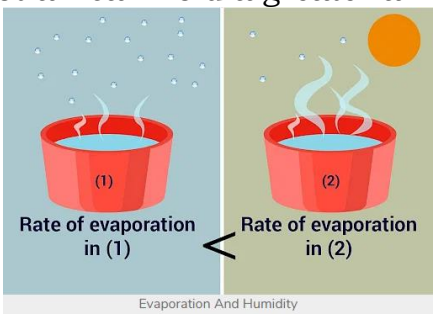
2) Surface Area Occupied by the Liquid

Evaporation is a surface phenomenon, which implies that the process only occurs at the surface of the liquid. During evaporation, the molecules of the liquid that are present at its surface overcome the intermolecular forces of attraction to break away from the liquid and escape into the atmosphere as a gas (or vapour).

Liquids are known to not have any definite shape – they assume the shape of their container. Therefore, the greater the surface area of the container (or the greater the surface occupied by the liquid), the greater the number of liquid molecules present at the surface. The larger the number of liquid molecules are at the surface, the larger the number of molecules that will break away from the liquid and become a gas at a given point of time, which contributes to an increase in the rate of evaporation.

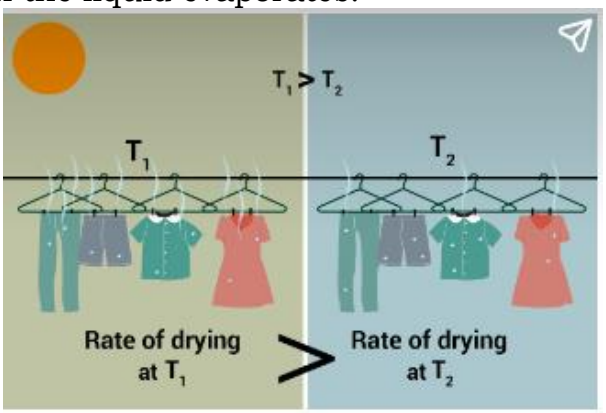
3) Humidity of the Surrounding

There is a limit to how much water vapour the atmosphere can hold. This limit is proportional to the temperature (which implies that hot air can hold more water vapour than cold air). Evaporation can be viewed as an equilibrium process through which the amount of water vapour in the atmosphere reaches an equilibrium with the amount of water in the surface of the liquid. Therefore, the greater the amount of water vapour in the atmosphere over the liquid, the slower the rate of evaporation. Also, it can be noted that an increase in temperature with constant humidity will contribute to an increase in the rate of evaporation since hot air can hold a greater amount of water vapour.



4) Air Circulation or Wind Speed

Evaporation increases the humidity of the atmosphere that immediately surrounds the liquid. This humid air takes some time to dissipate into the rest of the atmosphere. The presence of a breeze, a powerful wind, or some other form of air circulation can speed up this process and make the environment of the liquid less humid. Therefore, by decreasing the humidity of the liquid's surrounding, a powerful breeze or wind can increase the rate at which the liquid evaporates.



Conclusion: we collect the data about the factors which depend on evaporation in our daily life.

PROJECT REPORT

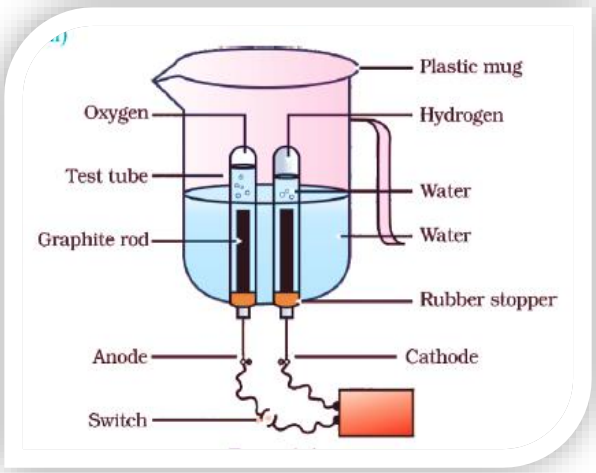
Name of the project :
Class : 9th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 9th class textbook

10th CLASS

Experiments -1

Aim: Electrolysis of water.

Apparatus: Plastic mug, Water, Test tubes, Graphite rods, Rubber stoppers, 6V Battery, Switch, Sulphuric acid.



