CHENNAI PUBLIC SCHOOL

SCIENCE

Class X

Preparatory Lab Manual

Name: _____ Sec. : ____

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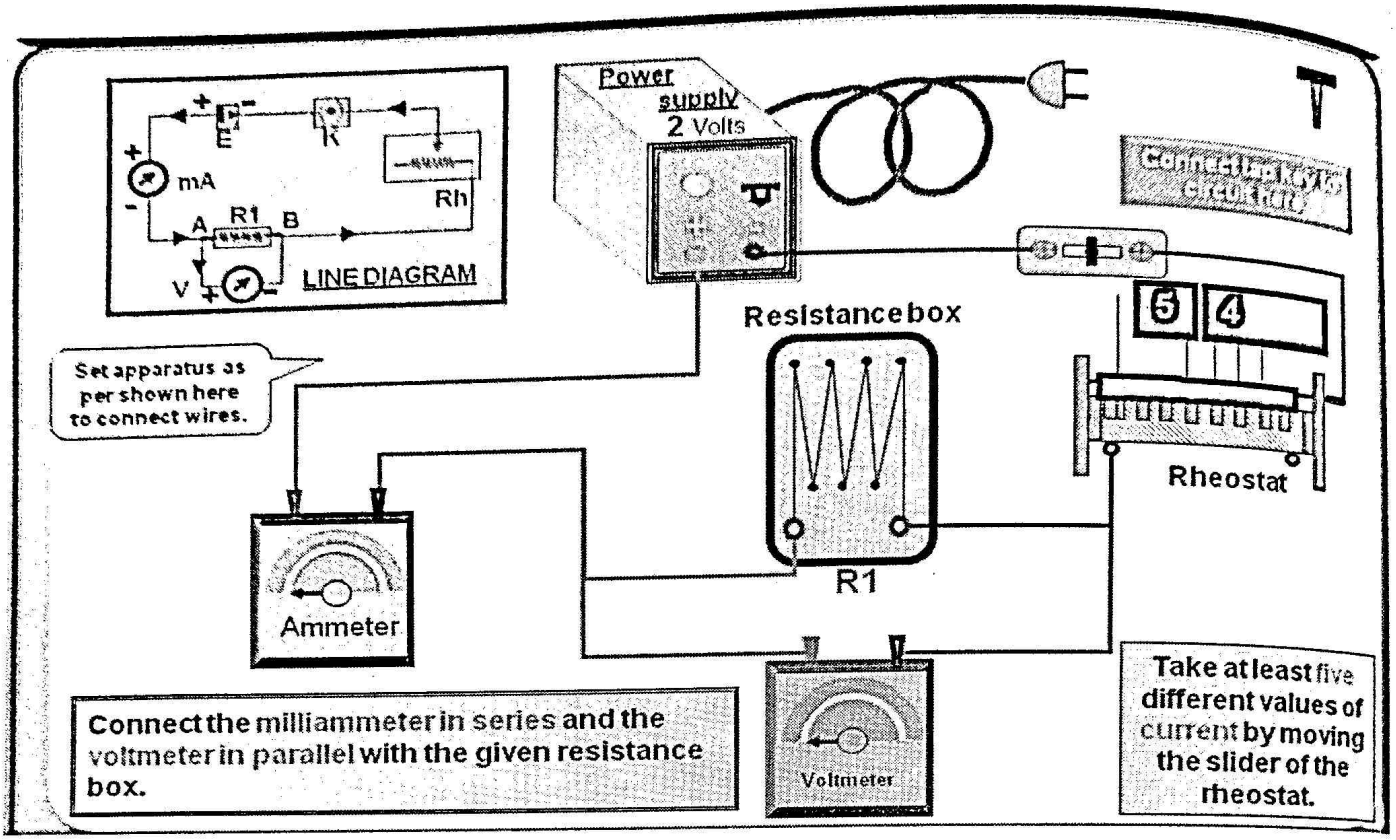
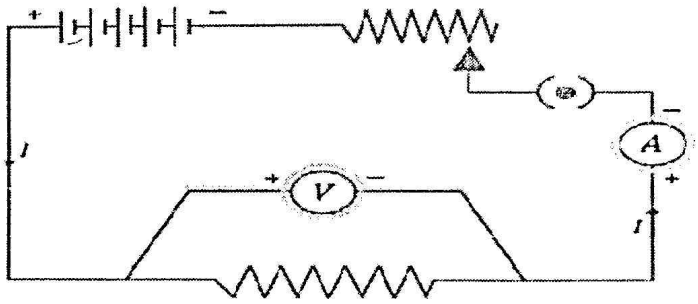
Expt.No.1 **OHM'S LAW**

Date: 25/4/18





Expt.No.1 **OHM'S LAW**

Date: 25/7/18

Aim:

To study the dependence of current (I) and the potential difference across a resistor and thereby determine the resistance.

Also plot a graph between V and I.

Materials required:

Battery, ammeter , voltmeter, rheostat, Resistance coil ,connecting wires

Theory:

Ohm's law states that at a constant temperature, current '**I**' through a conductor between two points is directly proportional to the potential difference '**V**', across the two points.

$$V \propto I$$

$$V/I = \text{constant} = R$$

This constant is called as the resistance (**R**) of the conductor.

Procedure:

1. Arrange the apparatus as per the circuit diagram.
2. Make the connections as per circuit diagram. All connections must be neat and tight. Take care to connect the ammeter and voltmeter with their correct polarity. (+ve to +ve and -ve to -ve).
3. Adjust the rheostat to pass a low current.
4. Insert the key K and slide the rheostat contact to see whether the ammeter and voltmeter are showing deflections properly.
5. Adjust the rheostat to get a small deflection in ammeter and voltmeter.

Observation:

No	POTENTIAL DIFFERENCE (V)	CURRENT (I)	RESISTANCE R= V/I
1	1 V	0.5A	$\frac{V}{I} = \frac{1}{0.5} = 2\Omega$
	1.5V	0.7A	$\frac{V}{I} = 1.5/0.7 = 2\Omega$
2	2V	0.9A	$\frac{V}{I} = 2/0.9 = 2\Omega$
	2.5	1.1A	$\frac{V}{I} = 2.5/1.1 = 2\Omega$
3	3	1.3A	$\frac{V}{I} = 3/1.3 = 2\Omega$
		Mean Value	2Ω

Observation from graph:

R= V / I = 2Ω

6. Record the readings of the ammeter and voltmeter.
7. Take at least three sets of readings.
8. Plot a graph with **V** along x-axis and **I** along y-axis.
9. The graph will be a straight line which verifies Ohm's law.

Inference and Result:

Current '**I**' through a conductor between two points is directly proportional to the potential difference '**V**', across the two points.

