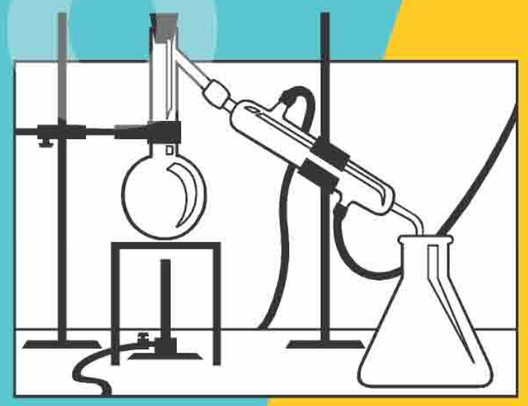
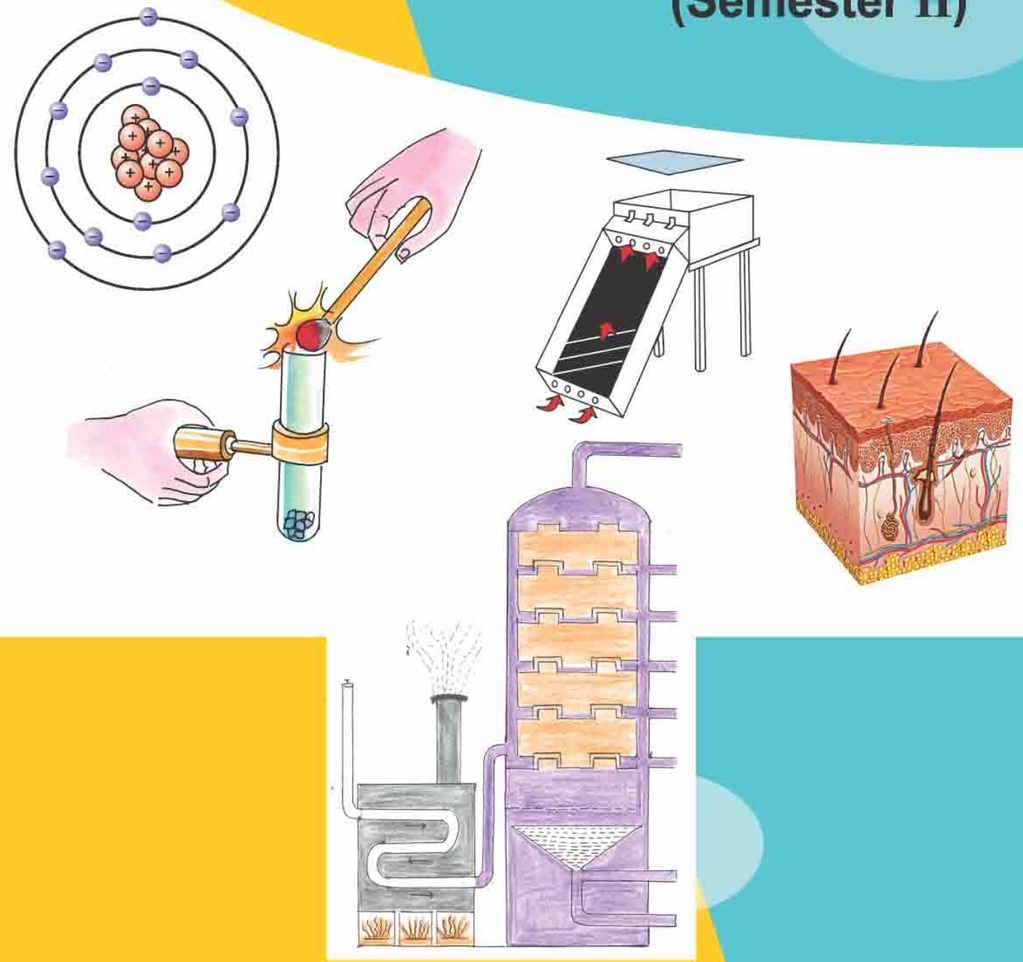
SCIENCE AND TECHNOLOGY 8



SCIENCE AND TECHNOLOGY

Standard 8

(Semester II)



Gujarat Council of Educational Research and Training
Gandhinagar

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ગુજરાત શૈક્ષણિક સંશોધન અને તાલીમ પરિષદ, ગાંધીનગરના પત્ર-ક્રમાંક
જીસીઈઆરટી / અભ્યાસક્રમ / 2013 / 20335 તા. 10-03-2013 થી મંજૂર

Science and Technology

Standard 8

(Semester II)

PLEDGE

India is my country.
All Indians are my brothers and sisters.
I love my country and I am proud of its rich and varied heritage.
I shall always strive to be worthy of it.
I shall respect my parents, teachers and all my elders and treat everyone with courtesy.
I pledge my devotion to my country and its people.
My happiness lies in their well-being and prosperity.

Price : ₹ 29.00

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PREFACE

The National Curriculum Framework (NCF) 2005 and the Right to Education Act (RTE) 2009 recommends connecting knowledge that is provided in school to the life outside the school. This principle marks a departure from the legacy of book is learning which continues to shape our education system and is creating removes a huge gap between the school, home and community.

The syllabi and textbook developed on the basis of above principle signify an attempt to implement it with a considerable change in the textbooks, teaching learning methods, approaches etc. Such textbooks will provide the scope to the students to learn individually, in pair, in group and as a whole class and privide self learning, improve the application and consolidation abilities of the children. In such a scenario, the teacher will be just an initiator, facilitator and guide and will create learner dominant classes.

During the process of designing and developing the textbooks, the core group personnel coordinators, writers and reviewers got a lot of inspiration and motivation from the Chief secretary of Elementary Education.

Also, the guidance from IGNUS-erg and co-operation of UNICEF was easily and continuously available to the group during the entire process of developing the textbooks. After implementing the textbooks as a part of the pilot study, due efforts were done to make it faultless. Now, it is in the hands of the users and beneficiaries.

GCERT welcomes constructive and creative commnets and suggestions which will be useful to undertake further revision and refinement.

