पुणा International School
Shree Swaminarayan Gurukul, Zundal

CLASS – X

SCIENCE PRACTICAL FILE

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3	To study the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also plot a graph between V and I.
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6	To show experimentally that light is necessary for photosynthesis.

Experiment - 1

AIM: To find the pH of the following samples by using pH paper/universal indicator.

(a) Dilute hydrochloric acid
(b) Dilute NaOH solution
(c) Dilute ethanoic acid solution
(d) Lemon juice
(e) Water
(f) Dilute sodium bicarbonate solution

Theory

● pH is the measure of the hydrogen ion concentration $[H^+]$ of a solution.
PH = $-\log_{10} [H^+]$
● Acids release H^+ ions when dissolved in water.
● Bases release OH ions when dissolved in water.

pH scale: pH is normally measured in a range of 0-14. [Due to mathematical definition and calculation it is possible to get negative pH and pH above 14]

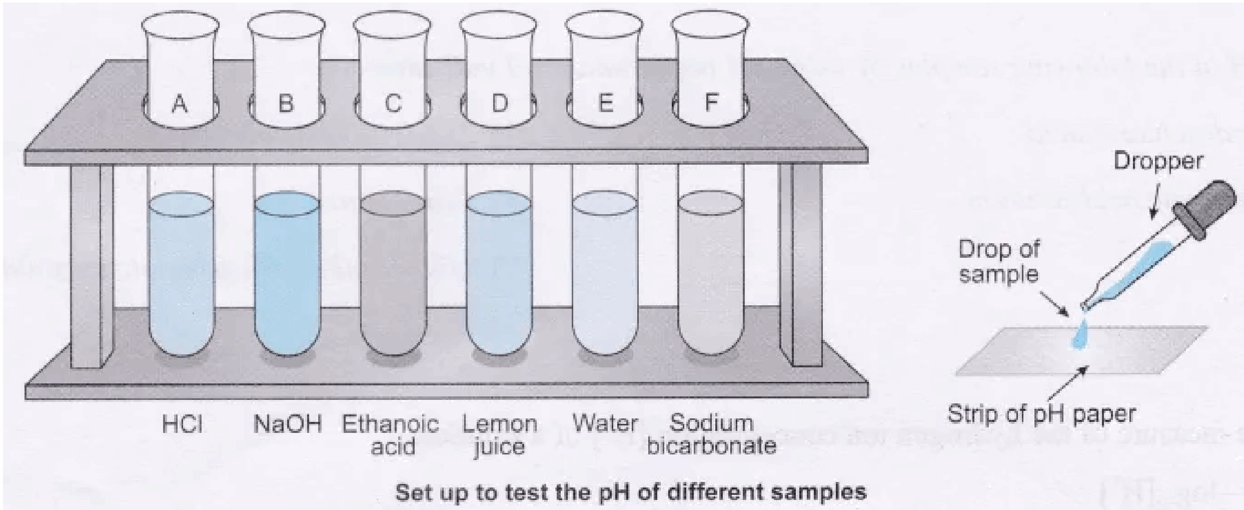
If pH < 7 then it is acidic solution.
If pH > 7 then it is basic solution.
If pH = 7 then it is neutral.

● **Components of Universal Indicator:** Universal indicator consists of a mixture of indicators such that there is a continuous colour change on slight change in pH. Some important constituents of universal indicator are:

• Sodium hydroxide • Thymol blue
• Methyl red • Bromothymol blue
• Phenolphthalein • Propanol

● Acids convert blue litmus paper red. For example, HCl, CH_3COOH, etc.
● Bases convert red litmus paper blue. For example, NaOH, $NaHCO_3$, etc.
● Neutral solutions have no affect on either blue or red litmus paper.

Materials Required
Six test tubes, six droppers, white tile, pH paper (with coloured chart strip of pH scale) and test tube stand.



Set up of test the pH of different samples

Chemicals required: Dilute hydrochloric acid, dilute solution of sodium hydroxide, dilute ethanoic acid, lemon juice, distilled water and dilute solution of sodium bicarbonate.

Procedure

1. Take six test tubes, wash them with distilled water and place them on test tube stand.
2. Mark these test tubes as A, B, C, D, E and F.
3. Take 2 mL each of the above chemicals and add them to the test tubes marked.

Test tube A – add 2 mL of dil. HCI acid Test tube B – add 2 mL of dil. NaOH solution
Test tube C – add 2 mL of dil-. ethanoic acid Test tube D – add 2 mL of lemon juice
Test tube E – add 2 mL of distilled water Test tube F – add 2 mL of dil. sodium bicarbonate solution

4. Take a white tile and place small strips of pH paper on it, mark them as A to F.
5. Take clean droppers rinsed with distilled water.
6. Use each dropper to suck the contents present in the test tubes A to F and pour a drop of each content on marked pH paper respectively.

E.g., the contents of test tube A to be placed on the pH paper with label A.

7. Observe the colour change in the pH paper and match it with the colour pH chart given. Record your observations.

Observations

Test tube	**Sample**	**Colour of pH Paper**	**Approximate pH**	**Nature**
A	Dil. HCI	Red colour	1	Strong acid
B	Dil. NaOH	Dark blue colour	14	Strong base

C	Dil. CH,COOH	Orange colour	3	Weak acid
D	Lemon juice	Pink colour	2	Weak acid
E	Water	Green colour	7	Neutral
F	Dil. $NaHCO_3$	Light blue colour	9	Weak base

Precautions

1. The test sample solutions should be freshly prepared and the firuit juice samples should also be fresh.
2. Use clean and rinsed droppers.
3. Use clean test tubes and mark them carefully.
4. Rinse the test tubes and droppers with distilled water only.
5. Use clean tile.

Sources of Error

1. Be careful while using the dropper, ensure that everytime you use a clean dropper.
2. Do not use tap water for rinsing, the pH may go wrong.