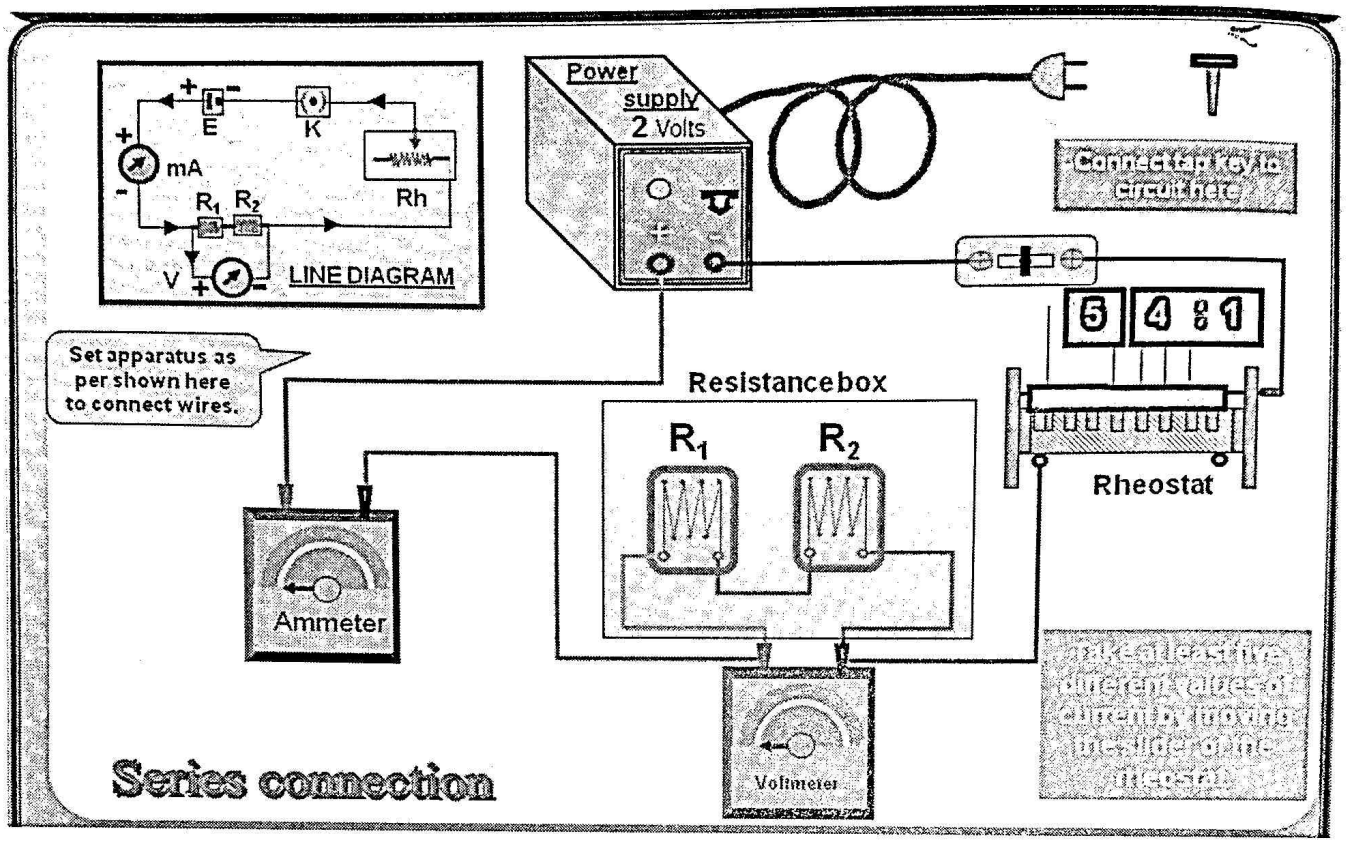
Resistance of the given resistor =

Precautions:

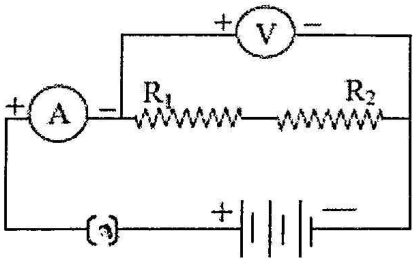
- All the electrical connections must be neat and tight.
- Connect the ammeter in series and voltmeter in parallel
- Voltmeter and Ammeter must be of proper range.
- The key should be inserted only while taking readings.

Expt.No.2 RESISTORS IN SERIES

Date:



Circuit Diagram



Expt.No.2 RESISTORS IN SERIES

Date:

Aim:
To determine the equivalent resistance of two resistors when connected in series

Materials required:
Battery, ammeter , voltmeter, rheostat, Resistance coils ,connecting wires

Theory :

When two resistors are connected in series, the equivalent resistance R_s is given by

$$R_s = R1 + R2$$

Procedure:

1. Arrange the apparatus as per the circuit diagram.
2. Make the connections as per circuit diagram. All connections must be neat and tight. Take care to connect the ammeter and voltmeter with their correct polarity. (+ve to +ve and -ve to -ve).
3. Connect resistance R1.
4. Insert the key K and slide the rheostat contact to see whether the ammeter and voltmeter are showing deflections properly.
5. Record at least 3 values with R1 and find the value of R1.(Table 1)
6. Connect resistance R2 .
7. Record at least 3 values with R2 and find the value of R2.(Table 2)
8. Now connect resistances R1 and R2 in series
9. Record the voltmeter and ammeter readings and find the value of R_s (Table 3)
10. Verify whether the value of R_s is equal to the sum of the resistances R1 and R2.

Observation:

Table 1: Resistance R1

No	POTENTIAL DIFFERENCE (V)	CURRENT (I)	RESISTANCE R1= V/I
1	0.5	0.2	2.5
2	1	0.4	2.5
3	0.8	0.3	2.6

Mean value R1= 2.5 Ω

Table 2: Resistance R2

No	POTENTIAL DIFFERENCE (V)	CURRENT (I)	RESISTANCE R2= V/I
1	0.5	0.25	2
2	1	0.5	2
3	0.8	0.4	2

Mean value R2 = 2 Ω

Table 3 : Resistors in series R_s

No	POTENTIAL DIFFERENCE (V)	CURRENT (I)	RESISTANCE R_s = V/I
1	1	0.2	5
2	1.5	0.3	5
3	2	0.4	5

Mean value R_s = 5 Ω.

Inference and Result:

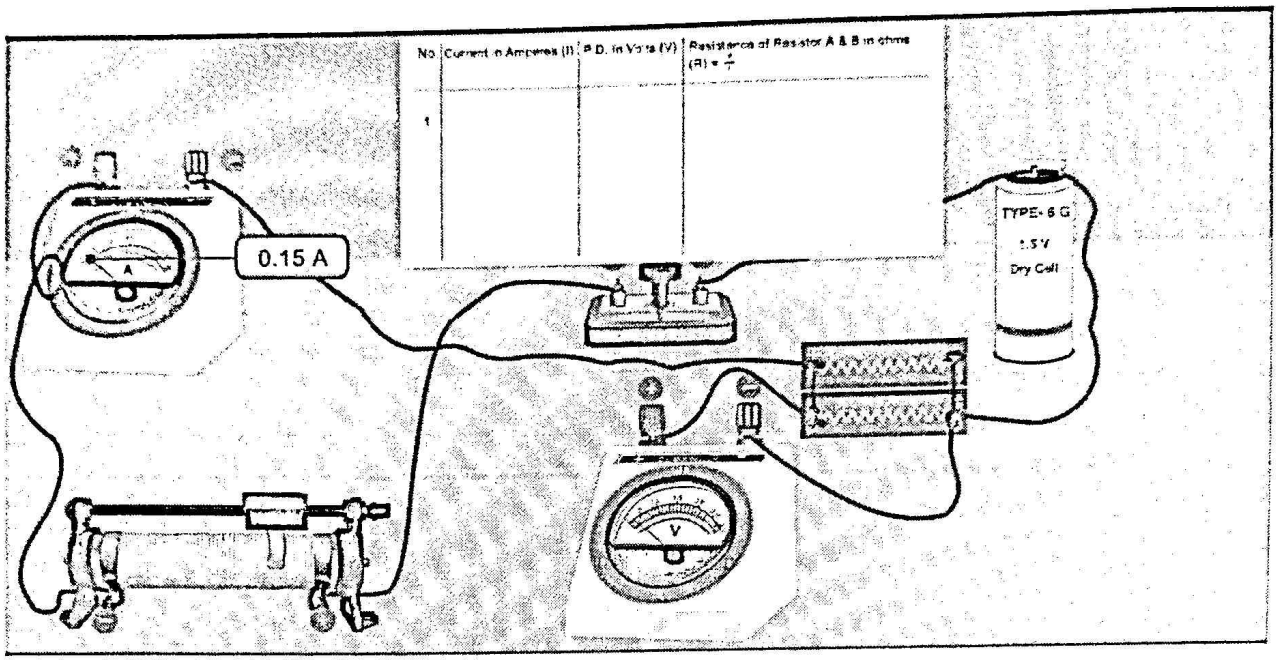
$$R1 = 2.5\,\Omega$$
$$R2 = 2\,\Omega$$
$$R1 + R2 = 4.5\,\Omega$$
$$R_s = 5\,\Omega.$$

Precautions:

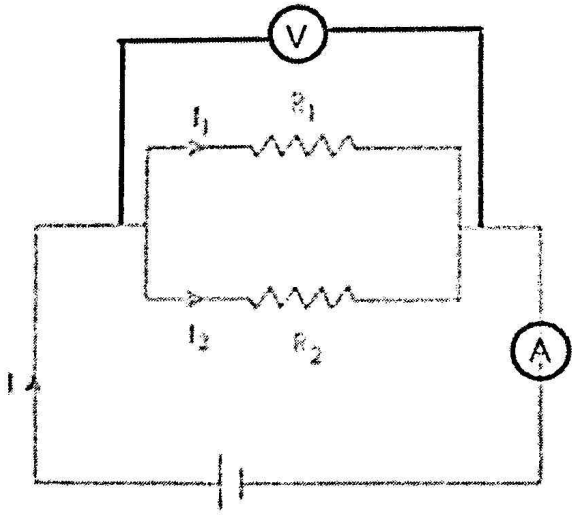
1. Connect the resistances properly in series
2. Connect the ammeter in series and voltmeter in parallel
3. Avoid touching any wire by hand ,when there is supply of current
4. If the wire is heated ,switch off the supply for a while and do the experiment
5. When not in use switch off the supply of current.

Expt.No.3 RESISTORS IN PARALLEL.