M. T. Shah
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FUNDAMENTAL DUTIES

It shall be the duty of every citizen of India :

(a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;

(f) to value and preserve the rich heritage or our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

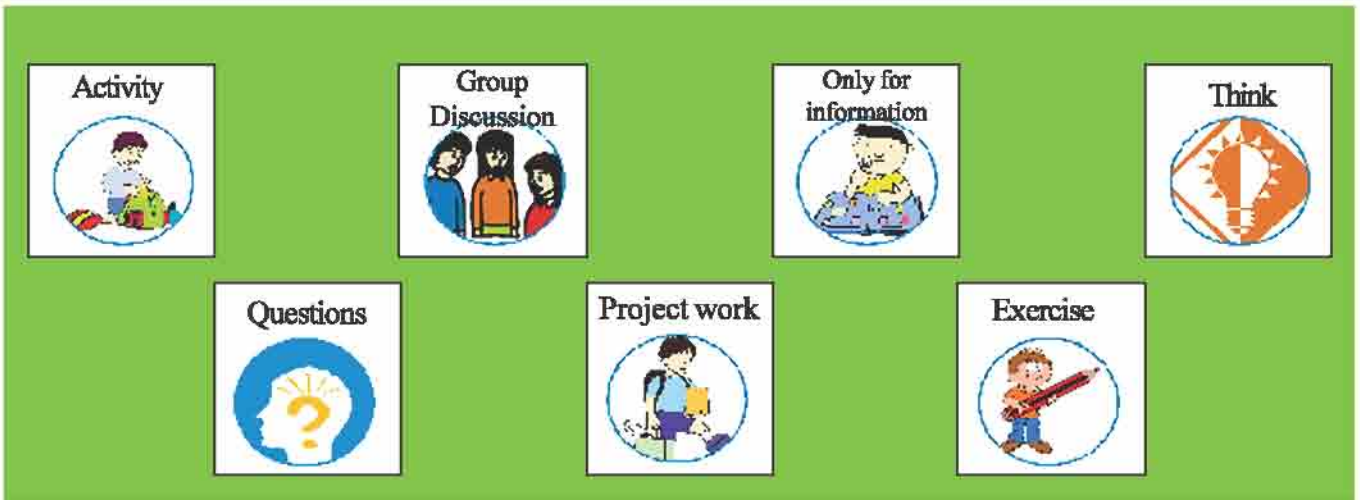
(i) to safeguard public property and to abjure violence;

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement.

*Constitution of India : Section 51-C

INDEX

Identification of signs used in this textbook.



1 Preparation of Gases

There are some gases in air, such as Oxygen, Carbon dioxide, Hydrogen, Nitrogen etc. These gases are very important for living beings.

Let us know the methods for the preparation of the gases such as Oxygen, Carbon dioxide, Hydrogen, and Nitrogen and their properties as well as their uses.

Preparation of Oxygen gas.

What is required? a test tube, a candle, an incense stick, a test tube holder (clamp), Potassium permanganate ($KMnO_4$), a match box.

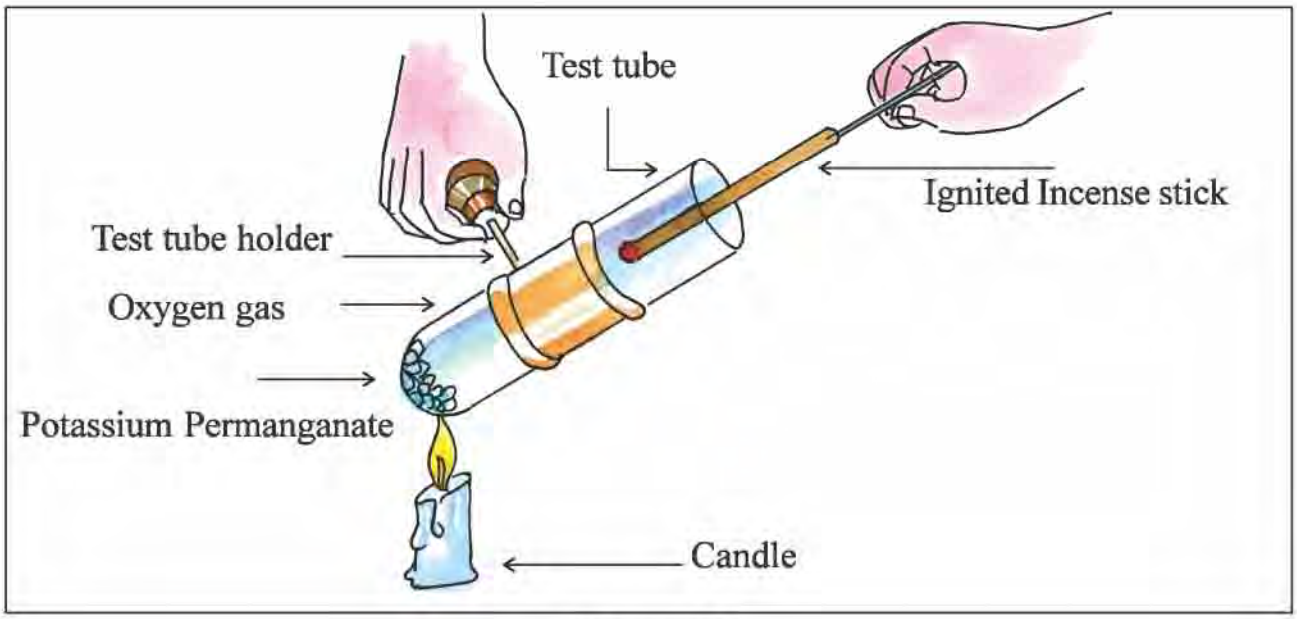


Figure 1.1

What to do?

- Take a test tube.
- Hold it with a test tube holder.
- Put Potassium Permanganate particles in the test tube.
- As shown in the figure: 1.1, heat the test tube with the flame of a candle.
- When Potassium Permanganate gets heated up in the test tube, there will be some crackling sound.

- After that , as shown in the figure, hold injected an incense stick in the test tube and keep it inside the test tube for some time and then make your observation and note it down.

Have a discussion with your teacher to find out the reason why it happens like this and then make note of it .

Chemical Reaction :

$$2KMnO_4 \xrightarrow{\text{Heating } (\Delta)} K_2MnO_4 + MnO_2 + O_2\uparrow$$

Potassium Permanganate — decomposition — Potassium Mangnate + Manganese dioxide + Oxygen gas

Physical Properties :

- Oxygen is colourless, odourless and tasteless.
- It is sparingly soluble in water.
- It helps in combustion.