Experiment - 2

Aim

To study the properties of acids and bases (dilute HCl and dilute NaOH) by their reaction with

(a) Litmus solution (Blue/Red) (b) Zinc metal (c) Solid sodium carbonate

Theory

Hydrochloric acid

> Chemical formula of hydrochloric acid is HCl.

> When it is dissolved in water; releases H^+(aq) ions, these H^+ ions cannot exist alone. Hence, it combines with water to form H_3O^+ (aq) ions.

$$\underset{\text{Hydrochloric acid}}{HCl\,(aq)} + \underset{\text{Water}}{H_2O\,(l)} \longrightarrow \underset{\text{Hydronium ion}}{H_3O^+\,(aq)} + \underset{\text{Chloride ion}}{Cl^-\,(aq)}$$

> The acidic property is seen due to this H^+(aq) ions/H_3O^+ ions.

Properties of hydrochloric acid

> It turns blue litmus solution red.

> Hydrochloric acid reacts with metals to release hydrogen gas.

$$\underset{\text{Zinc}}{Zn(s)} + \underset{\text{Hydrochloric acid}}{2HCl(aq)} \longrightarrow \underset{\text{Zinc chloride}}{ZnCl_2(aq)} + \underset{\text{Hydrogen}}{H_2(g)}$$

> **Test for H_2 gas:** When a burning splinter is brought near the mouth of test tube releasing H_2 gas, it bums with a 'pop sound'.

> Hydrochloric acid react with sodium carbonate to release CO_2 gas.

$$\underset{\text{Sodium carbonate}}{Na_2CO_3(s)} + \underset{\text{Hydrochloric acid}}{2HCl(aq)} \longrightarrow \underset{\text{Sodium chloride}}{2NaCl(aq)} + \underset{\text{Water}}{H_2O(l)} + \underset{\text{Carbon dioxide}}{CO_2(g)}$$

> **Test for CO_2 gas:** When CO_2 gas is allowed to pass through freshly prepared lime water, then the lime water turns milky or when a burning splinter is brought near the mouth of the test tube releasing CO_2 gas then the burning splinter extinguishes.

Sodium hydroxide

> Chemical formula of sodium hydroxide is NaOH.

> When it is dissolved in water releases OH^- ions.

Properties of Sodium hydroxide

> It turns red litmus solution blue.

> Not all bases react with zinc metal to release H_2 gas but sodium hydroxide solution reacts with zinc metal to release hydrogen gas.

$$\underset{\text{Sodium hydroxide}}{2NaOH\,(aq)} + \underset{\text{Zinc}}{Zn\,(s)} \longrightarrow \underset{\text{Sodium zincate}}{Na_2ZnO_2\,(aq)} + \underset{\text{Hydrogen}}{H_2\,(g)}$$

> Sodium hydroxide do not react with solid sodium carbonate.

Materials Required

A test tube stand, test tubes, match box, test tube holder, droppers, a bent delivery tube, burner and cork.

Chemicals required: Dilute hydrochloric acid, dilute sodium hydroxide, blue litmus solution, red litmus solution, zinc metal granules or powdered zinc, solid sodium carbonate and freshly prepared lime water.

Procedure

(A) Properties of Hydrochloric Acid

	Experiment	Observation	Inference
1.	**Litmus Test** Take two clean test tubes. Pour 1 mL of dilute HCl solution in each test tube. Pour a drop of blue litmus in one test tube and a drop of red litmus solution in the second test tube.	Blue litmus solution turns red in first test tube. Red litmus solution shows no change in second test tube.	Dil. HCl shows acidic character.
2.	Reaction with Zinc Metal Take 1 mL of dilute HCl in a clean test tube. Add a small piece of zinc metal/ zinc powder in it. Light a matchstick and bring it near the mouth of the test tube, remove the thumb and observe.	Zinc metal reacts with the acid. Test tube becomes warm and pressure is exerted on thumb due to release of a gas. The matchstick bums with a pop sound.	Zinc + dil. HCl → Zinc chloride + Hydrogen gas $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$ Hydrogen gas always bums with a pop sound when lighted matchstick is introduced in it.

3.	Reaction with Sodium Carbonat Take a clean test tube. Add 2 mL of dilute HCl. Now add lg/pinch of sodium carbonate in it. Immediately close the mouth with cork containing delivery tube. Hold a test tube with lime water at the other end of the delivery tube.	Dilute HCl reacts with sodium carbonate to release a colourless gas. The gas turns lime water milky.	(i) $Na_2CO_3 + 2HCl \rightarrow$ $2NaCl + H_20 + CO_2$ (ii)$Ca(OH)_2$+$CO_2 \rightarrow$ Lime water$CaCO_3$ +H_2O White insoluble ppt

(B) Properties of Sodium Hydroxide

	Experiment	Observation	Inference
1.	**Litmus Test** Take two clean test tubes. Pour 1 mL of dilute NaOH in each test tube. Add a drop of blue litmus solution in one test tube and a drop of red litmus solution in the second test tube.	Blue litmus solution shows no change. Red litmus solution changes to blue colour.	Dil. NaOH shows basic character.
2.	**Reaction with Zinc Metal** Take a clean test tube. Add zinc metal granules/zinc powder in it. Pour 2 mL of NaOH solution in the tube. Hold the test tube with a test tube holder and heat it. Bring a	On heating the mixture; reaction begins, colourless gas is evolved. The burning matchstick bums with a ‘pop’ sound.	$Zn(s) + 2NaOH(aq)$ $Na_2ZnO_2(aq) + H_2(g)$ Hydrogen gas always bums with a pop sound.

	burning matchstick near the mouth of the test tube.		
3.	**Reaction with Solid Sodium Carbonate** Take a clean test tube. Add 2 mL of NaOH solution in a tube and 1 g of sodium carbonate. Heat the mixture.	No change.	Dil. NaOH doesn't react with sodium carbonate.