Date:



Circuit diagram



Expt.No.3 RESISTORS IN PARALLEL

Date:

Aim:
To determine the equivalent resistance of two resistors when connected in parallel

Materials required:
Battery, ammeter , voltmeter, rheostat, Resistance coils ,connecting wires

Theory:
When two resistors are connected in parallel , the equivalent resistance R_p is given by

$$1/R_p = 1/R1 + 1/R2$$

Procedure:

1. Arrange the apparatus as per the circuit diagram.
2. Make the connections as per circuit diagram. All connections must be neat and tight. Take care to connect the ammeter and voltmeter with their correct polarity. (+ve to +ve and -ve to -ve).
3. Connect resistance R1.
4. Insert the key K and slide the rheostat contact to see whether the ammeter and voltmeter are showing deflections properly.
5. Record at least 3 values with R1 and find the value of R1.(Table 1)
6. Connect resistance R2 .
7. Record at least 3 values with R2 and find the value of R2.(Table 2)
8. Now connect resistances R1 and R2 in parallel
9. Record the voltmeter and ammeter readings and find the value of R_p (Table 3)
10. Verify

$$1/R_p = 1/R1 + 1/R2$$

Observation :

Table 1: Resistance R1

No	POTENTIAL DIFFERENCE (V)	CURRENT (I)	RESISTANCE R1= V/I
1	0.5	0.2	2.5
2	1	0.41	2.5
3	0.5	0.3	2.5

Mean value R1= 2.5

Table 2: Resistance R2

No	POTENTIAL DIFFERENCE (V)	CURRENT (I)	RESISTANCE R2= V/I
1	0.5		
2	1		
3			

Mean value R2=

$1/R_p = 1/R1 + 1/R2 =$

$R_p =$

Table 3 : Resistors in parallel R_p

No	POTENTIAL DIFFERENCE (V)	CURRENT (I)	RESISTANCE R_p = V/I
1	0.5	0.4	1.2
2	0.7	0.6	1.1
3	1		1.1

Mean value R_p= 1.13

Inference and Result:

R1 = 2.6 R2 = 2

$1/R_p = 1/R1 + 1/R2$

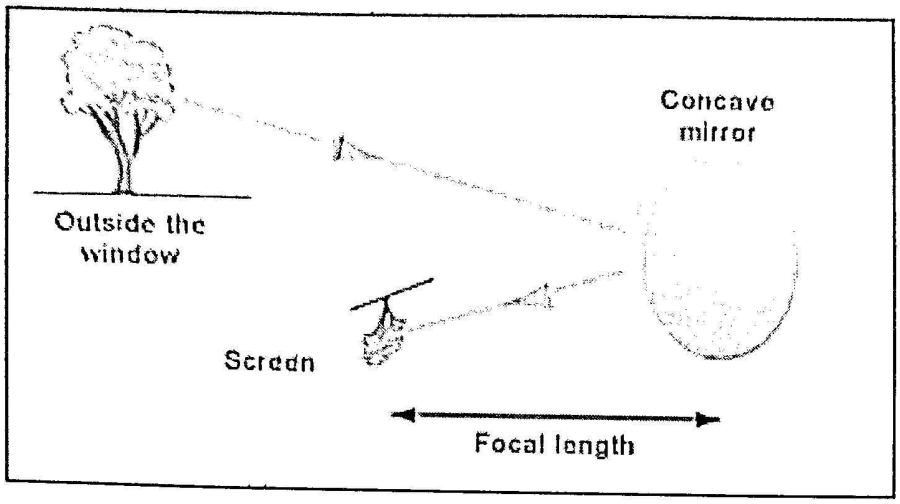
$R_p =$ 1.1

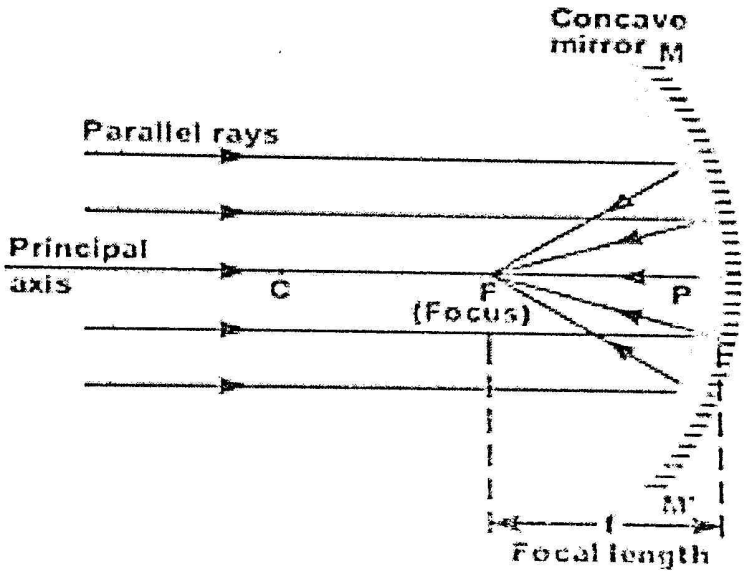
Precautions:

1. Connect the resistances properly in parallel.
2. Connect the ammeter in series and voltmeter in parallel
3. Avoid touching any wire by hand ,when there is supply of current
4. If the wire is heated ,switch off the supply for a while and do the experiment
5. When not in use switch off the supply of current.

Expt.No.4 **FOCAL LENGTH OF A CONCAVE MIRROR**

Date:





NO	OBJECT	f = DISTANCE BETWEEN MIRROR AND SCREEN

Focal length of the given concave mirror = f = cm.

Expt.No.4 FOCAL LENGTH OF A CONCAVE MIRROR

Date:

Aim:

To determine the focal length of a given concave mirror by distant object method.

Materials required:

Concave mirror, mirror stand, screen, scale

Theory:

When the object is at infinity in front of a concave mirror , its image is formed at the focus of the mirror. The distance between the pole and the focus is the focal length of a concave mirror.

By Sign convention the focal length of a concave mirror is negative.

Procedure:

1. Adjust the concave mirror to focus a distant object like –branch of a tree window etc.
2. Adjust the position of the screen in such a way that a sharp image of the distant object falls on it.
3. Measure the distance between the mirror and the screen
4. Repeat the steps for two or three objects and find the mean value.

Inference and Result:

The focal length of the given concave mirror= f = cm

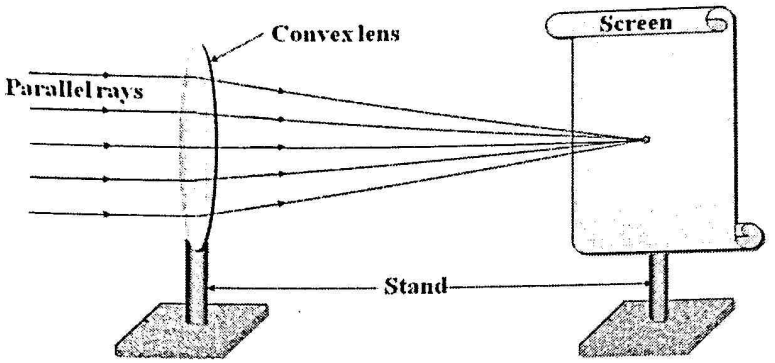
Precautions :

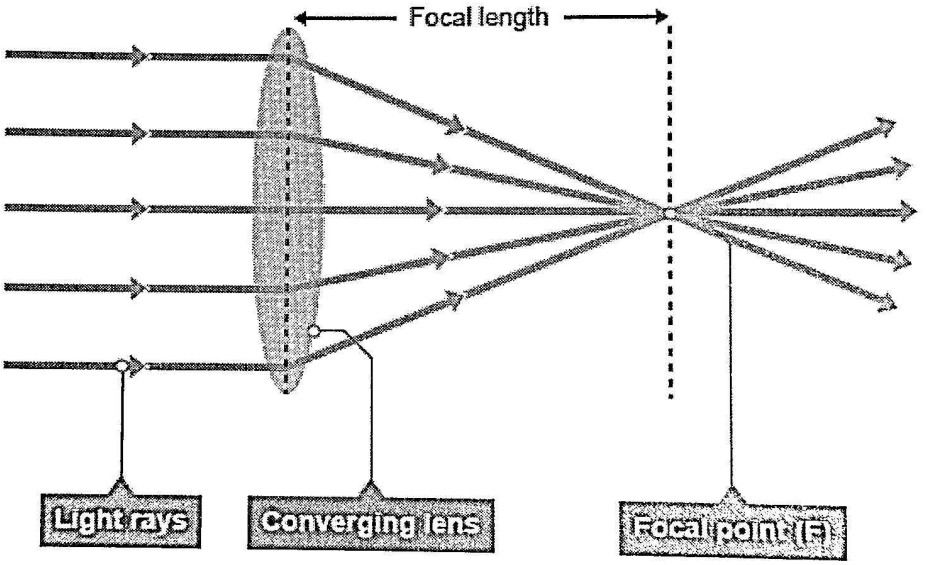
1. Image obtainted on the screen should be sharp and distinct.
2. Metre scale should be held horizontally ,while measuring the distance.

Expt.No.5

FOCAL LENGTH OF A CONVEX LENS

Date:





Observation:

NO	OBJECT	f = DISTANCE BETWEEN THE LENS AND SCREEN

Focal length of the given convex lens = f = cm

Expt.No.5 FOCAL LENGTH OF A CONVEX LENS

Date:

Aim:

To determine the focal length of a given convex lens by distant object method.

Materials required:

Convex lens , lens holder , screen, scale

Theory:

When a parallel rays of light from a distant object incident on a convex lens the rays, after refraction converge at focus on the other side of the lens.

The distance between the optical centre and focus is called the focal length of the lens.

By Sign convention the focal length of a convex lens is positive.

Procedure:

1. Adjust the convex lens to focus a distant object like –branch of a tree , window etc
2. Adjust the position of the screen in such a way that a sharp image of the distant object falls on it.
3. Measure the distance between the lens and the screen
4. Repeat the steps for two or three objects and find the mean value.