Procedure: 1.Take a plastic mug. Drill two holes at it base and fit rubber stoppers in these holes. Insert carbon electrodes in these rubber stoppers.

2. Connect these electrodes to 6 volt battery. Fill the mug with water such that the electrodes are immersed.
3. Add a few drops of dilute sulphate acid to the water. Take two test tubes filled with water and invert them over the two carbon electrodes.
4. Switch on the current and leave the apparatus undisturbed for some time.
5. Once these test tubes are filled with the gases, carefully remove them from the mug.
6. Take a glowing candle near the mouth of the test tubes.
7. The candle fire and burns with a pop sound, showing the presence of hydrogen gas in the test tube.
8. The candle starts to burn brightly, showing the presence of oxygen gas in the test tube.

$$2H_2O \xrightarrow{\text{Electricity}} 2H_2 + O_2$$

Observation: 1. Hydrogen gas is liberated at the cathode while Oxygen gas is liberated at the anode.

2. The hydrogen gas volume is twice the oxygen gas volume contained in the other test tube.

Experiments -2

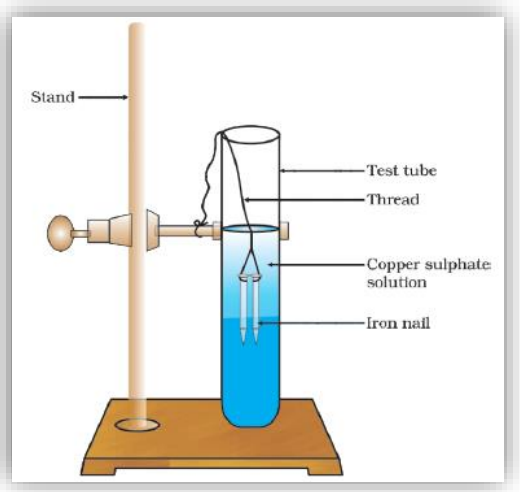
Aim: To Demonstrate the iron has displaced copper from copper sulphate solution.

Apparatus: Test tubes, Iron nails, Copper sulphate solution, Sandpaper.

Procedure: 1. Take 3 iron nails and clean them by rubbing with sandpaper.

2. Take 2 test tubes marked as A and B.
3. In each test tube, take about 10 ml copper sulphate solution.
4. Tie 2 iron nails with a thread and immerse them carefully in the copper sulphate solution in the tube B for about 20 minutes.
5. Keep one iron nail aside for comparison.
6. After 20 minutes, take out the iron nails from the copper sulphate solution.

7. Compare the intensity of the blue colour of copper sulphate solutions in test tubes A and B.
8. Compare the colour of the iron nails dipped in the copper sulphate solution with the one kept aside.



$Fe\ (s) + CuSO_4\ (aq) \rightarrow FeSO_4\ (aq) + Cu\ (s)$

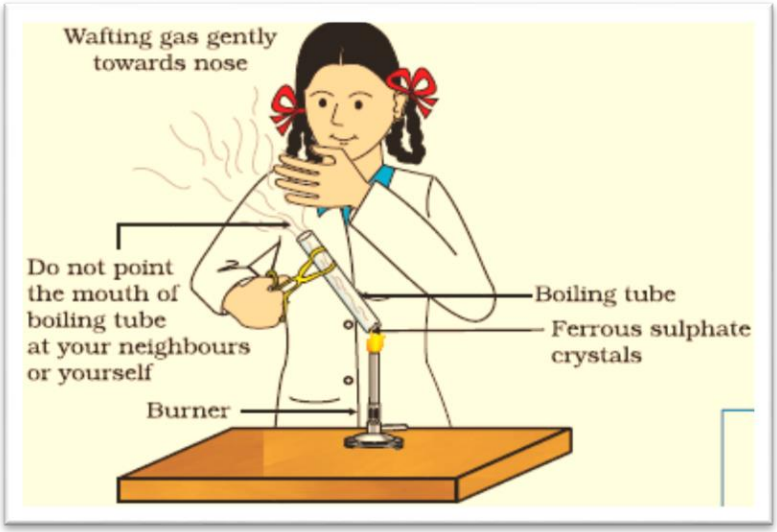
(Iron) (Copper sulphate) (Iron sulphate) (Copper)

Observation: 1. The iron nail become brownish in colour and the blue colour of copper sulphate solution fades.
2. Iron has displaced another copper element from copper sulphate solution.