Precaution

1. Use clean test tubes.
2. Use very small amount of chemicals.
3. Handle hydrochloric acid and sodium hydroxide solutions very carefully.
4. Shake the solutions and reaction mixtures carefully without spilling.
5. Always carry out the test for hydrogen with a very small volume of gas.
6. For H_2 gas test, be careful as H_2 catches fire. The flame on test tube can be seen due to H_2 gas.
7. For lime water test, allow the CO_2 gas to pass through lime water and shake the test tube by placing thumb on the mouth of the tube to get quick result.

Experiment - 3

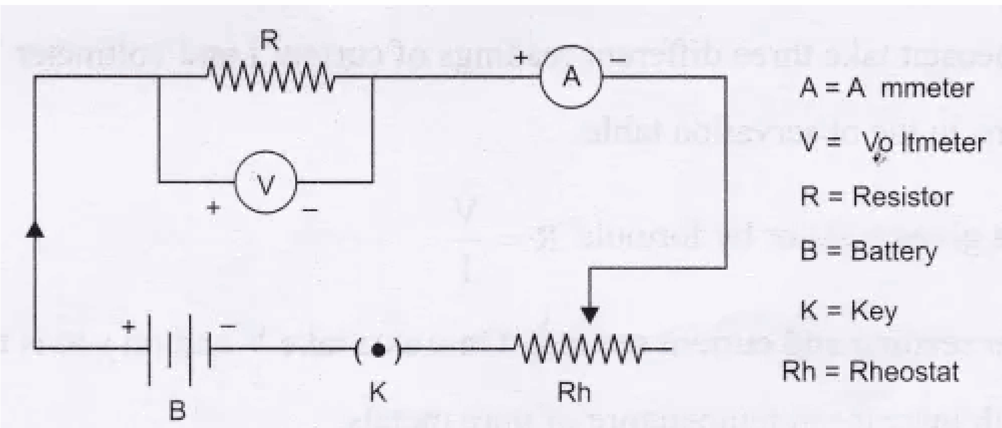
Aim
To study the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also plot a graph between V and I.

Theory

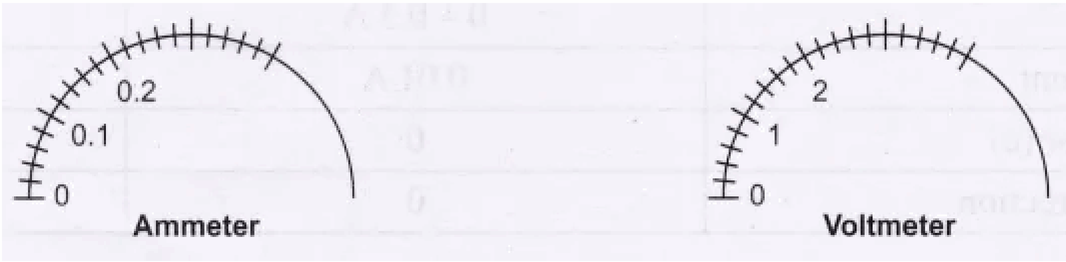
- **Ohm's Law:** The potential difference, V across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature is the same. This is Ohm's law.
  $V \propto I$
  .'. $V = IR$, (Here R = Constant for the given metallic wire)
- The SI unit of resistance is Ohm (Ω).
  $R=VI$
- **One Ohm:** If the potential difference across the ends of a conductor is 1 volt and the current flowing through it is 1 ampere, then the resistance of the conductor R is 1 ohm.

$$1 \text{ Ohm} = \frac{1 \text{ Volt}}{1 \text{ Ampere}}$$

- **Factors affecting resistance:**
- The nature of resistor (a conductor having some resistance.)
- The length of the resistance. ($R \propto l$)
  (Resistance increases as the length of the wire is increased)
- The area of cross-section of the resistor. $R \propto 1A$
  (Resistance decreases with the increase in the cross-section area of the wire)
- **Circuit Diagram:**



- In a circuit ammeter is always connected in series and voltmeter is connected in parallel across the points between which potential difference is to be measured.
- A straight line graph obtained between V and I verifies the Ohm's law.
- **Least Count:** It is very important to find the least count of ammeter and voltmeter before using them.



If in the ammeter, there are 10 divisions from 0 to 0.1 A then each division indicates 0.01 A.
A. To calculate the least count of ammeter.
Range of ammeter = A_R……………………
Number of divisions in ammeter = A_N…………………………
.’. Least count of ammeter = ARAN= …………….. ampere.
B. To calculate the least count of voltmeter.
Range of voltmeter = V_R……………………
Number of divisions in voltmeter = V_N
.’. Least count of voltmeter = VRVN = ………………. volt.
Materials Required
A battery, an insulated copper wire (cut into 10 pieces), a key, an ammeter, a voltmeter, a rheostat, a resistor and a piece of sand paper.
Procedure

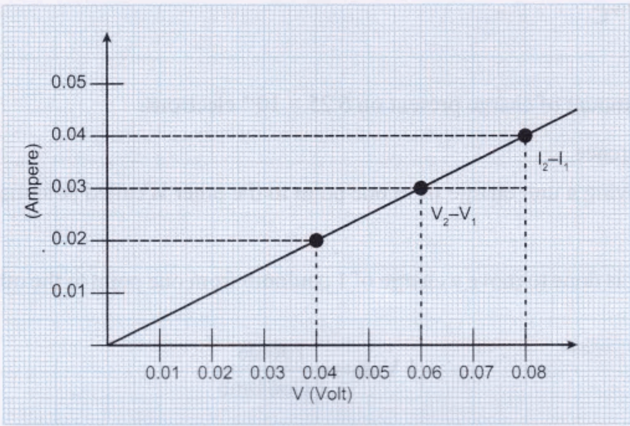
1. Keep the devices as shown in the circuit diagram.
2. Connect them with the connecting wires and keep the key open.
3. Positive terminal of the battery is connected to the positive terminal of the ammeter.
4. Check the +ve and -ve terminals of voltmeter before connecting it in the circuit.
5. Once the circuit is connected, insert the key and check the rheostat, adjust its slider and see whether the ammeter and voltmeter readings are shown.
6. By using the slider of rheostat take three different readings of current 1 and voltmeter V.
7. Record your observations in the observation table.
8. Calculate resistance of a given resistor by formula R=VI.
9. Plot a graph of voltmeter reading and current reading. On x axis take V and on y axis take I.
10. Resistance increases with increase in temperature of pure metals.
11. **Observation Table**
    A. Least count of ammeter and voltmeter