Inference and Result:

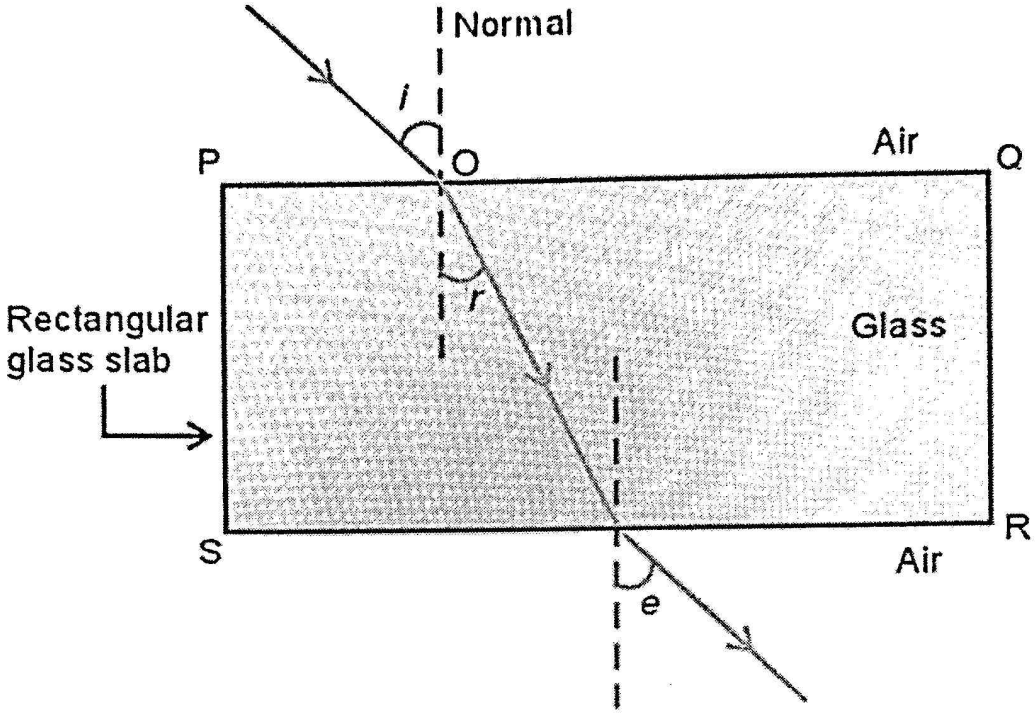
The focal length of the given convex lens = f = cm

Precautions :

1. Image obtainted on the screen should be sharp and distinct.
2. Metre scale should be held horizontally , while measuring the distance.

Expt.No.6 REFRACTION OF LIGHT THROUGH A GLASS SLAB

Date:



Expt.No.6 REFRACTION OF LIGHT THROUGH A GLASS SLAB

Date:

Aim:

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

MATERIALS REQUIRED:

Rectangular glass slab, a sheet of white paper, ruler, pencil, drawing pins, drawing board

THEORY:

1. When a ray of light passes from a rarer medium to a denser medium, it is refracted towards the normal at the point of incidence.
2. When a ray of light passes from a denser medium to a rarer medium, it is refracted away from the normal at the point of incidence.
3. When refraction takes place between two parallel faces of a medium, the angle of incidence is always equal to the angle of emergence.

Procedure:

1. A sheet of paper is fixed on a drawing board.
2. The glass slab is placed and the outline is drawn
3. An incident ray is drawn and two pins A and B are fixed on the incident ray. Looking at the pins through the other side of the glass slab two more pins C and D are placed.
4. The position of all the pins are noted and the glass slab is removed.
5. The emergent ray and the refracted ray are drawn.
6. The angle of incidence , angle of refraction and the angle of emergence are noted.
7. Repeat the steps for another value of i.

OBSERVATION:

NO	ANGLE OF INCIDENCE	ANGLE OF REFRACTION	ANGLE OF EMERGENCE

Inference and Result:

The angle of incidence is equal to the angle of emergence

Precautions:

1. The separation between pins should be at least 5cm.
2. Angles should be fixed be between 30^0 to 60^0 for incident ray.

Expt.No.7 **RAY DIAGRAMS - CONVEX LENS**

Date:

Observation:

NO	POSITION OF THE OBJECT	RAY DIAGRAM
1	AT INFINITY	
2	AT F	
3	BEYOND 2F	
4	BETWEEN F AND 2F	
5	AT 2F	
6	BETWEEN F AND O	

Expt.No.7 **RAY DIAGRAMS - CONVEX LENS**

Date:

Aim:

To understand the nature and position of the image formation in convex lens for various positions of the object

Materials required:

Light, Convex lens , stand and screen.

Theory:

Rules for drawing ray diagrams:

1. Any incident ray traveling parallel to the principal axis of a converging lens will refract through the lens and travel through the focal point on the opposite side of the lens.
2. Any incident ray traveling through the focal point on the way to the lens will refract through the lens and travel parallel to the principal axis.
3. An incident ray that passes through the center of the lens will in effect continue in the same direction that it had when it entered the lens.

Procedure:

1. Hold the convex lens near a window and focus on a distant tree .
2. Adjust the screen on the other side of the lens until we get a sharp image of the tree
3. The distance between the screen and the lens is equal to its focal length.
4. Mark the position of F and 2F on either side of the lens.
5. For various positions of the object , observe the image obtained on the screen.
6. Draw the ray diagrams for various positions of the object.

OBSERVATION :

Position of the object	Position of the image	Nature and size of the image
At infinity		
At F		
Beyond 2F		
Between F and 2F		
At 2F		
Between F and O		

Inference and Result:

1. Real and inverted image is formed , when the object is kept at the following positions : At 2F , Beyond 2F , Between F and 2F, and At F.

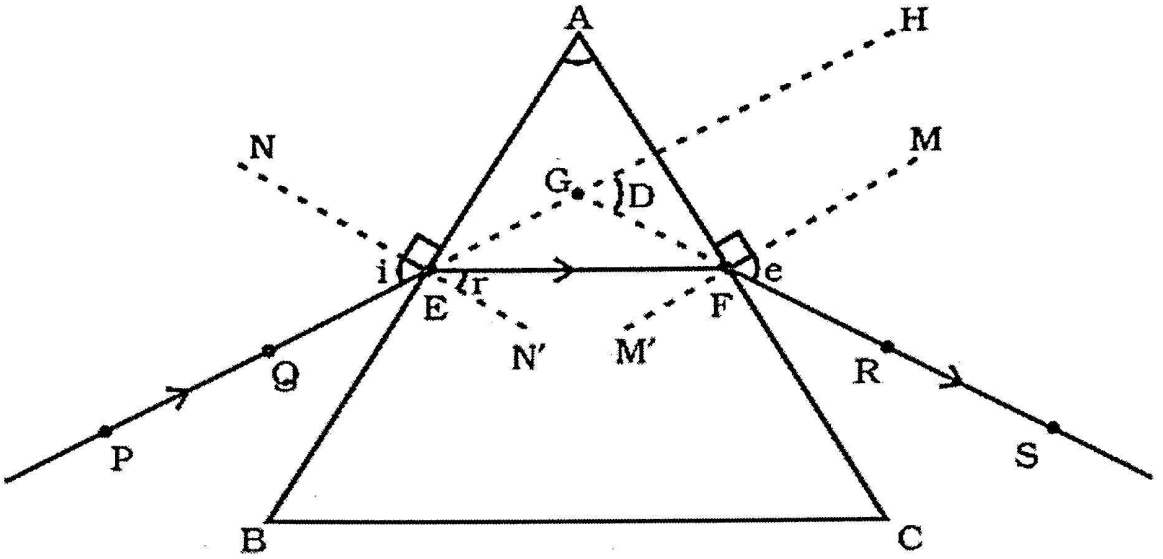
2. Virtual and erect image is formed when the object is kept between the optical centre and the focus

Precautions:

1. Image obtainted on the screen should be sharp and distinct.
2. Metre scale should be held horizontally , while measuring the distance.

Expt.No.8 REFRACTION OF LIGHT THROUGH A GLASS PRISM

Date:



Observation:

Angle of incidence =

Angle of emergence =

Angle of Refraction =

Angle of the prism =

Angle of deviation =

Expt.No.8 REFRACTION OF LIGHT THROUGH A GLASS PRISM

Date:

Aim:

To trace the path of a ray light passing through a glass prism and measure the angle of incidence , emergence, refraction and interpret the result.

MATERIALS REQUIRED:

Rectangular glass slab, a sheet of white paper, ruler, pencil, drawing pins, drawing board

Theory:

1. When a ray of light passes from a rarer medium to a denser medium, it is refracted towards the normal at the point of incidence.
2. When a ray of light passes from a denser medium to a rarer medium, it is refracted away from the normal at the point of incidence.
3. When refraction takes place between two non parallel faces of a medium, the angle of incidence is not equal to the angle of emergence.