Chemical Properties :

- Oxygen reacts with metal and forms out metal oxide.

$$2\,Mg + O_2 \longrightarrow 2MgO$$

Magnesium + Oxygen → Magnesium Oxide

- Oxides of metal react with water and form hydroxides of metal.

$$MgO + 2H_2O \longrightarrow Mg(OH)_2$$

Magnesium oxide + Water → Magnesium hydroxide

- Test the hydroxides of metals with litmus papers and decide whether they are acidic or basic. Make necessary note of it.

- Oxygen reacts with non-metals and gives oxides of non-metals.

$$S + O_2 \longrightarrow SO_2$$

Sulphur Oxygen Sulphur dioxide gas

- Oxides of non-metals react with water and give acids.

$$SO_2 + H_2O \longrightarrow H_2SO_3$$

Sulphur dioxide Water Sulphurous acid

Test Sulphurous acid with litmus paper and determine that it is acidic. Make a necessary note of it.

Uses of Oxygen :

- Every living being makes use of Oxygen in respiration. It dissolves in water hence creatures living under water also make use of dissolved Oxygen for respiration.
- Hand pumps of special types are made for the patients suffering from the diseases like Pneumonia and Lung diseases. In this hand pump, there is an upper valve, when it is pressed a reaction takes place between Sodium peroxide (Na_2O_2) and water forming oxygen. Using the released Oxygen, the patient gets instant relief.
- Oxygen is used to produce flames having high temperature, like Oxyhydrogen flame (2800^0 C) and Oxyacetylene flame (3100^0 – 3300^0 C). With the help of these flames, metals can be cut or metals can be joined together.
- Oxygen is very necessary in the production of Chlorine, Nitric acid, Sulphuric acid etc.

There are other two methods, as given below, to prepare Oxygen:

1. The mixture of Potassium Chlorate ($KClO_3$) and Manganese dioxide (MnO_2) in the proportion 5:1 is heated and Oxygen is obtained.

2. Slowly add water in Sodium peroxide (Na_2O_2) and Oxygen is released.

Preparation of Carbon dioxide gas.

What is required? a transparent glass bottle, a candle, an incense stick, marble pieces or marble powder, Hydrochloric acid

What to do ?

- Take a transparent glass bottle.
- Add pieces or powder of marble in it.
- Add a little hydrochloric acid in the bottle.
- Place and injected ignited stick in the bottle.
- Observe it for some time and note down your observation.

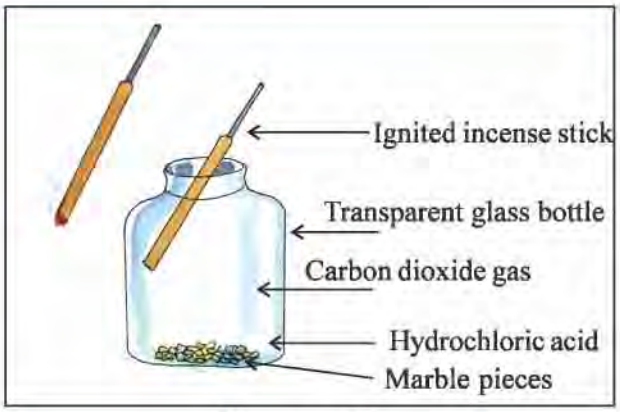


Figure 1.2

Have a discussion with your teacher about the reason why it happens like this and then make a note of it.

Chemical Reaction :

$CaCO_3$	+	$2HCl$	$\longrightarrow$	$CaCl_2$	+	H_2O	+	$CO_2\uparrow$
Calcium Carbonate		Hydrochloric acid		Calcium Chloride		Water		Carbon dioxide gas

This gas is known as Carbon dioxide gas

Physical Properties:

- It is colourless, odourless and tasteless.
- It is sparingly soluble in water.
- It is heavier than other gases .

Chemical Properties :

What is required? Slaked lime, water, a bowl / dish and a straw.

What to do?

- Take water in the bowl / dish.
- Dissolve slaked lime in this water and allow it to settle down.
- Remove the top layer of water (decanted water) from the bowl / dish and let the precipitates of lime remain in the bowl / dish.
- Observe and note the colour of the decanted water.

Figure 1.3

Blow some air with a straw in the decanted lime water. Observe the colour obtained and then make a note of it.

Why does the colour change in decanted lime water? Write down a note with help your teacher.

Chemical Reaction: **By the reaction of Calcium hydroxide with Carbon dioxide, Calcium carbonate and water are obtained.**

$$Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$$

Calcium Hydroxide	Carbon dioxide	Calcium Carbonate	Water

- Now blow air with the help of the straw on the obtained milky white solution. Observe the colour obtained and make note of it.

- Why does it happen like this? Discuss with your teacher and make a note.

Chemical Reaction: **On reacting Carbon dioxide with Calcium Carbonate and water, it produces calcium bicarbonate.**

$$CaCO_3 + H_2O + CO_2 \longrightarrow Ca(HCO_3)_2$$

Calcium Carbonate	Water	Carbon dioxide	Calcium bicarbonate

- On heating Carbon dioxide with water at high pressure, Carbonic acid is obtained.

$$CO_2 + H_2O \longrightarrow H_2CO_3$$

Carbon dioxide	water	Carbonic acid

- With the process of reaction of Carbon dioxide with metal oxides, metal carbonates are obtained.

$$MgO + CO_2 \longrightarrow MgCO_3$$

Magnesium Oxide	Carbon dioxide	Magnesium carbonate

- With the process of reaction of Carbon dioxide with sodium hydroxide, water soluble sodium carbonate (washing soda) and sodium bicarbonate (baking soda) are produced.

$$2NaOH + CO_2 \longrightarrow Na_2CO_3 + H_2O$$

Sodium hydroxide	Carbon dioxide	Sodium carbonate	Water

$$Na_2CO_3 + H_2O + CO_2 \longrightarrow 2NaHCO_3$$

Sodium Carbonate	water	carbon Dioxide	Sodium bicarbonate

Uses of Carbon Dioxide :

- It is used in photosynthesis by vegetation.
- It is used for extinguishing fire.
- It is used in bringing fermentation for idli, dhosa etc.
- It is used for the preparation of cold drinks like soda water.
- Solid Carbon dioxide is known as 'Dry Ice'. It is used as a cooling agent.
- It is used for the preparation of washing soda (Sodium carbonate).
- It is used for the preparation of baking soda (Sodium bicarbonate) useful in cooking.

- Carbon dioxide gas cylinders. Used as fire extinguisher are visible in public places like petrol pump, big show rooms, cinema theaters, CNG pumps and conference halls etc.
- Fire extinguisher an iron cylinder, is filled with aqueous solution of sodium carbonate or sodium bicarbonate. In the upper part, there is a glass bottle. It is filled with concentrated sulphuric acid or hydrochloric acid. The bottle is attached to a metal ring and its upper end is kept outside .