S. No.		Ammeter (A)	Voltmeter (V)
1.	Range	0 – 0.5 A	0-0.1 V
2.	Least Count	0.01 A	0.01 V
3.	Zero Error (e)	0	0
4.	Zero Correction	0	0

12. **B. For reading of ammeter and voltmeter**

S. No.	Current in Ampere (I) (Ammeter Reading)		Potential difference in Volts (V) (Voltmeter Reading)		Resistance in Ohms R = V/I(Ω)
	Observed	Corrected	Observed	Corrected	
1.	0	0.02	0	0.04	R_1 =2 Ω
2.	0	0.03	0	0.06	R_2 = 2 Ω
3.	0	0.04	0	0.08	R_3 = 2Ω

$\therefore$ Mean value of R $= \frac{R_1 + R_2 + R_3}{3} = \frac{2+2+2}{3} = 2\Omega$



Graph between current and voltage

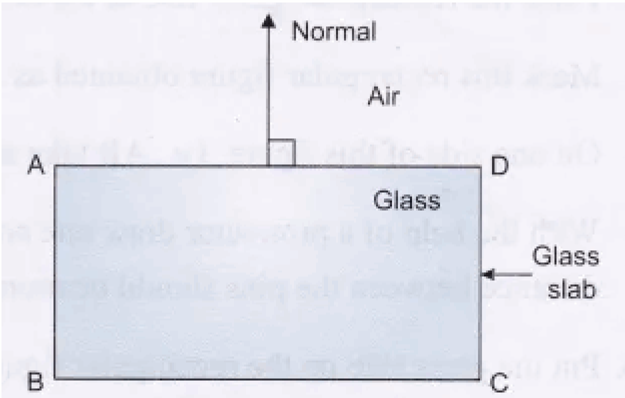
Experiment - 4

Aim

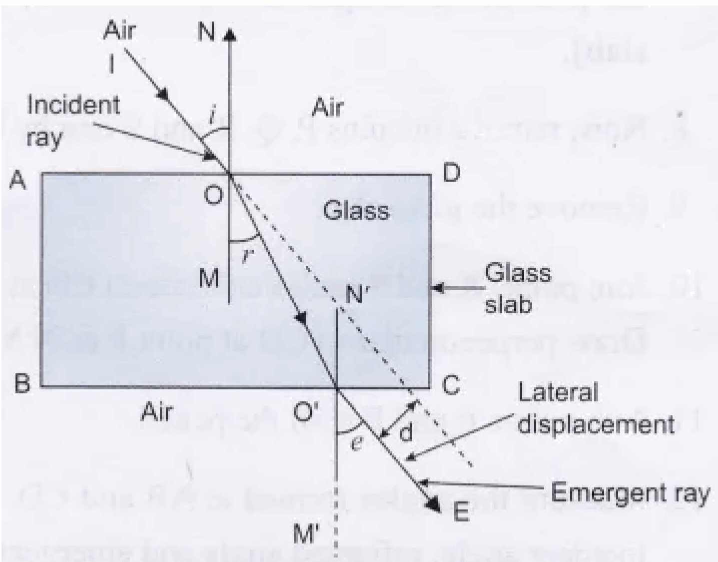
To trace the path of a ray of light passing through a rectangular glass slab for different angles of incidence. Measure the angle of incidence, angle of refraction, angle of emergence and interpret the result.

Theory

- **Refraction of Light:** When light passes from one medium to other it deviates/changes its path, this property of light is called refraction of light.
- **Normal Ray:** A ray of light which forms an angle of 90° with the refracting surface is said to be normal. When a ray of light travels along the normal, it does not suffer any refraction.
- **Incident Ray:** A ray of light that travels towards the refracting surface is called incident ray.
- **Refracted Ray:** A ray of light that changes its path when passes through a refracting surface is said to be refracted ray.



Rectangular glass slab



Refraction of light through a glass slab

- **Emergent Ray:** A ray of light which emerges out into the original medium after refraction is said to be an emergent ray.
- **Lateral Displacement:** The perpendicular shift in the path of light, seen when it emerges out from the refracting medium is called lateral displacement.
- **Angle of Incidence (i):** The angle formed between the normal and incident ray is called angle of incidence.
- **Angle of Refraction (r):** The angle formed between the refracted and normal ray is called angle of refraction.

- **Angle of Emergence (e):** The angle formed between the normal and emergent ray is called angle of emergence.
- **DRAN:** When a ray of light travels from denser medium to rarer medium it bends away from the normal.
- **RDTN:** When a ray of light travels from rarer medium to denser medium, it bends towards the normal.
- **During Refraction:**
  (i) Angle of incidence = Angle of emergence.
  (ii) Incident ray and emergent ray are parallel.
- **Laws of Refraction:**
  (i) The incident ray, the normal ray and the refracted ray, all lie in the same plane.
  (ii) The ratio of the sine of angle of incidence to the sine of angle of refraction is a constant quantity for the two given media. This law is also known as Snell's law. sin i/ sin r
  This constant value is called the refractive index of the second medium with respect to the first.