Procedure:

1. A sheet of paper is fixed on a drawing board.
2. A glass prism is placed on the paper and the outline is drawn
3. An incident ray is drawn and two pins P and Q are fixed on the incident ray.
4. Looking at the pins through the other side of the prism two more pins R and S are placed.
5. The position of all the pins are noted and the prism is removed.
6. The emergent ray and the refracted ray are drawn.
7. The angle of incidence , angle of refraction and the angle of emergence are noted.

Inference and Result:

The angle of incidence and the angle of emergence is not equal.

Precautions:

1. The separation between pins should be at least 5cm.
2. Angles should be fixed be between 30^0 to 60^0 for incident ray to observe the refraction clearly.

Expt.No.9 STUDY OF THE pH OF GIVEN SAMPLES

Date: 11/01/18

OBSERVATION:

S.No	SAMPLE SOLUTION	APPROXIMATE pH VALUE	INFERENCE
1	Dil.HCL		
2	Dil.NaOH		
3	Dil. ETHANOIC ACID		
4	LEMON JUICE		
5	$NaHCO_3$		
6	WATER		

Expt.No.9 **STUDY OF THE pH OF GIVEN SAMPLES**

Date:

AIM:

To find the pH of the given samples like Dil.HCl, Dil.NaOH, Dil.Ethanoic acid, Lemon juice, $NaHCO_3$, and water.

MATERIALS REQUIRED:

Dil.HCl, Dil.NaOH, Dil.Ethanoic acid, Lemon juice, $NaHCO_3$, and water, test tubes, watch glass, pH paper strips, fine droppers.

THEORY:

The acidic and basic nature of the solution depends upon the amount of H+ or OH- ions present in the aqueous solutions. It can be determined with the help of pH scale. The pH of the solution is defined as the negative logarithm of hydrogen ion concentration.

$pH = - \log[H^+]$ or $pH = - \log [H_3O^+]$

If pH is equal to 7, the solution is neutral.

If pH is < 7, the solution is acidic because $[H^+] > [OH^-]$

If pH is > 7, the solution is ~~acidic~~ basic because $[OH^-] > [H^+]$

PROCEDURE:

Place the pH strips separately in each watch glass. Add few drops of the sample solutions in each watch glass separately. Observe and note the pH value by comparing the colour appeared on the pH strip and the pH chart. Record your observations in the observation table and infer whether the given sample is strongly/weakly acidic or basic.

RESULT:

pH OF Dil.HCl is _____ and the solution is _____

pH OF Dil.NaOH is _____ and the solution is _____

pH OF Dil.CH_3COOH is _____and the solution is _____

pH OF Lemon Juice is _____ and the solution is _____

pH OF $NaHCO_3$ is _____ and the solution is _____

pH OF Water is _____ and the solution is _____

PRECAUTIONS:

- Extract fresh juice from lemon to avoid oxidation.
- Dropper used in one sample should not be used for other samples without washing.
- Do not touch or taste any solution.

SOURCES OF ERROR:

The pH is likely to go wrong, if

- The watch glass is not cleaned properly.
- The dropper is not rinsed well.

Expt.No.10 STUDY THE PROPERTIES OF ACIDS AND BASES

Date:

OBSERVATION:

S.No	EXPERIMENT	OBSERVATION	INFERENCE
1	Action of Dil.HCl on litmus solution. Action of HCl in Phenolphthalein HCl in Methyl Orange		
2	Action of Dil.HCl on Zinc metal.		
3	Action of Dil.HCl on Sodium Carbonate.		
4	Action of Sodium Hydroxide on litmus solution.		
5	Action of Sodium Hydroxide on Zinc metal.		
6	Action of Sodium Hydroxide on Sodium Carbonate.		

Expt.No.10 STUDY THE PROPERTIES OF ACIDS AND BASES

Date:

AIM:

To study the properties of acids and bases [dil.HCl and NaOH] with

a) Blue and red litmus solution
b) Zinc metal
c) Solid sodium carbonate.

MATERIALS REQUIRED:

a) Dil.HCl,.NaOH, solid sodium carbonate, sodium hydroxide, Blue and red litmus solution , distilled water, test tubes, boiling testube -1 , beaker.

THEORY:

According to Arrhenius theory, an acidic and basic nature of the solution depends upon the amount of H+ or OH- ions present in the aqueous solutions.

PROCEDURE:

ACTION OF Dil.HCl ON LITMUS SOLUTION:

Take a few drops of e blue litmus and red litmus solutions in separate test tubes and add few drops of Dil.HCl to them. Observe and record your observations.

ACTION OF Dil.HCl ON ZINC METAL:

Take few Zinc metal pieces in a boiling test tube and add a few drops of Dil.HCl to it. Place a stopper with a fine jet on the mouth of the test tube and warm it. Bring a burning matchstick near the mouth of the fine jet. Observe and record your observations.

ACTION OF Dil.HCl ON SODIUM CARBONATE:

Take a small quantity of solid sodium carbonate in a test tube fixed with a thistle funnel and add few drops of Dil.HCl to it. Pass the gas evolved through lime water and record your observations.

WRITE THE RELEVANT EQUATIONS FOR THE REACTIONS AND BALANCE THEM

1.

2.

3.

4.

5.

6.

ACTION OF SODIUM HYDROXIDE SOLUTION ON LITMUS SOLUTION:

Take a few drops of e blue litmus and red litmus solutions in separate test tubes and add few drops of sodium hydroxide solution to them. Observe and record your observations.

ACTION OF SODIUM HYDROXIDE SOLUTION ON ZINC METAL:

Take few Zinc metal pieces in a boiling test tube and add a few drops of sodium hydroxide solution to it. Place a stopper with a fine jet on the mouth of the test tube and warm it. Bring a burning matchstick near the mouth of the fine jet. Observe and record your observations.

ACTION OF SODIUM HYDROXIDE SOLUTION ON SODIUM CARBONATE:

Take a small quantity of solid sodium carbonate in a test tube and add a few drops of sodium hydroxide solution to it. Observe and record your observations.

RESULT:

- Dil.Hydrochloric acid turns blue litmus red, liberates hydrogen gas with Zinc metal and Carbon di oxide with Sodium carbonate.
- Sodium Hydroxide acid turns red litmus blue, liberates hydrogen gas with Zinc metal and no reaction with Sodium carbonate.

PRECAUTIONS:

- Take small amounts of Zinc and Dil.HCl, otherwise large volume of hydrogen will be formed which may cause explosion.
- Hydrogen should be burnt carefully.
- Do not touch or taste any solution.

Expt.No.11 **IDENTIFY THE TYPES OF CHEMICAL REACTIONS**

Date:

OBSERVATION:

S.No	EXPERIMENT	OBSERVATION	INFERENCE
1	Action of water on quick lime		
2	Action of heat on ferrous sulphate crystals		
3	Reaction of iron nails with copper sulphate solution		
4	Reaction of Sodium sulphate with Barium chloride		

Expt.No.11 **TYPES OF CHEMICAL REACTIONS**

Date:

AIM:

To classify the following reactions as Combination reaction, Decomposition reaction, Displacement reaction, Double displacement reaction.

1) Action of water on quick lime
2) Action of heat on ferrous sulphate crystals
3) Reaction of iron nails with copper sulphate solution
4) Reaction of Sodium sulphate with Barium chloride

MATERIALS REQUIRED:

Quick lime, ferrous sulphate crystals, iron nails , copper sulphate solution, Sodium sulphate , Barium chloride, water, testubes, 4, Bunsen burner, test tube holder.

THEORY:

Combination reactions: A reaction in which two or more substances combine to produce a single substance is known as combination or ***synthesis reaction***.

$$A + B \text{ ----> } AB$$

Decomposition reactions: A ***decomposition reaction*** is a chemical reaction in which a substance degrades into two or more components.

$$AB \text{ ----> } A + B$$

Substitution or Single Replacement: A single free element replaces or is substituted for one of the elements in a compound. The free element is more reactive than the one its replaces.

$$A + BC \text{ ----> } B + AC$$

Double Displacement : The positive ion in the first compound combines with the negative ion in the second compound and the positive ion in the second compound combines with the negative ion in the first compound.

$$AB + CD \text{ ----> } AD + CB$$

WRITE THE RELEVANT EQUATIONS FOR THE REACTIONS AND BALANCE THEM.

1.

2.

3.

4.

PROCEDURE:

ACTION OF WATER ON QUICK LIME

Add a small amount of water to calcium oxide[quick lime] taken in a beaker until quick lime is completely submerged in water. Leave the beaker undisturbed for few minutes. Observe and record your observations..