Experiments -3

Aim: Correct way of heating the boiling tube containing crystals of ferrous sulphate and of smelling the odour

Apparatus: Ferrous sulphate crystals, A dry boiling tube, Burner/ Spirit lamb, A pair of tongs



Procedure: 1. Take about 2 grams of Ferrous sulphate crystals in a dry boiling tube.
2. Note the colour of the Ferrous sulphate crystals before heating i.e light green.
3. Heat the boiling tube over the flame of a burner/ spirit lamp.

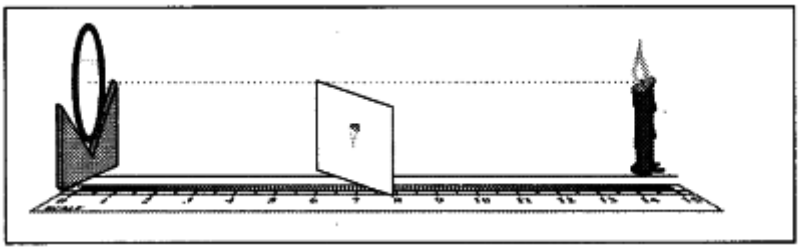
$$2FeSO_4\ (s) \xrightarrow{heat} Fe_2O_3\ (s) + SO_2\ (g) + SO_3\ (g)$$

Observation: 1. Light green colour of Ferrous sulphate crystals lose water when heated and changes to white colour of the crystals.
2. It is decomposes to Ferric oxide, Sulphur dioxide and Sulphur trioxide.

Experiments -4

Aim: To study the formation of images by concave mirror by an object at different positions on its principal axis.

Apparatus: Conacave mirror, Metre scale, Chalk piece, Burning candle, Paper screen.



Procedure: 1. Take a concave mirror of known focal length.

2. Mark a line on a Table with a chalk. Place the concave mirror on a stand. Place the stand over the line such that its pole lies over the line.
3. Draw with a chalk two more lines parallel to the previous line such that the distance between any two successive lines is equal to the focal length of the mirror. These lines will now correspond to the positions of the points P, F and C respectively.
4. Keep a bright object, say a burning candle, at a position far beyond C. Place a paper screen and move it in front of the mirror till you obtain a sharp bright image of the candle flame on it.
5. Observe the image carefully. Note down its nature, position and relative size with respect to the object size.
6. Repeat the activity by placing the candle – (a) beyond C , (b) at C, (c) between F and C, (d) at F, and (e) between P and F.
7. In one of the cases, you may not get the image on the screen. Identify the position of the object in such a case. Then, look for its virtual image in the mirror itself.
8. Note down and tabulate your observations.

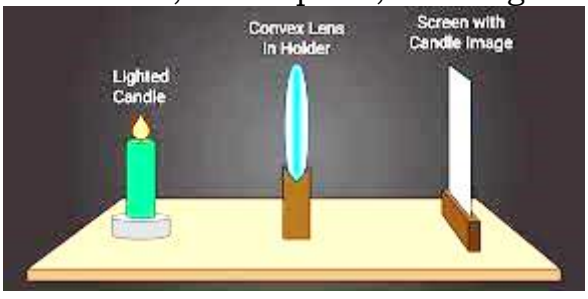
Position of the object	Position of the image	Size of the image	Nature of the image
At infinity	At the focus F	Highly diminished point-sized	Real and inverted
Beyond C	Between F and C	Diminished	Real and inverted
At C	At C	Same size	Real and inverted
Between C and F	Beyond C	Enlarged	Real and inverted
At F	At infinity	Highly enlarged	Real and inverted
Between P and F	Behind the mirror	Enlarged	Virtual and erect

Observation: We observe that the nature, position and size of the image formed by a concave mirror depends on the position of the object in relation to points.

Experiments -5

Aim: To study the formation of images by convex lens by an object at different positions on its principal axis.

Apparatus: Convex lens, Metre scale, Chalk piece, Burning candle, Paper screen.



Procedure: 1. Take a convex lens of known focal length.