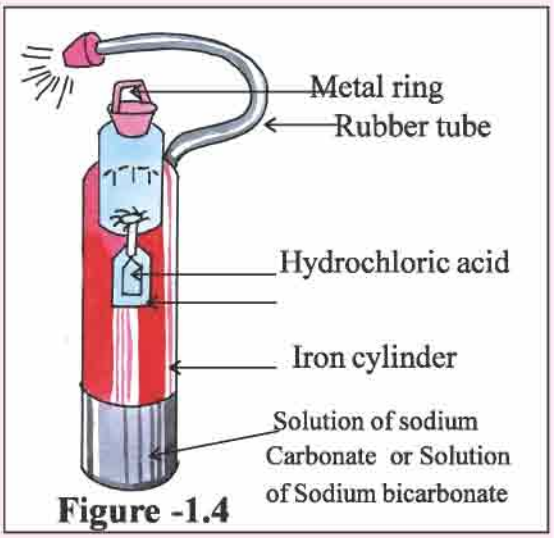


Figure -1.4

The gas comes out towards the upper portion through a rubber tube. When there is a fire, the upper ring is banged so it breaks the glass bottle and the acid contained in it mixes with the solution. Thus acid reacts with sodium carbonate or sodium bicarbonate and carbon dioxide gas is produced.The gas comes out with force and helps in extinguishing the fire.

- In the preparation of carbon dioxide , instead of Calcium carbonate even sodium carbonate or sodium bicarbonate also can be utilized.

Preparation of Hydrogen gas:

What is required? a test tube, a match box, Magnesium strip or pieces of iron nails hydrochloric acid

What to do?

- Take a test tube.
- Take a magnesium strip or pieces of iron nails in it.
- Add some hydrochloric acid on the strip of magnesium or the pieces of iron nails.

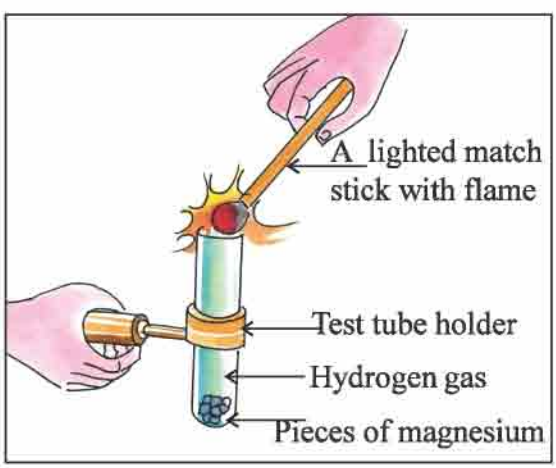


Figure 1.5

- After that, observe the test tube and make note of it.

- As shown in the figure, bring a lighted match stick just above mouth of the test tube, observe it and make note of the observation.

Discuss with your teacher about the reason why it happens like this and make note of it.

Chemical Reaction :

$$\underset{\text{Magnesium}}{Mg} + \underset{\text{Hydrochloric acid}}{2HCl} \longrightarrow \underset{\text{Magnesium}}{MgCl_2} + \underset{\text{Hydrogen gas}}{H_2\uparrow}$$

$$\underset{\text{Iron}}{Fe} + \underset{\text{Hydrochloric acid}}{2HCl} \longrightarrow \underset{\text{Iron chloride}}{FeCl_2} + \underset{\text{Hydrogen gas}}{H_2\uparrow}$$

Physical Properties :

- It is colourless, odourless, and tasteless.
- It is lighter than other gases.
- It is inflammable.(combustible)

Chemical Properties :

- Some of the reactive metals like sodium, potassium, calcium etc. react with hydrogen and gives hydrides of the metals.

$$2\,Na + H_2 \longrightarrow 2\,NaH$$

Sodium Hydrogen Sodium Hydride

- With the process of reaction of non metals with hydrogen, hydroxide of non metals are produced.

$$Cl_2 + H_2 \longrightarrow 2\,HCl$$

Chlorine Hydrogen Hydrochloric acid

Uses of Hydrogen :

- Hydrogen gas is used as fuel and also it is used to obtain electricity.
- It is lighter than air, hence this gas is used in the balloons which are used for the study of the atmosphere above air level.

Preparation of Nitrogen gas :

What is required? a transparent glass bottle, a tripod, a spirit lamp, wire gauze ammonium-chloride (NH_4Cl), sodium nitrite ($NaNO_2$).

What to do?

- As shown in the figure:1.6, take ammonium chloride and sodium nitrite in equal proportion in a glass bottle.
- After that, arrange the apparatus as shown in the figure and heat the bottle with spirit lamp. After some time the bubbles of gas will be visible in the bottle. Here the produced gas is Nitrogen gas.

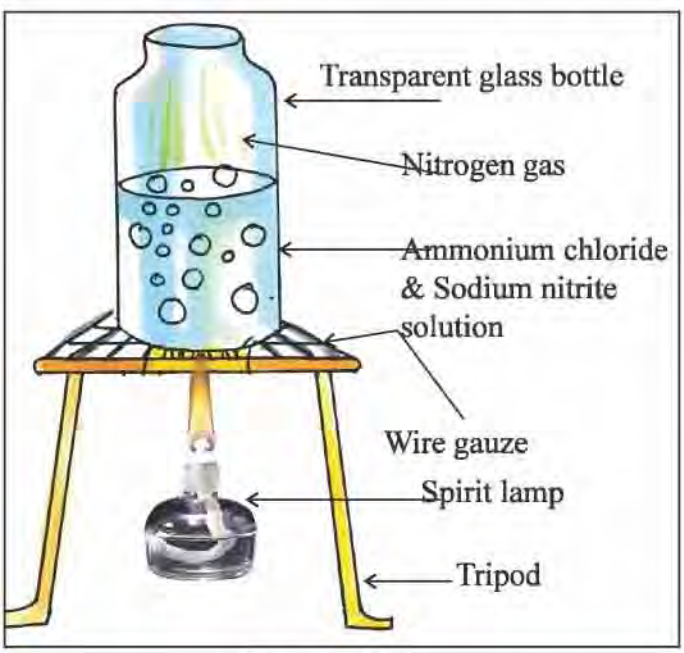


Figure 1.6

Nitrogen gas cannot be easily examined. Examining the compounds of nitrogen, its presence can be known.