ACTION OF HEAT ON FERROUS SULPHATE CRYSTALS:

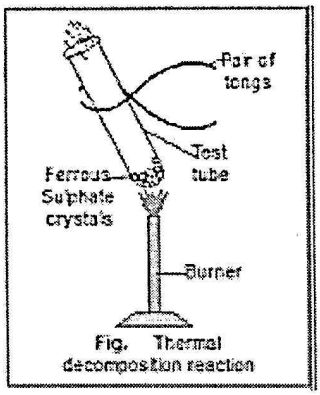
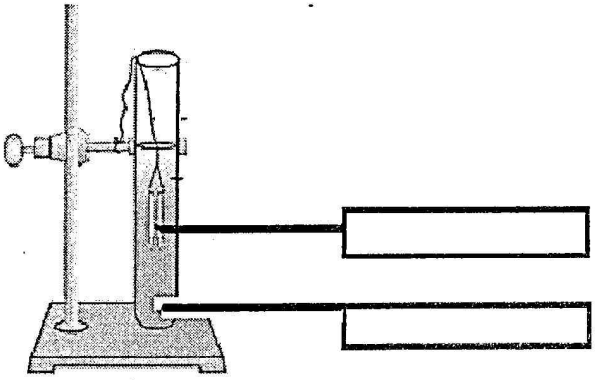


Fig. Thermal decomposition reaction

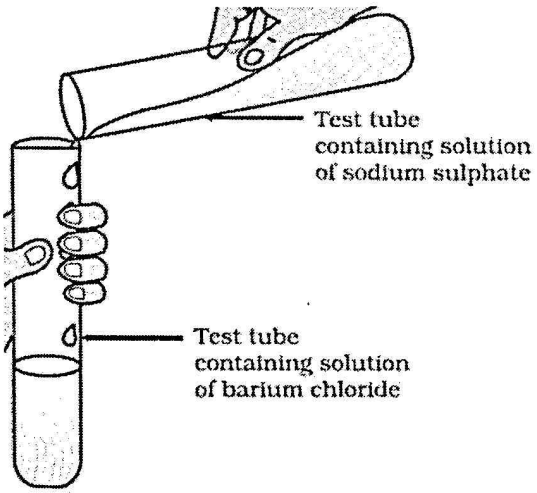
Take about 5g of ferrous sulphate crystals in a boiling test tube and heat it. Observe and record your observations.

REACTION OF IRON NAILS WITH COPPER SULPHATE SOLUTION:



Take copper(II) sulphate solution in a beaker and place two well polished iron nails in it. Leave it undisturbed for few minutes. Observe3 and record your observations.

REACTION OF SODIUM SULPHATE WITH BARIUM CHLORIDE:



Take 3ml of aquaous barium chloride in a test tube. Add equal volume of sodium sulphate solution to it. Observe and record your observations.

RESULT:

ACTION OF WATER ON QUICK LIME

As two reactants combine to form one product it is a combination reaction.

ACTION OF HEAT ON FERROUS SULPHATE CRYSTALS:

A single reactant breaks down into simpler products, it is a decomposition reaction.

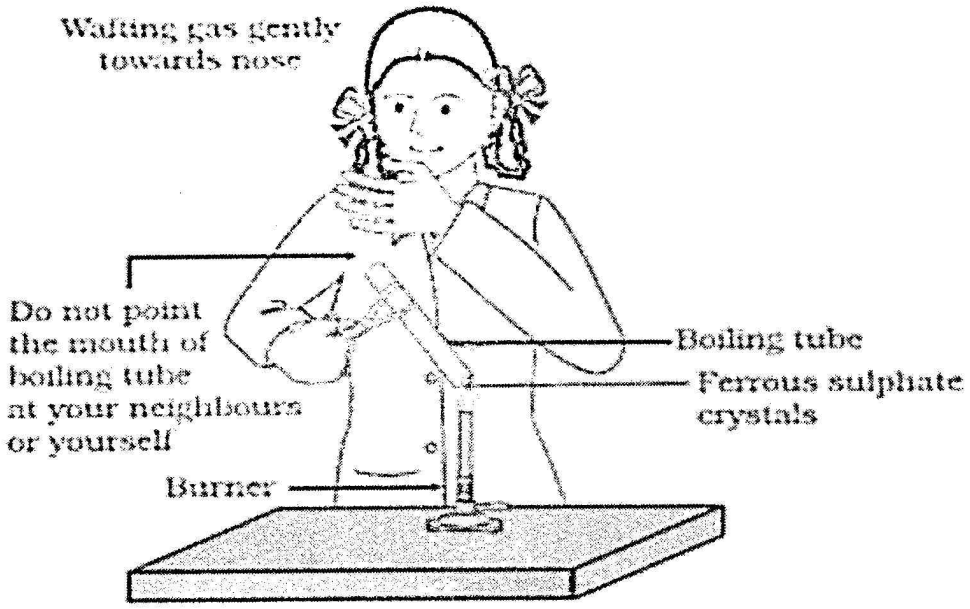
REACTION OF IRON NAILS WITH COPPER SULPHATE SOLUTION:

As iron is more reactive than copper, it displaces copper Cu^{2+} from copper sulphate. It is a single displacement reaction.

REACTION OF SODIUM SULPHATE WITH BARIUM CHLORIDE:

As exchange of ions take place it is a double displacement reaction.

PRECAUTIONS:



- Always use a test tube holder while heating the test tubes.
- Do not touch the chemicals with your hand.
- Clean the iron nails by rubbing it sand paper to remove rust and dust.
- Wash the test tubes before using it for experiments.

Expt.No 12 REACTION OF METALS WITH SALT SOLUTIONS

Date:

OBSERVATION:

S.No	EXPERIMENT	OBSERVATION	INFERENCE
1	Aluminium metal in Zinc sulphate solution.		
2	Aluminium metal in ferrous sulphate solution.		
3	Aluminium metal in Copper sulphate solution.		
4	Aluminium metal in Aluminium sulphate solution.		
5	Zinc metal in Zinc sulphate solution.		
6	Zinc metal in ferrous sulphate solution.		
7	Zinc metal in Copper sulphate solution.		
8	Zinc metal in Aluminium sulphate solution.		

Expt.No.12 REACTION OF METALS WITH SALT SOLUTIONS

Date:

AIM:

To observe the action of Zn, Fe, Cu and Al metals on the following salt solutions.

a) $ZnSO_4$

b) $FeSO_4$

c) $CuSO_4$

d) $(Al)_2(SO_4)_3$

Arrange Zn, Fe, Cu and Al in the decreasing order of reactivity based on the above result.

MATERIALS REQUIRED:

Solutions of $ZnSO_4$, $FeSO_4$, $CuSO_4$, $(Al)_2(SO_4)_3$, Aluminium foil, copper turnings, zinc granules, iron filings, test tubes.

THEORY:

More electro positive metal can displace less electro positive metal from its salt solution.

PROCEDURE:

STEP 1:

Take four test tubes and add Solutions of $ZnSO_4$, $FeSO_4$, $CuSO_4$, $(Al)_2(SO_4)_3$ separately in each test tube. Add Aluminium foil in all of them. Observe and record your observations.

STEP 2:

Take four test tubes and add Solutions of $ZnSO_4$, $FeSO_4$, $CuSO_4$, $(Al)_2(SO_4)_3$ separately in each test tube. Place Zinc metal in all of them. Observe and record your observations.

STEP 3:

Take four test tubes and add Solutions of $ZnSO_4$, $FeSO_4$, $CuSO_4$, $(Al)_2(SO_4)_3$ separately in each test tube. Add iron filings in all of them. Observe and record your observations

S.No	EXPERIMENT	OBSERVATION	INFERENCE
1	Iron filings in Zinc sulphate solution.		
2	Iron filings in ferrous sulphate solution.		
3	Iron filings in Copper sulphate solution.		
4	Iron filings in Aluminium sulphate solution.		
5	Copper turnings in Zinc sulphate solution.		
6	Copper turnings in ferrous sulphate solution.		
7	Copper turnings in Copper sulphate solution.		
8	Copper turnings in Aluminium sulphate solution.		

STEP 4:

Take four test tubes and add Solutions of $ZnSO_4$, $FeSO_4$, $CuSO_4$, $(Al)_2(SO_4)_3$ separately in each test tube. Add copper turnings in all of them. Observe and record your observations

RESULT:

The order of reactivity of the metals is Al > Zn > Fe > Cu.

PRECAUTIONS:

- Clean the metals with sand paper
- Some metals may react slowly, therefore, observe the changes carefully.

Expt.No.13 STUDY THE PROPERTIES OF ACETIC ACID

Date:

OBSERVATION:

S.No	EXPERIMENT	OBSERVATION	INFERENCE
1	Odour		
2	Solubility in water		
3	Effect on litmus paper		
4	Reaction with sodium bicarbonate		

Expt.No.13 STUDY THE PROPERTIES OF ACETIC ACID

Date:

AIM:

To observe the following properties of acetic acid

a) Odour

b) Solubility in water

c) Effect on litmus

d) Reaction with sodium bi carbonate

MATERIALS REQUIRED:

Acetic acid, blue and red litmus paper or solution, water, sodium bicarbonate, lime water, test tubes.

THEORY:

Acetic acid is a monocarboxylic organic acid. It belongs to carboxylic acid because it has one –COOH functional group. It is soluble in water because it gets ionized in aqueous solution due to which it is acidic in nature.

$CH3COOH \rightarrow CH3COO^{-} + H_3O$

PROCEDURE:

STEP 1:

Take a small amount of Acetic acid in a test tube and smell its odour. Observe and record your observations.