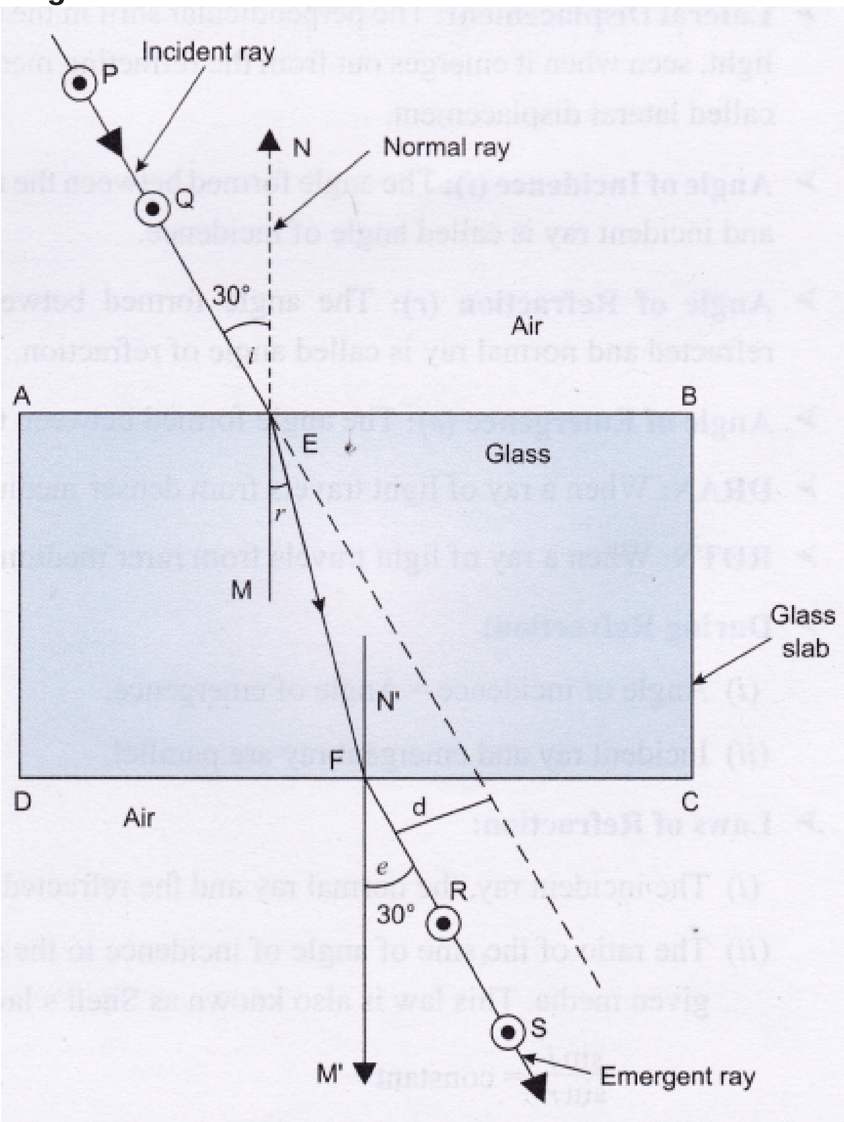
Materials Required

A drawing board, 4-6 all pins, white sheet of paper, rectangular glass slab, a protractor, a scale, a pencil and thumb pins.

Procedure

1. Take a soft drawing board. Fix a white sheet on it with the help of thumb pins.
2. Place the rectangular glass slab in the centre of the white paper and draw its outline boundary with pencil.
3. Mark this rectangular figure obtained as ABCD.
4. On one side of this figure, i.e., AB take one point E, draw a perpendicular EN and label it as normal ray.
5. With the help of a protractor draw one angle of 30° with the EN. Fix two pins P and Q on the ray of this angle, the distance between the pins should be more than 4-5 cm.
6. Put the glass slab on the rectangular figure ABCD.
7. See through the glass slab from side CD and fix pin R and S such that when seen through the glass slab all
   the pins lie in straight line, [i.e., Pins P, Q, R and S should lie in straight line when seen through the glass slab], '
8. Now, remove the pins P, Q, R and S one by one and draw small circles around the pin points.
9. Remove the glass slab.
10. Join points R and S such that it meets CD at point F.
    Draw perpendicular to CD at point F as N'M'.
11. Join points E and F with the pencil.
12. Measure the angles formed at AB and CD, i.e., the incident angle, refracted angle and emergent angle.
13. Extend ray PQ with scale and pencil in dotted line. It will be parallel to ray FRS. The distance between these two parallel rays is called lateral displacement (d).
14. Measure the lateral displacement.
15. Repeat the above procedure for angles 45° and 60°.

Diagram



Refraction of light through a rectangular glass slab

ABCD = Glass slab
EN and FM’ = Normal rays
P, Q, R, S = All pins ∠PEN = ∠i = incident angle = 30°
∠MEF = ∠r = refracted angle
∠SFM’= ∠e = emergent angle = 30° ~ 31°
d = lateral displacement.

Glass Slab Experiment Class 10 Observations Table

S.No.	Angle of incidence ∠i = ∠PEN	Angle of refraction ∠r = ∠MEF	Angle of emergence ∠e = ∠SFM’	∠i – ∠e ∠PEN – ∠SFM’
1.	30°	28°	30°	0°
2.	45°	43°	44.8°	0.2°
3.	60°	56°	59.8°	0.2°

During performing this experiment, ∠i – ∠e may not be zero at times as shown above due to human error.

Precautions

1. The glass slab should be perfectly rectangular with all its faces smooth.
2. The drawing board should be soft so that pins can be easily fixed on it.
3. The angle of incidence should lie between 30° and 60°.
4. All pins base should lie in straight line.
5. While fixing the pins P and Q or the pins R and S, care should be taken to maintain a distance of about 5 cm between the two pihs.
6. Draw thin lines using a sharp pencil.
7. Use a good quality protractor having clear markings.
8. Place the protractor correctly to measure the angles.
9. Perpendiculars should be drawn correctly.