Chemical Reaction :

$$NH_4Cl + NaNO_2 \longrightarrow NH_4NO_2 + NaCl$$

Ammonium Chloride — Sodium nitrite — Ammonium nitrite — Sodium chloride

$$NH_4NO_2 \xrightarrow{\Delta} N_2\uparrow + 2\,H_2O$$

Ammonium nitrite — Nitrogen gas — water

Physical Properties :

- It is colourless, odourless, and tasteless.
- It is neither combustible nor a support of combustion.

Chemical Properties :

- It combines with other elements in suitable circumstances and makes compounds.
- Nitrogen combines with Oxygen and forms nitric oxide. Combining with more Oxygen it produces nitrogen dioxide.

$$N_2 + O_2 \longrightarrow 2\,NO$$

Nitrogen — Oxygen — Nitric oxide

$$2\,NO + O_2 \longrightarrow 2\,NO_2$$

Nitric oxide — Oxygen — Nitrogen dioxide

Nitrogen dioxide dissolves in water and gives Nitric acid.

Uses of Nitrogen :

- It is used to prepare chemicals like Ammonia, nitric acid, calcium Cyanamide, urea etc.
- It is used to prepare inert atmosphere e.g. On the inflammable liquid, instead of air, nitrogen gas should be filled so that there is less possibility of fire.
- It decreases reactivity of oxygen (O_2) in air.
- In films, dramas, to show unnatural smoke or clouds, nitrogen gas is used.

- The roots of the plants like peas make use of the nitrogen from the air and produce food containing plenty of protein.
- It is filled in the tubes of the tyres of some of the vehicles.

Q.1 Mark the correct statement with the sign (√) and the wrong statement with the sign (x) from the given following statements :

(1) Oxygen gas is necessary for respiration.

(2) Carbon dioxide gas is lighter than air.

(3) Hydrogen gas burns quickly with explosion.

(4) Nitrogen gas increases the reactivity of Oxygen gas.

Q.2 Write down the uses of the following :

(1) Carbon dioxide gas.

(2) Nitrogen gas.

Q.3 Match the following correctly :

Group A	Group B
(1) Oxygen gas	(1) Inert gas
(2) Carbon dioxide gas	(2) Support of combustion
(3) Hydrogen gas	(3) Extinguishing Fire gas
	(4) Combustible gas

2 Molecular Structure

Every substance of the universe is composed of certain basic substances, we know such basic substances as elements.

What is required? Sulphur, Carbon. Magnifying glass.

What to do ?

- Crush both the substances into fine particles or powdered form. Take some powder separatly and observe it under a magnifying glass.

- The particles visible here are composed of very minute particles. This very minute particle is known as an atom. Atoms are so minute that they are not visible even by a microscope.
- The group of similar atoms is called element. The fundamental component of an element is atom.
- The circular central portion of the atom is known as Nucleus. It is also known as centre of the atom.There are two types of particles namely Proton and Neutron in the centre of an atom, which is called Nucleus.
- The particles known as electrons move around the nucleus in a definite circular path. This circular path is known as an orbit.
- Protons are electrically positively charged particles. Electrons are electrically negatively charged particles, but neutrons are electrically neutral i.e. they do not have any charge.

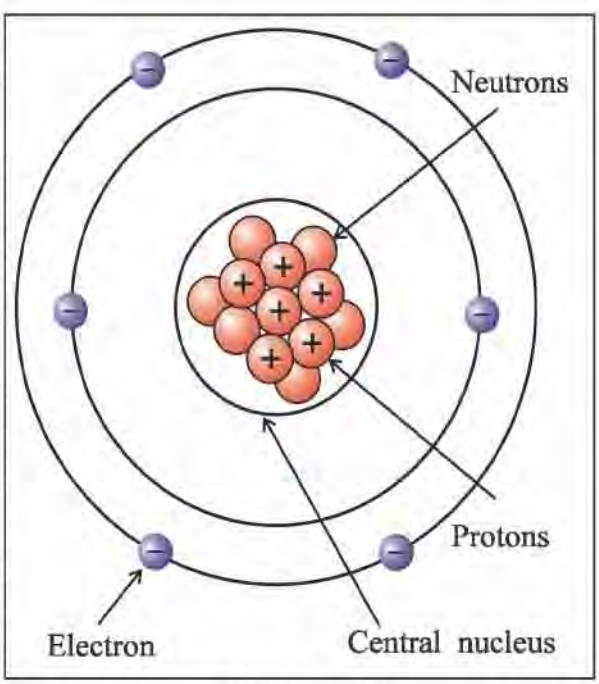


Figure 2.1

Compare the two pictures given here and discuss with your teacher :