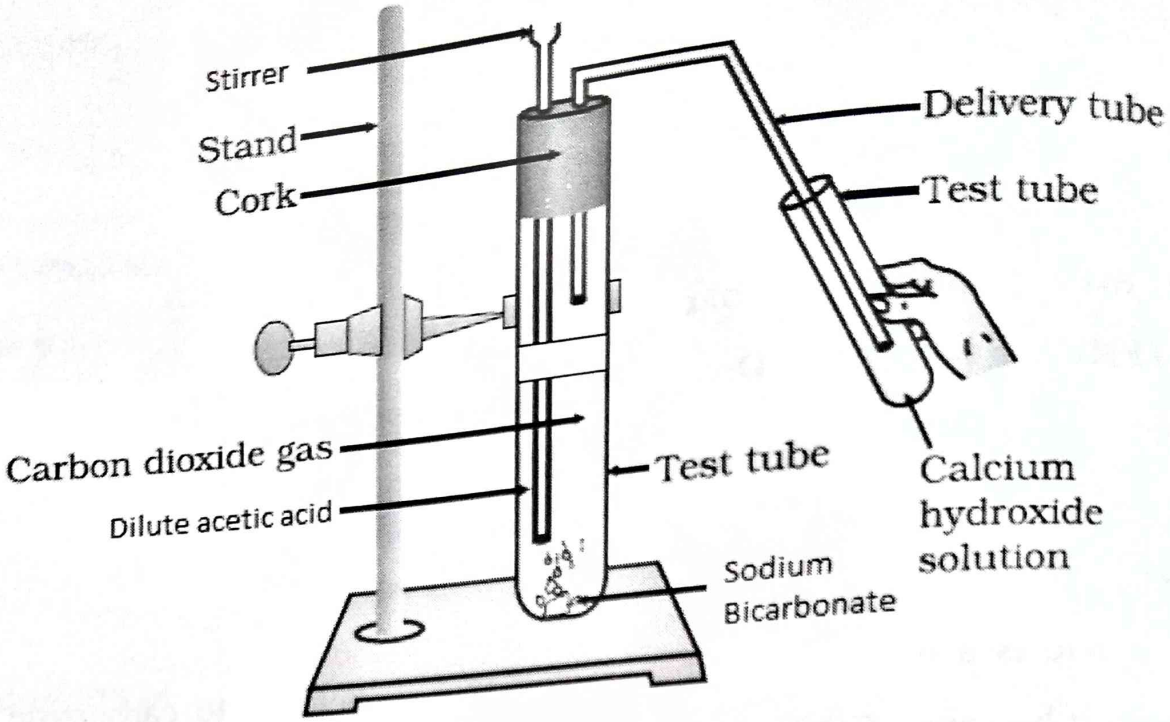
STEP 2:

Take little acetic acid in two different test tubes and add few drops of blue and red litmus solutions separately. Observe and record your observations.

STEP 3:

Take 5ml of acetic acid in a test tube and add equal volume of water to it. Observe and record your observations.

Write the equation of the reaction of acetic acid with sodium bi carbonate.



STEP 4:

Take a small quantity of solid sodium bi carbonate in a test tube and add a few drops of acetic acid to it. Pass the gas liberated through lime water. Observe and record your observations.

RESULT:

Physical and chemical properties of acetic acid have been studied.

PRECAUTIONS:

- Do not inhale vapours of acetic acid directly.
- Do not add lot of sodium bi carbonate.

HIGHLY FLAMMABLE
these substances readily catch fire

CORROSIVE
these substances attack and destroy living tissue eg skin

TOXIC
these substances can cause death if eaten, breathed in or absorbed through the skin

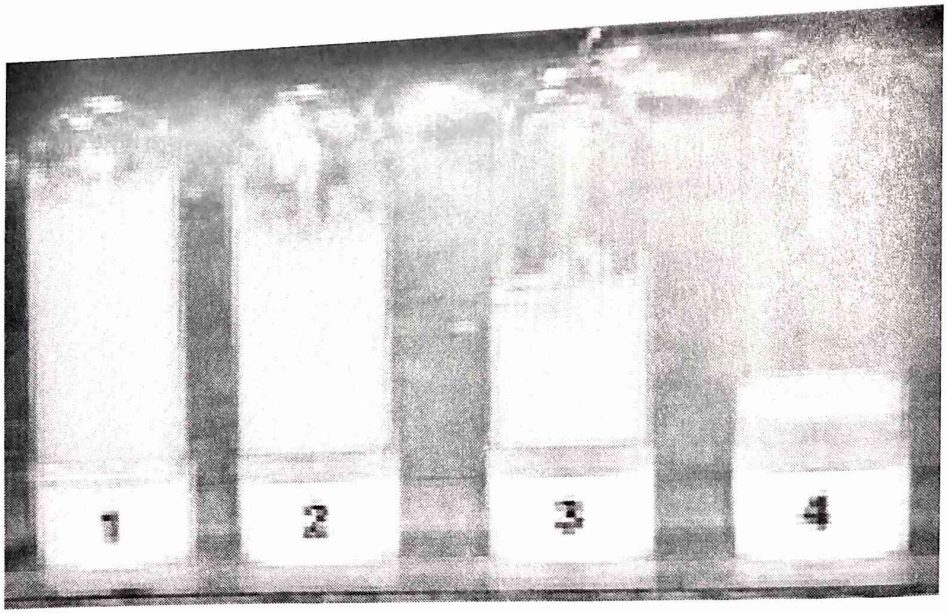
IRRITANT
these substances are not corrosive but can inflame or blister the skin

Expt.No.14 THE CLEANSING CAPACITY OF SOAP IN HARD AND SOFT WATER

Date:

OBSERVATION

S.NO	GIVEN SAMPLE OF WATER	INITIAL LENGTH OF WATER	LENGTH OF LATHER FORMED	OBSERVATION: HARD OR SOFT WATER
1	Distilled water			
2	Mineral water			
3	Salt water 1			
4	Salt water 2			



Expt.No.14 **THE CLEANSING CAPACITY OF SOAP IN HARD AND SOFT WATER**

Date:

AIM:

To study the comparative cleansing capacity of soap in hard and soft water

MATERIALS REQUIRED:

Distilled water, tap water, mineral water, salt water, soap solution four test tubes and a dropper.

THEORY:

- Hard water does not lather readily with soap. Soft water readily lathers with soap.
- Hardness of water is due to the presence of bicarbonates, chlorides and sulphates of calcium and magnesium.

$$Ca^{2+} + 2C_{17}H_{35}COONa \rightarrow (C_{17}H_{35}COO)_2Mg + 2Na$$

$$Mg^{2+} + 2C_{17}H_{35}COONa \rightarrow (C_{17}H_{35}COO)_2Mg + 2Na$$

PROCEDURE:

The given samples of distilled water, hard water are taken in four different test tubes in equal volumes.

Measure the initial length of the solution in test tubes A, B, C, D. Add five to eight drops of soap solution to each test tube and shake vigorously.

Measure the length of the lather formed in each case and tabulates the results in a tabular column

RESULT:

Thus using soap solution the different samples of water are tested and identified as hard and soft water.

PRECAUTIONS:

1. Take same quantity of water in each test tube.
2. Add same quantity of liquid soap.
3. Shake the test tubes for equal number of times uniformly
4. Do not use detergents in this experiment.

EXPT.NO: 15 TEMPORARY MOUNT OF A LEAF PEEL SHOWING STOMATA

DATE:

AIM:

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

MATERIALS REQUIRED:

Canna or lilly leaf, slide, cover slip, petridish, water, glycerine, saffranin, scissors or blade, forceps, dropper, microscope, painting brush and filter paper.

PROCEDURE:

1) Take a canna or lilly leaf and fold it in the centre so that it breaks into two pieces.

2) Gently pull one leaf piece so that a transparent leaf peel is obtained.

3) Take the leaf peel and cut it with scissors or a blade into small pieces and transfer these pieces with the help of a paintbrush into a petridish containing water.

4) Select a piece of a leaf peel and transfer it into another watch glass containing dilute solution of saffranin.

5) With the help of paintbrush transfer the peel on to a slide.

6) Now put a drop of glycerine on the peel and cover it carefully with a coverslip by using needle to avoid air bubbles. Remove excess glycerine with the help of a filter paper.

OBSERVATION:

On observing the slide under the microscope, the following details are noted.

1) The cells are arranged in a horizontal row that may be irregular or rectangular in shape.

2) Stomata may be observed at certain places. The stomata consists of two guard cells with the stoma in the centre which may be open or closed.

3) The inner wall of the guard cell is thicker than the outer wall.

4) Each guard cell has a nucleus and many chloroplasts.

INFERENCE:

The leaf peel showing the stomata was thus observed under the microscope.

PRECAUTIONS:

1) The leaf should be small and not be allowed to dry.

2) There should be no air bubbles in the slide and overstaining of the material should be avoided.

3) The slide should be clean

DATE:

AIM:

To show that carbon dioxide is produced during respiration using KOH solution.

MATERIALS REQUIRED:

Germinating gram pea or moong seeds,conical flask, small test-tube, thread, one-holed cork, bent glass tube, beaker,water and KOH pallet or solution.