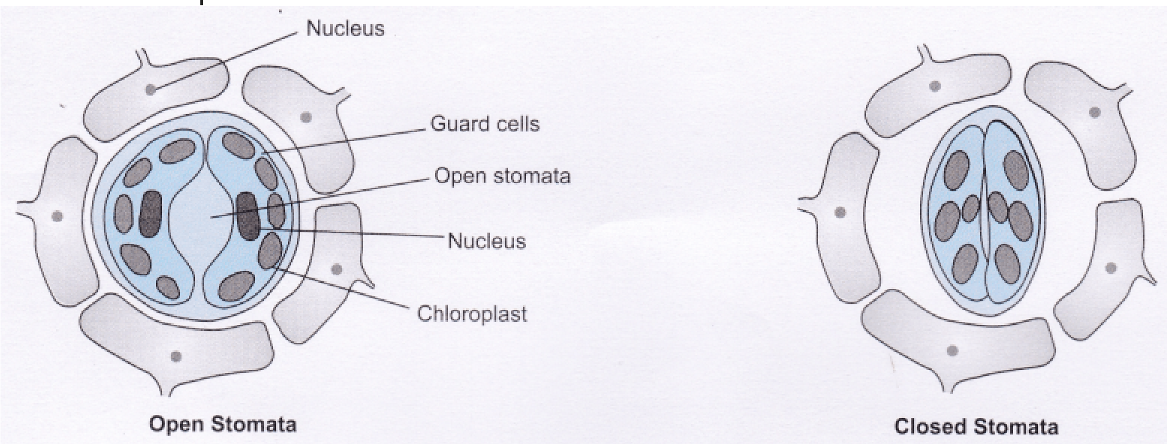
Experiment - 5

Aim

To prepare a temporary mount of a leaf peel to show stomata.

Theory

- Plants need oxygen for respiration and carbon dioxide for photosynthesis. The exchange of gases in plants occurs through the surface of stems, roots and leaves.
- On leaves there are plenty of small tiny pores called stomata.
- On the dorsal side of leaf more stomatal pores are present than the ventral surface of leaf.
- Through these pores, plants can also lose water by the process called transpiration.
- To avoid excess loss of water, the stomata pores closes and when gases are required, these pores open.
- This opening and closing of pores is monitored by guard cells.
- The guard cells swell when water flows into them, causing the stomata pore to open. When the guard cells shrink the stomata pores close.
- The guard cells contain chloroplast and nucleus in it. They are bean-shaped in dicots and dumb-bell shaped in monocots.