2. Mark a line on a Table with a chalk. Place the convex lens on a stand. Place the stand over the line such that its pole lies over the line.
3. Draw with a chalk two more lines parallel to the previous line such that the distance between any two successive lines is equal to the focal length of the lens. These lines will now correspond to the positions of the points O, F and C respectively.
4. Keep a bright object, say a burning candle, at a position far beyond C. Place a paper screen and move it other side of the lens till you obtain a sharp bright image of the candle flame on it.
5. Observe the image carefully. Note down its nature, position and relative size with respect to the object size.
6. Repeat the activity by placing the candle – (a) beyond C , (b) at C, (c) between F and C, (d) at F, and (e) between O and F.
7. In one of the cases, you may not get the image on the screen. Identify the position of the object in such a case. Then, look for its virtual image in the lens itself.
8. Note down and tabulate your observations.

Position of the object	Position of the image	Relative Size of the image	Nature of the image
At infinity	At the focus F_2	Highly diminished, point-sized	Real and inverted
Beyond 2F	Between F_2 and $2F_2$	Diminished	Real and inverted
At $2F_1$	At $2F_2$	Same size	Real and inverted
Between F_1 and $2F_1$	Beyond $2F_2$	Enlarged	Real and inverted
At Focus F_1	At infinity	Infinitely large or Highly enlarged	Real and inverted
Between P and and optical centre O	Behind the mirror of the lens as the object	Enlarged	Virtual and erect

Observation: We observe that the nature, position and size of the image formed by a convex lens depends on the position of the object in relation to points.

Project – 1

Title of the Project: Applications of reflection of light in various fields

Aim of the Project: Application of reflection of light in various fields.

Hypothesis: The reflection of light finds numerous applications across various fields, enabling diverse functionalities and technologies.

Introduction:

Optics and Imaging:

1. **Mirrors in Optics:** Mirrors, both concave and convex, are extensively used in telescopes, microscopes, and cameras to reflect and focus light for magnification, imaging, and visual observation.
2. **Reflective Telescopes:** Reflecting telescopes use mirrors to gather and focus light, enabling astronomers to observe distant celestial objects.
3. **Rearview and Side Mirrors:** In vehicles, mirrors are crucial for providing drivers with a clear view of their surroundings, aiding in safe navigation.

Lighting and Illumination:

1. **Fiber Optic Technology:** Mirrors and reflective surfaces play a role in guiding and redirecting light in fiber optic cables, allowing for high-speed transmission of data in telecommunications.
2. **Reflectors in Lighting:** Reflectors are employed in lamps and lighting fixtures to redirect light, ensuring better illumination in specific areas or to enhance efficiency by directing light where needed.

Architecture and Design:

1. **Skylights and Light Wells:** Architectural designs incorporate reflective surfaces to redirect natural light into buildings, reducing the need for artificial lighting during the day.
2. **Reflective Coatings:** Reflective materials and coatings on buildings or surfaces help manage heat absorption, keeping structures cooler in sunny climates.

Solar Energy:

1. **Solar Reflectors:** Mirrors and reflective surfaces are used in solar power plants to concentrate sunlight onto solar panels or collectors, maximizing energy production.

Scientific Applications:

1. **Spectroscopy:** Reflection and dispersion of light are essential in spectrometers, enabling the analysis of materials' composition by separating light into its component wavelengths.
2. **Optical Experiments:** Reflection is utilized in various optical experiments to understand the behavior of light, such as in mirrors, lenses, and prisms.

Art and Display:

1. **Art Installations:** Artists use mirrors and reflective surfaces creatively in installations and artworks to manipulate light and create visual effects.
2. **Display Technologies:** Reflective displays, such as electronic ink or e-paper, use ambient light reflection for low-power, easy-to-read digital screens.

Conclusion: The applications of light reflection span across scientific, technological, artistic, and everyday contexts, showcasing its versatility and significance in enabling various functionalities and innovations in different fields.

PROJECT REPORT

Name of the project :
Class : 10th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 10th class textbook

Project – 2

Title of the Project: How to reducing of corrosion and protection of articles

Aim of the Project: Reducing of corrosion and protection of articles.

Hypothesis: Reducing corrosion and protecting articles from its damaging effects is crucial in maintaining the integrity and longevity of metal objects and structures.

Introduction: When a metal is attacked by substances around it such as moisture, acids etc. it is said to corrode and this process is called corrosion.

Reducing of corrosion:

1. Protective Coatings and Paints

Applying protective coatings and paints is one of the most common methods to prevent corrosion. These coatings act as a barrier between the metal surface and the corrosive elements.

Paints: Various paints can be applied, including epoxy, polyurethane, and zinc-rich paints, which provide a durable and long-lasting protective layer.