PROCEDURE:

1. Take enough quantity (100 gm) of germinating seeds.Put them into a conical flask.
2. Tie a thread to a small test tube.Put a few pellets of KOH* in the test tube.
3. Insert a bent tube through a one-holed rubber cork and fix it to the opening or to the conical flask along with the test tube hanging inside the flask.
4. Keep the other end of the bent glass tube dipped in a beaker containing water.Mark the water level in the glass tube.
5. Keep the whole set for 1-2 hours as such without disturbing it.

OBSERVATION:

After sometime you will see that the water level rises in the bent glass tube.

RESULT:

1. Respiring germinating seeds produce carbon dioxide.
2. This is absorbed by the KOH pellets,kept in the hanging test tube – creating vacuum for that many molecules of carbon dioxide.
3. The air from the bent tubes moves into the conical flask.
4. To fill gap the water the water level in the bent tube rises up.

PRECAUTIONS:

1. Germinating seeds should be kept moist.

2. All connections of the set-ups should be air tight.

3. Freshly prepared KOH solution be used.

4. The testtube containing KOH should be hung carefully.

EXPT.NO: 17 **EXPERIMENT TO SHOW THAT CARBONDIOXIDE IS PRODUCED DURING RESPIRATION USING LIME WATER**

DATE:

AIM:

To show that carbon dioxide is produced during respiration using lime water.

MATERIALS REQUIRED:

Germinating moong seeds, bottle, two-holed cork, water reservoir, bent glass tube, beakers, water and lime water.

PROCEDURE:

1. Take enough quantity (100 gm) of germinating seeds.Put them into a bottle.
2. Insert a bent tube through in one hole and tube of wate reservoir in other hole.
3. Fix the cork over the bottle.
4. Place the other end of the bent tube in a beaker with limewater.
5. Pour water into the water reservoir .
6. Keep the whole set for 1-2 hours as such without disturbing it.
7. After 1-2 hours remove the beaker with water and replace it with limewater.
8. Open the stopcock of water reservoir to release water into the bottle. Add more water if needed.

OBSERVATION:

1. You will see that water moves inside the bottle.
2. The limewater turns milky.

RESULT:

1. The limewater turns milky,when it comes in contact with carbondioxide.
2. This proves that the gas released during respiration is carbon dioxide.

EXPT.NO: 18 **BINARY FISSION IN AMOEBA**

DATE:

AIM:

To study binary fission in amoeba with the help of prepared slide.

MATERIALS REQUIRED:

Prepared slide of amoeba,Microscope.

COMMENTS:

1. It is the simplest and commonest type of method of reproduction in uni celluar organisms like Amoeba.
2. The parent body divides into two daughter Amoeba cells by mitosis cell division. Hence called binary fission.
3. It takes place in favorable conditions when plenty of food is available.
4. During the process, the body becomes first spherical and the nucleus becomes dumb-bell shaped and then divides into two daughter nuclei.
5. Each daughter cell gets a daughter nucleus. The body of Amoeba constricts in the middle forming two daughter cells.
6. Each binary fission takes about 30 minutes.

EXPT.NO:20 **BUDDING IN HYDRA**

DATE:

AIM:

To study budding in Hydra with the help of a prepared slide.

MATERIALS REQUIRED:

Prepared slide of hydra showing budding and a microscope.

COMMENTS:

1. Hydra is a small freshwater organism belonging to the phylum cnidaria.
2. Asexual reproduction takes place in Hydra by the process called "budding"
3. Budding involves the formation of a new individual from a protrusion called the bud.
4. In Hydra, the cells divide rapidly at a specific site and develop as an outgrowth called the bud.
5. These buds, while attached to the parent plant, develop into small individuals.
6. When this individual becomes large enough, it detaches itself from the parent body to exist as an independent individual

EXPT.NO:21 **IDENTIFY THE DIFFERENT PARTS OF AN EMBRYO OF A DICOT SEED (GRAM SEED)**

DATE:

AIM:

To identify the different parts of an embryo of a dicot seed (gram seed).

MATERIALS REQUIRED:

Few seeds soaked in water overnight, a forceps, petridish.

PROCEDURE:

1. Carefully observe the soaked seeds one by one of each type.
2. Carefully peel out the seed coat of a seed with the help of forceps or your finger nails.
3. Keep the peeled seed each in the petridish.

OBSERVATION:

1. The structure observed is embryo.
2. Unfold the embryo and
3. The axis of embryo observed.
4. Draw a labelled diagram of the embryo with cotyledons folded and unfolded.

PRECAUTIONS:

1. Carefully remove the seed coat.
2. Carefully unfold the cotyledons to observe the young baby plant.

ACTIVITIES

Activity:1 STUDY THE SAPONIFICATION REACTION

Date:

AIM:

To study the saponification reaction

MATERIALS REQUIRED:

Sodium hydroxide, vegetable oil 50ml, common salt 10g, distilled water, water bath

THEORY:

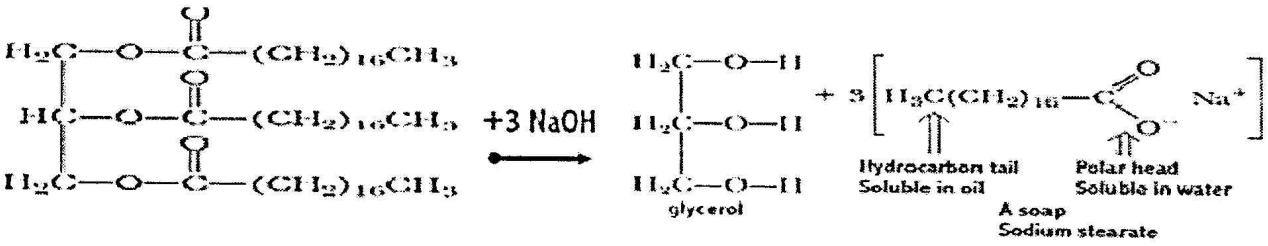
The process of making soap by the hydrolysis of fats and oils with alkalies is called saponification.

Soap is made by heating animal fats or vegetable oil with concentrated sodium hydroxide (NAOH)

Fat or Oil + NAOH ⟶ Soap + Glycerol

PROCEDURE:

Take about 20ml of coconut oil in a beaker and add 25ml of 20% sodium hydroxide solution to it. Heat the mixture until it becomes concentrated. Add 5g of sodium chloride and stir it well. Allow it to cool to get solid soap.



OBSERVATION

Glycerol is formed along with soap during saponification reaction.

PRECAUTIONS:

1. Do not touch solid NaOH.
2. Stir the mixture constantly while heating.

Activity: 2 **EXPERIMENT TO SHOW THAT LIGHT IS NECESSARY FOR PHOTOSYNTHESIS**

Date :

AIM:

To show experimentally that light is necessary for photosynthesis.

MATERIALS REQUIRED:

A healthy potted plant, black paper strips, clips, water bath, beaker, wire gauze, tripod stand, Bunsen burner, petridish, match box, water, forceps,chemicals like ethanol and iodine solution.

PROCEDURE:

1. Destarch the leaves of the potted plant by keeping the plant in dark for 10 – 12 hours or overnight.
2. Cover the middle part of one or two healthy leaves with strips of black paper. Fasten the black paper strips with a clip or adhesive tape.
3. Place the watered potted plant in sunlight for 3-4 hours.
4. After 3-4 hours pluck the leaf and remove the black paper strips.
5. Put the leaves in a beaker containing water. Boil the leaves for 10 minutes to kill the germs.
6. Now remove the leaves .Put them in a beaker containing some alcohol.Keep the beaker in the water bath and boil the leaves for 30- 40 minutes. This process decolourises the leaves completely
7. Remove the leaves, with the help of forceps and transfer them to a petri dish containing warm water to wash them.
8. Now take off leaf, put it into dil. solution of iodine for 1-2 minutes, wash and observe it

OBSERVATION:

The covered portion of the leaf shows no blue black colouration, where as the uncovered portion of the leaf shows blue black colouration.

RESULT:

Light exposed portion of leaf synthesised starch,i.e.,light is essential for photosynthesis.

PRECAUTIONS:

1. Do not use the plant or leaves without destarching them.
2. The paper strips or light screen should be placed properly over the leaf.
3. The beaker with ethanol (alcohol) should not be heated directly. It should be kept over the water bath for heating.

Activity:3 **STUDY OF HOMOLOGY AND ANALOGY OF ANIMALS**

DATE:

AIM:

To study homology and analogy with the help of models/charts of animals.

COMMENTS:

1. The endoskeleton of forelimbs of some vertebrate animals show homology in the embryonic development, skeletal support,etc.
2. Forelimbs are modified in these vertebrates for flying in bird and bat , for swimming in seal, for running in horse, for holding/ grasping things in man.
3. All these organs have the same basic pentadactyl structural plan.

COMMENTS:

1.The wings of birds, bat and insect show analogy or analogous organs.

2.They are externally similar in appearance and function

3.Wings of bird and bat have bones whereas bones are absent in wings if insect.