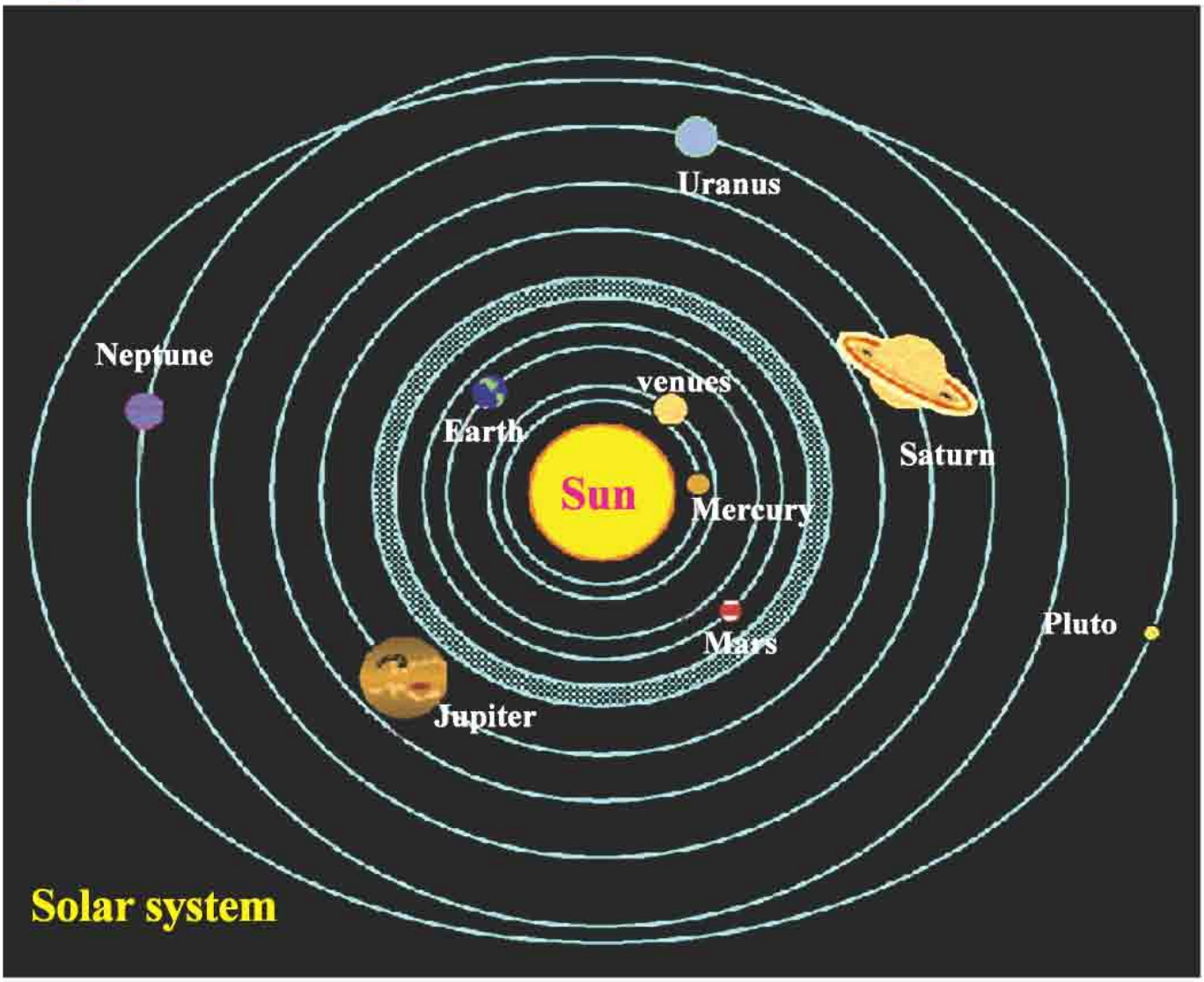
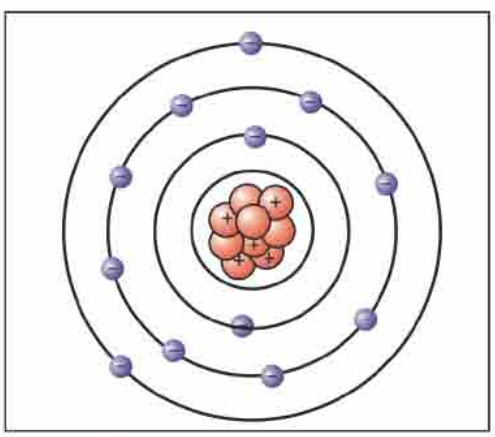


Figure 2.2

A new definition of a planet is given by International Astronomical Union (IAU) in the year 2006. This definition does not fit for Pluto hence it is no more considered as a planet. But it is considered as a dwarf planet.



Molecular structure **Figure 2.3**

What similarity do you see between figures on page 14?

What is at the centre of both the figures?

What is it roating around the centre in both the figures?

Discuss with your teacher about the differences visible in both the figures.

- Protons and neutrons are relatively very heavy particles whereas electrons are vern lighte in their comparison.
- Due to the attraction of the positively charged protons in the nucleus, the negatively charged electrons rotate around the nucleus in a circular path.

The electric current flows in the wire due to the flow of the electrons present in the wire conductor.

- In an atom, the number of protons and electrons are equal. Since the positive charges and the negative charges are equal, an atom is neutral with respect to the electrical charge.
- The number of protons or electrons present in an atom of an element is called 'Atomic Number'.

Thus,

The Atomic Number of an Element =
The number of Protons present in it = The number of Electrons present in it.

Fill the blanks in the following table :

Name of the Element	Symbol	Atomic Number	No of Protons	Electrons
Hydrogen	H	1	1	1
Helium	He	2	2	2
Lithium	Li	3	3	3
Beryllium	Be	4	4	
Boron	B	5		5
Carbon	C		6	6
Nitrogen	N	7	7	
Oxygen	O		8	8
Fluorine	F	9	9	
Neon	Ne	10		
Sodium	Na		11	11
Magnesium	Mg	12	12	
Aluminium	Al		13	13
Silicon	Si	14	14	
Phosphorus	P	15		15
Sulphur	S		16	16
Chlorine	Cl			17
Argon	Ar		18	
Potassium	K	19		
Calcium	Ca	20	20	20

Electrons are arranged in specific energy level and in a specific way around the nucleus. This arrangement is known as 'Electron Configuration'.

- The closest energy level to the nucleus is called the first energy level.
- Beyond the first energy level, gradually the second, third and the fourth energy levels come in that order.
- **In the first energy level maximum 2, in the second energy level maximum 8, in the third energy level maximum 18 and in the fourth energy level maximum 32 electrons can be accommodated.**

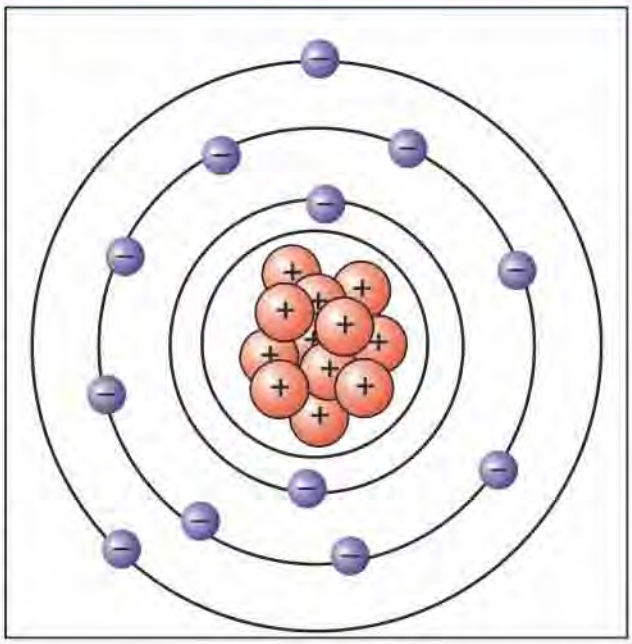


Figure 2.4

To know how many electrons can be accommodated in any energy level , the formula $2n^2$ is very helpful , where 'n' stands for the serial number of the energy level.