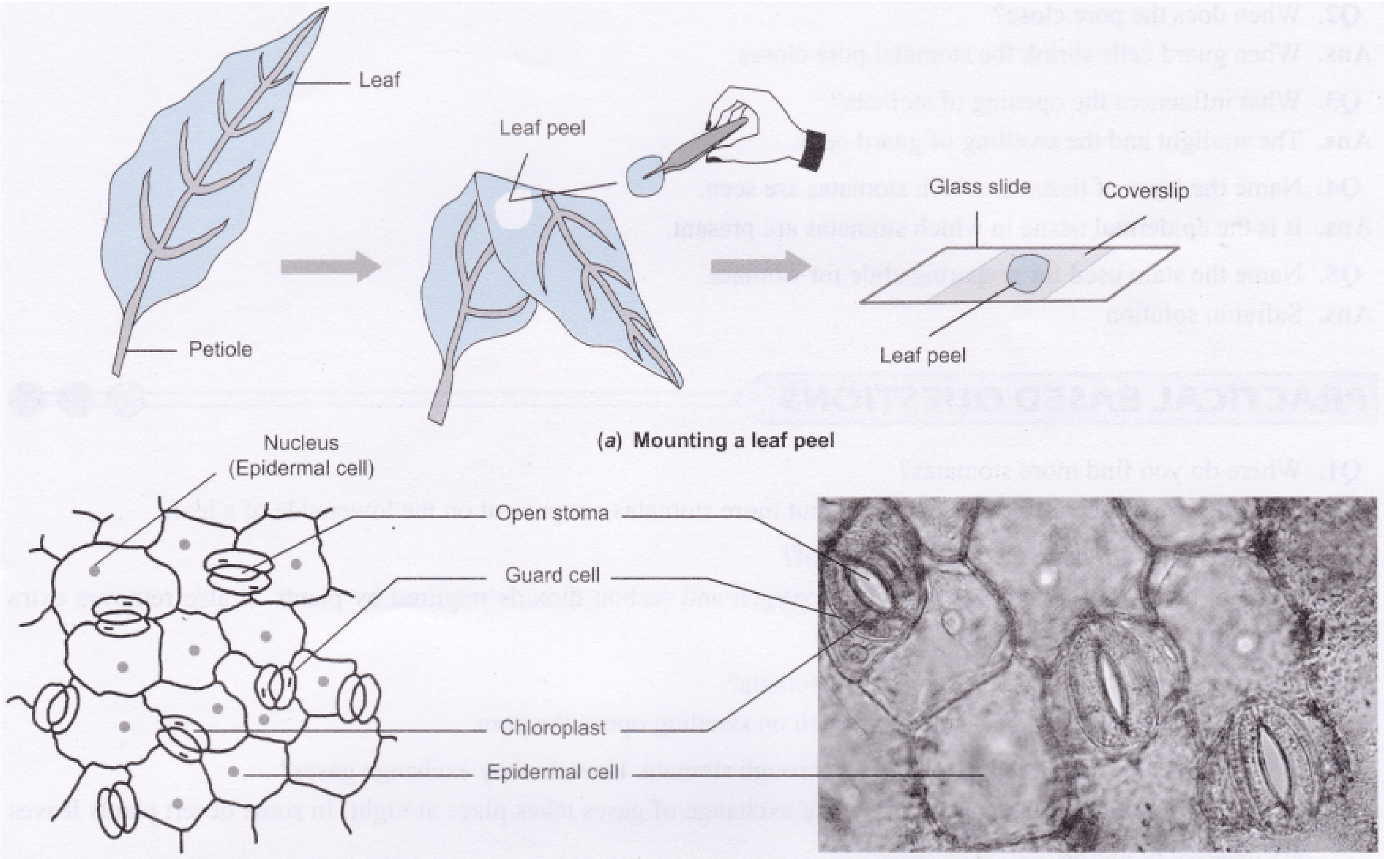


Materials Required

Freshly plucked leaf of Rheo or Tradescantia, petri dish, slide, coverslip, needle, forceps, brash, dropper, watch glass, filter paper, glycerine, safranin solution and microscope.

Procedure

1. Take a freshly plucked leaf (Rheo or Tradescantia).
2. Stretch the leaf with its dorsal (lower) part facing upwards.
3. Break the leaf by applying suitable pressure so that the epidermis projects from the leaf.
4. Cut the epidermis and put it in a petri dish.
5. Take a watch glass, add few drops of water and a drop of stain in it.
6. Transfer the small piece of epidermis from petri dish into the watch glass with the help of brash.
7. Allow the peel to remain in the stain for 2-3 minutes, so that it can take up the stain.
8. With the help of brush transfer the stained peel into a petri dish with water to remove the extra stain.
9. Now take a clean slide and place it on a filter paper. In the centre of the slide put a drop of glycerine and transfer the stained peel from petri dish on the slide.
10. Gently hold the coverslip with the needle and place it on the peel. Avoid air bubbles formation.
11. Use the filter paper to clean the excess stain, water or glycerine that comes out from the coverslip sides.
12. Ensure that the slide is clean and place it under the microscope. First view it under low power (10X) and then under high power(45X).
13. Record your observations.



(a) Mounting a leaf peel

(b) Epidermal layer in the peel taken from a dicot leaf showing open stomata

(c) High power magnification of stomata

Observations

1. In an epidermal peel we see single layer of cells.
2. In between the epidermal layer small spots are seen.
3. When focused under powerful microscope the stomata pores are clearly seen.
4. Each stomata pore has two kidney-shaped cells called guard cells.
5. Each guard cell has one nucleus and many chloroplasts.

Conclusion

Epidermal layer of leaf peel has many stomata pores. Each stomatal pore has two kidney shaped guard cells, in dicots plants. Each guard cell has one nucleus and many chloroplasts.

Precautions

1. While removing the epidermal peel, ensure that you pluck the thinner scrap of leaf.
2. Do not overstain the peel.
3. Avoid air-bubbles formation while placing the coverslip.
4. The peel should not be folded.
5. The slide should be clean and dry before placing it under microscope.

Experiment - 6

Aim

To show experimentally that light is necessary for photosynthesis.

Theory

- Plants prepare their food by the process called photosynthesis. To make food, plants need CO_2 water, chlorophyll and light/sunlight. In absence of any of these plants cannot prepare their food.
- Plants can prepare their food in blue light.
- The rate of photosynthesis depends on all three factors i.e.—light, temperature, availability of components, i.e.,— CO_2 and H_20.
- If the intensity of light increases the rate of photosynthesis also increases.
- When light falls on plants they show light reaction. In this light reaction the water in leaves undergo photolysis
  i.e.,—the water splits to form oxygen and hydrogen due to photons of light. The oxygen gas is released out in the atmosphere but hydrogen is kept by the plant. It is this hydrogen that combines with CO_2 to form carbohydrate (reduction reaction). Hence; photosynthesis is an oxidation-reduction reaction.
- Photosynthesis reaction:

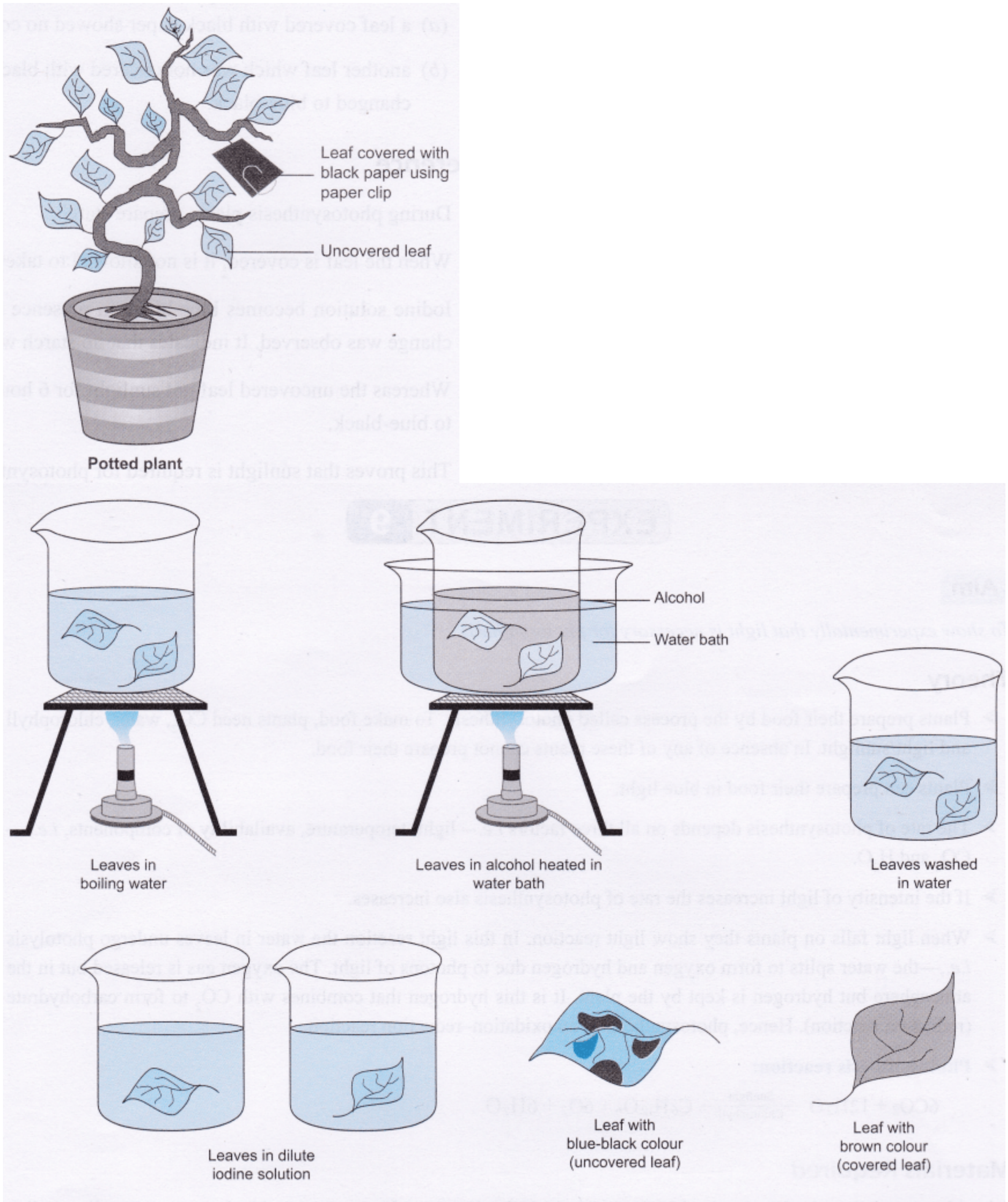
$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$