Varnishes and Lacquers: Clear coatings that provide a protective layer without altering the appearance of the metal.

Powder Coating: A dry finishing process that uses a powder applied electrostatically and then cured under heat, forming a tough, protective layer.

2. Galvanization

Galvanization involves coating steel or iron with a layer of zinc, which acts as a protective barrier. Zinc corrodes more slowly than steel and iron, providing sacrificial protection.

Hot-Dip Galvanization: The metal is dipped into molten zinc, forming a thick, durable coating.

Electrogalvanization: Zinc is electroplated onto the metal surface, providing a thinner but uniformly distributed layer.

3. Using Corrosion-Resistant Materials

Using materials that are inherently resistant to corrosion can be very effective.

Stainless Steel: Contains chromium, which forms a passive layer of chromium oxide that protects against further corrosion.

Aluminum: Forms a protective oxide layer that shields the underlying metal.

Plastic and Composites: Non-metallic materials that do not corrode and can be used in corrosive environments.

4. Regular Maintenance and Cleaning

Regular maintenance and cleaning help remove corrosive substances like salt, dirt, and moisture that can accelerate the corrosion process.

Cleaning: Periodically washing metal surfaces with water and mild detergents to remove contaminants.
Inspection: Regularly inspecting for signs of corrosion and addressing them promptly.

5. Environmental Control

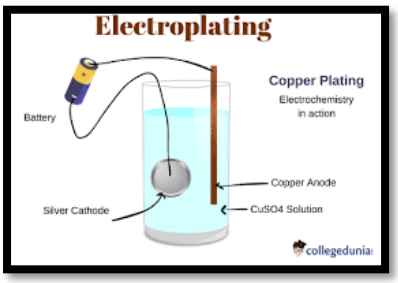
Reducing exposure to corrosive environments can significantly reduce the rate of corrosion.
Dehumidification: Using dehumidifiers in humid environments to reduce moisture.
Climate Control: Storing metal objects in controlled environments where temperature and humidity are regulated.
Avoiding Salt Exposure: Keeping metals away from saltwater or de-icing salts, or washing off salt residues promptly.

6. Design Improvements

Designing structures and components to minimize corrosion can be highly effective.
Drainage: Ensuring proper drainage to avoid water accumulation.
Ventilation: Allowing air circulation to keep surfaces dry.
Avoiding Crevices: Designing parts to avoid crevices where moisture and corrosive agents can accumulate.

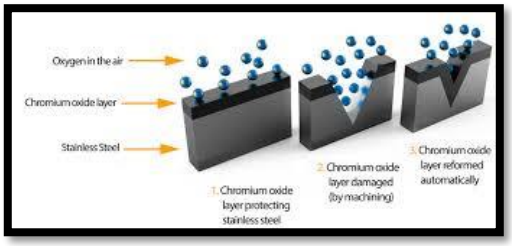
7. Electroplating

Electroplating involves depositing a layer of metal onto the surface of another metal using an electric current, providing protection and aesthetic appeal.
Chromium Plating: Provides a shiny, corrosion-resistant surface.
Nickel Plating: Adds a layer of nickel, which is resistant to corrosion and wear.



8. Passivation

Passivation is a process that removes surface contaminants and enhances the formation of a protective oxide layer.
Chemical Passivation: Using acids or other chemicals to clean the metal surface and promote the formation of a protective oxide layer.



Conclusion:
Implementing these strategies can significantly reduce corrosion and protect metal articles in various environments. Combining multiple methods, such as using corrosion-resistant materials, applying protective coatings, and regular maintenance, often provides the best protection against corrosion.

PROJECT REPORT

Name of the project :
Class : 10th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 10th class textbook

Project – 3

Title of the Project: Applications of refraction of light in various fields

Aim of the Project: Application of refraction of light in various fields.

Hypothesis: The refraction of light finds numerous applications across various fields, enabling diverse functionalities and technologies.

Introduction:

1. Optics and Vision:

- *Eyeglasses and Contact Lenses:* Corrective lenses use refraction to adjust the focal point of light entering the eyes, thereby correcting vision impairments like myopia, hyperopia, and astigmatism.
- *Cameras:* Lenses in cameras refract light to focus images onto the film or sensor, allowing for clear photographs.
- *Microscopes and Telescopes:* These devices use multiple lenses to refract light and magnify small or distant objects for better viewing.