Doing some calculation, you yourself can verify it :

Name of the Element	Symbol	Atomic Number	Electron Configuration
Hydrogen	H	1	(1)
Helium	He	2	(2)
Lithium	Li	3	(2, 1)
Beryllium	Be	4	(2, 2)
Boron	B	5	(2, 3)
Carbon	C	6	(2,4)

Name of the Element	Symbol	Atomic Number	Electron Configuration
Nitrogen	N	7	(2, 5)
Oxygen	O	8	(2, 6)
Fluorine	F	9	(2, 7)
Neon	Ne	10	(2, 8)
Sodium	Na	11	(2, 8, 1)
Magnesium	Mg	12	(2, 8, 2)
Aluminium	Al	13	(2, 8, 3)
Silicon	Si	14	(2, 8, 4)
Phosphorus	P	15	(2, 8, 5)
Sulphur	S	16	(2, 8, 6)
Chlorine	Cl	17	(2, 8, 7)
Argon	Ar	18	(2, 8, 8)

Till the outer energy level (the outer most energy level) of the atom of any element is not completely filled with electrons, the atom is active and has the tendency to combine with another atom.

eg. The atomic number of sodium (Na) is 11, therefore electron configuration is (2, 8, 1). Its outer most energy level has only one electron. To complete the energy level, it has a tendency to lose one electron. Due to the loss of an electron, with regards to the nuclear charge, it does not remain neutral but it becomes positively charged. Therefore, it is called positive ion of sodium (Na^+) .

$$\underset{\substack{(2,8,1)\\ \text{Sodium Atom}}}{Na} \longrightarrow \underset{\substack{(2,8)\\ \text{Sodium positive ion}}}{Na^+} + \underset{\text{1 free electron}}{e^-}$$

The atomic number of Chlorine is 17, therefore the electron configuration is (2, 8, 7). Its outer most energy level has seven electrons. To complete the energy level, it has a tendency to gain one electron. Due to the gain of one electron with regards to the nuclear charge, it does not remain neutral, but it becomes negatively charged. Therefore it is called negative ion of Chlorine (Cl^-).

Cl	+	e^-	⟶	Cl^-
(2, 8, 7)				(2, 8, 8)
Atom of Chlorine		1 free electron		Nagative Ion of Chlorine

Oppositely charged ions like negative or positive charge are attracted towards each other, combine make a molecule of sodium chloride (salt).

Na^+	+	Cl^-	⟶	$NaCl$
Positive Ion of Sodium		Negative Ion of Chlorine		Molecule of Sodium Chloride.

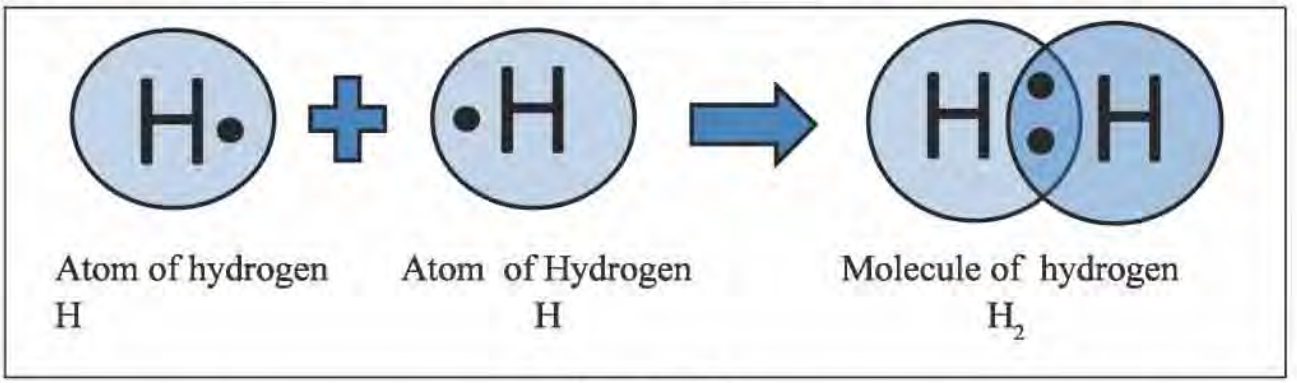
The elements which have 1, 2 or 3 electrons in the outer most energy level easily lose 1, 2 or 3 electrons and make positive ions having the valence +1, +2 or +3 .

eg. Na^+, Mg^{2+}, Al^{3+}

The elements which have 7, 6 or 5 electrons in the outer most energy level gain easily 1, 2 or 3 electrons and make negative ions having the valence - 1, -2 or -3 .

eg. Cl^-, O^{2-}

Sometimes there is no possibility of gaining or losing, two atoms share the electrons present in their outer most present energy level and combine with each other.



Atom of hydrogen	Atom of Hydrogen	Molecule of hydrogen
H	H	H_2

Figure 2.5

Here both the Hydrogen atoms share one electron each and complete the energy level having two electrons and make one molecule of Hydrogen (H_2).

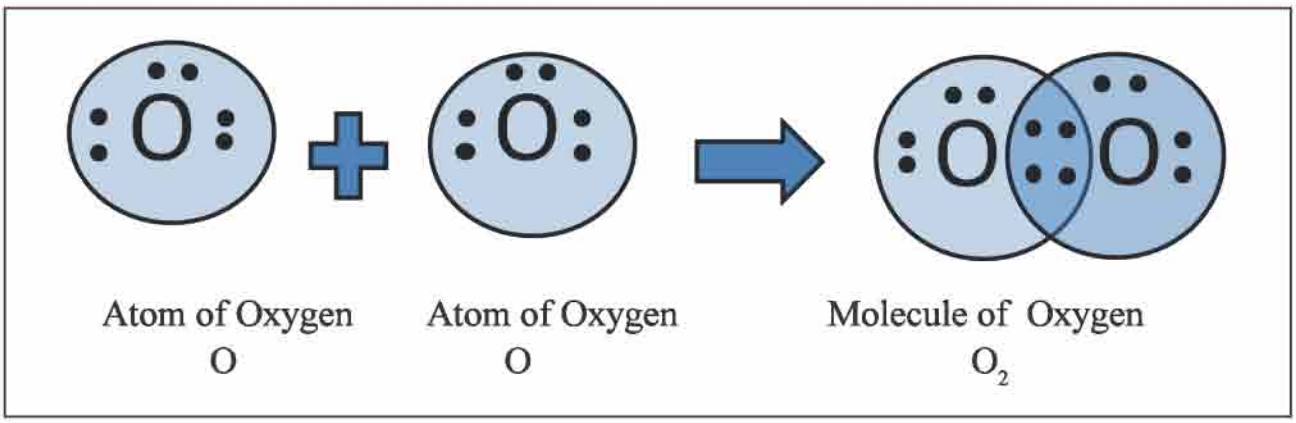


Figure 2.6

Both the Oxygen atoms share two electrons each and complete the energy level having 8 electrons and make Oxygen molecule (O_2) .