Materials Required

A healthy potted plant, beaker, a pair of forceps, tripod stand, wire gauze, bunsen burner, black paper, paper clips, iodine solution, alcohol, water bath etc.

Procedure I

1. Take a healthy potted plant and keep it in a dark room for 48 hours so that all the starch gets used up.
2. Now cover one leaf of a plant with a black paper using paper clip.
3. Keep this plant in sunlight for about six hours.
4. Pluck two leaves from the plant, one that is covered and the other one that is uncovered.
5. Dip the leaves in boiling water for a few minutes.
6. Now immerse the leaves in a beaker containing alcohol.
7. Carefully place this beaker in water bath and heat it till the alcohol begins to boil.
8. Observe the colour of the leaves and solution.
9. Wash the leaves with lot of fresh water.
10. Now dip the leaves in iodine solution for a few minutes.
11. Now observe the colour of leaves and compare them.



Light is necessary for photosynthesis

Observations

1. When leaves are boiled in alcohol, the alcohol solution becomes green and the leaves become colourless.
2. When iodine solution is added on the leaves
   (a) a leaf covered with black paper showed no colour changes with iodine solution.
   (b) another leaf which was not covered with black paper when dipped in dilute iodine solution, the colour of leaf changed to blue-black.

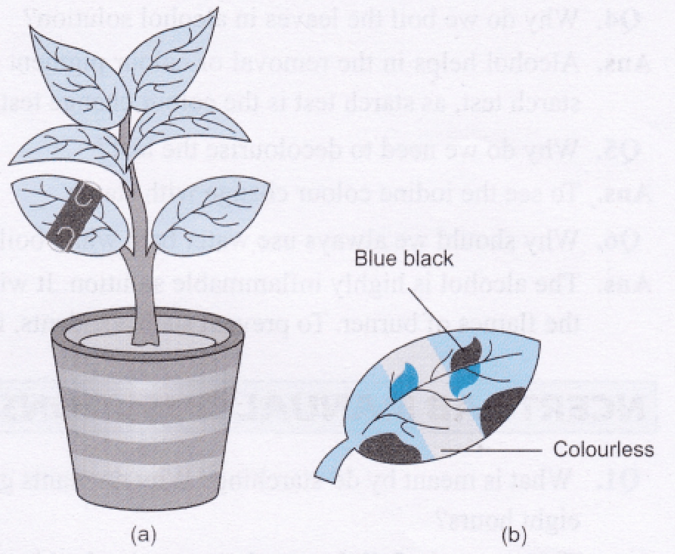
Inference

- During photosynthesis plants prepare starch.
- When the leaf is covered, it is not allowed to take sunlight and hence, no starch was prepared in the leaf.

- Iodine solution becomes blue-black in presence of starch. On adding iodine solution to covered leaf no colour change was observed. It indicates that no starch was made by this leaf.
- Whereas the uncovered leaf got sunlight for 6 hours and when iodine solution was added to it, the colour changed to blue-black.
- This proves that sunlight is required for photosynthesis.

Procedure II

1. Select a potted plant, keep it in dark room for 48 hours.
2. Select a healthy leaf and clip a portion of it with dark colour paper using clips.
3. Keep this plant in sunlight for 6 hours.
4. Then do the same steps (4-11) as in procedure 1 on previous page.



(a) A de-starched potted plant with part of a leaf covered with black paper strips on either side;
(b) An experimental leaf after treatment with iodine

Important Note

1. When you cover a portion of leaf with dark paper the results are not clearly visible. There is a possibility of translocation of food from uncovered leaf to a covered part of leaf.
2. The above experiment can be done by covering a portion of leaf with black paper.

Precautions

1. Select a small healthy, herbaceous potted plant.
2. Do not destarch the plant for more than 48 hours.
3. Choose a leaf and clip it carefully so that it does not break or crack from the stem.
4. Alcohol is highly inflammable, be careful while boiling leaf in alcohol using water bath.
5. Wash the alcohol from the leaves and then do the iodine test.
6. Satisfactory results will not be obtained if the plant is not completely de-starched.

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