2. Medical Field:

- *Endoscopy:* Endoscopes use fiber optics, which rely on total internal reflection and refraction to transmit light through flexible tubes, allowing doctors to view internal organs without invasive surgery.
- *Ophthalmology:* Various diagnostic instruments, such as slit lamps and retinoscopy's, use refraction principles to examine the eye and diagnose conditions.

3. Astronomy:

- *Astronomical Telescopes:* Refracting telescopes use lenses to bend and focus light from distant stars and planets, aiding in celestial observations.
- *Atmospheric Refraction:* Understanding how light bends as it passes through Earth's atmosphere helps astronomers correct for atmospheric distortion when observing stars and other celestial bodies.

4. Communications:

- *Fiber Optic Cables:* These cables transmit data as light pulses, using refraction and total internal reflection to guide light through glass or plastic fibers with minimal loss over long distances.
- *Underwater Communication:* Sonar systems use the refraction of sound waves in water to detect objects and communicate underwater.

5. Engineering and Construction:

- *Surveying Instruments:* Theodolites and other surveying instruments use lenses and prisms to accurately measure angles and distances by refracting light.
- *Building Design:* Architects use knowledge of light refraction to design buildings with optimal natural lighting, enhancing energy efficiency and comfort.

6. Entertainment:

- *Projectors:* Movie and slide projectors use lenses to refract and focus light, projecting images onto screens for viewing.
- *Virtual Reality:* VR headsets use lenses to refract light from screens, creating immersive visual experiences.

7. Scientific Research:

- *Spectroscopy:* This technique analyzes the refraction of light to study the composition of substances. It is widely used in chemistry, physics, and astronomy.
- *Refractometer:* Refractometers measure the refractive index of liquids, aiding in quality control and composition analysis in industries like food and beverage, pharmaceuticals, and chemicals.

8. Everyday Applications:

- *Rainbows:* The refraction and dispersion of light in water droplets create rainbows, demonstrating the natural beauty of light phenomena.
- *Mirages:* Atmospheric refraction causes mirages, where light bends due to temperature gradients, creating illusions of water or displaced objects on the horizon.

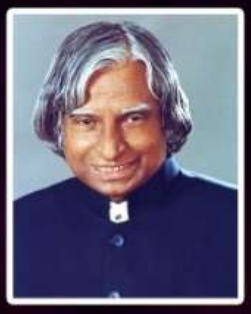
These applications highlight the fundamental role that refraction plays in both advanced technology and everyday life, enabling a wide range of practical and scientific advancements.

Conclusion: The applications of light refraction span across scientific, technological, artistic, and everyday contexts, showcasing its versatility and significance in enabling various functionalities and innovations in different fields.

PROJECT REPORT

Name of the project :
Class : 10th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 10th class textbook

PHYSICAL SCIENCE

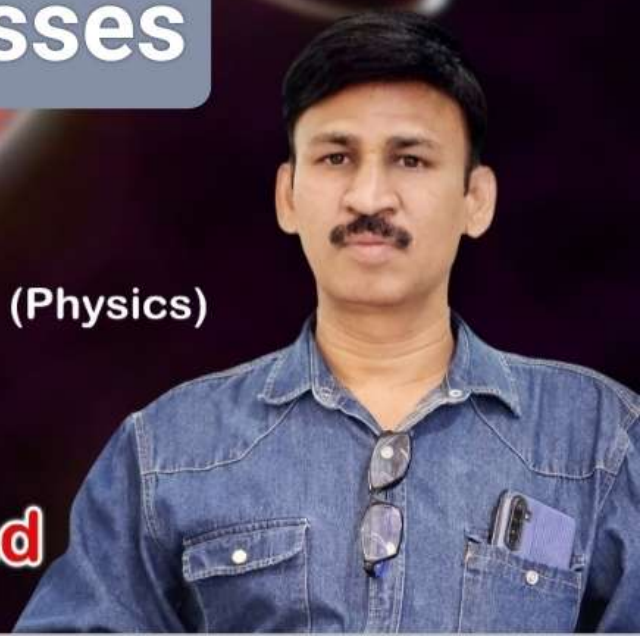


FORMATIVE ASSESSMENT - 1

Experiments/Lab activities/Activities and Projects

(2024 - 2025)

VIII, IX & X Classes



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