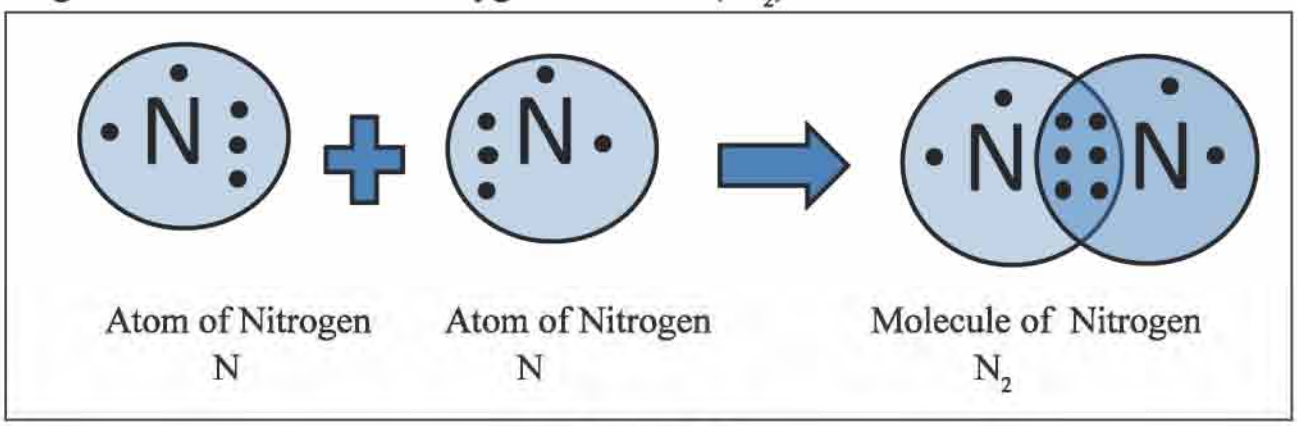


Figure 2.7

Here both the Nitrogen atoms share three electrons each and complete the energy level having 8 electrons and form Nitrogen Molecule (N_2) .

Q.1 Select the correct choice and write it in [ ] :

(1) Which particles are not in the nucleus? [ ]

(a) Proton (b) Neutron (c) Electron (d) none of the three.

(2) Which particles are moving around the nucleus ? [ ]

(a) Proton (b) Neutron (c) Electron (d) None of the three.

(3) Which particles do not possess any charge ?

(a) Proton (b) Neutron (c) Electron (d) None of the three

(4) How many maximum electrons can be accommodated in the third energy level ?

(a) 2 (b) 8 (3) 18 (4) 32

Q.2 Give two points of the differences :

(1) Molecule – Atom

(2) Atom – Ion

Q.3 Explain :

(1) Atom is neutral with respect to the electrical charge.

(2) Basic unit for an element is atom, whereas the basic unit for compound is molecule.

3 Metal - Non Metal

You must be familiar with substances like iron, aluminium, coal, copper, brass Bellow a list of such substances is given. With regards to the external appearance does it have any lustre or not? Make note of this.

Name of the substance	Does it have lustre ?
Iron	
Coal	
Sulphur	
Aluminium	
Copper	
A rod of Carbon	

In the above table, the substances which have lustre on them are metal elements. Other substances are non metals. To have a lustre is a common physical property of metals.

What is required? an iron nail, coal, a piece of aluminium wire, pencil tip, a carbon rod, and a hammer.

What to do ?

- Give a few blows with the hammer on the iron nail. (See that you do not get hurt your hand).
- In the same manner, give a few blows with the hammer on coal, a piece of aluminium wire, pencil tip and a carbon rod one by one.
- What did you see? Note down your observation.

Figure -3.1

No.	Name of the substance	What happens by hammering it with a hammer ? (Flat / pieces)
1	Iron nail	
2	Coal	
3	Aluminium wire	
4	A lead of a pencil	
5	Carbon rod	

You must have seen that on hammering iron nail or aluminium wire with a hammer, they become flat. But the non metals like coal, lead of a pencil and carbon rod turn into pieces on hammering.

Physical Properties of Metal :

- They have a shiny and bright surface with a metallic luster.
- They can be hammered into a thin strip (malleability).
- Metals can be drawn into thin wires.
- On striking, it produces ringing sound.
- They are good conductors of heat and electricity.
- melting points are very high.
- Metals are usually solids, Exception mercury is the only metal found in liquid forms.
- Generally metals are heavy, yet sodium, potassium, magnesium and aluminium are light metals.

Physical Properties of Non Metals :

- They do not have metallic luster.
- On hemmerring, they turn into pieces.
- They do not produce ringing sound while striking.
- They cannot be drawn into wires.

- Some non metallic elements the property of allotropes. Such as possess.
  Carbon : Coal, diamond, graphite.
  Phosphorus : Black phosphorus, yellow phosphorus, red phosphorus.

Soft metals like Sodium and Potassium can be cut with a knife.

Properties of metals are different from those of non metals. For this, the electron configuration of the atom of an element is responsible.

- In the electron configuration of the atom of an element of metal, in the outer most energy level either one, two or three electrons are there. Due to the loss of electron, it possesses the nature of becoming positive ion.
- In the electron configuration of the atom of an element of non metal, in the outer most energy level either four, five, six or seven electrons are there. Due to the gain of electron, it possesses the nature of becoming negative ion.
- The process of losing electron by an atom of a metal or gaining electron by an atom of non metal is called ionization. eg. the electron configuration of sodium is (2, 8, 1). Its outer most energy level has only one electron. Hence it has a nature of losing an electron and becoming positive ion of sodium (Na^+).
  The electron configuration of Chlorine is (2, 8, 7). Its outer most energy level has seven electrons. Hence it has a nature of gaining an electron and becoming negative ion of Chlorine (Cl^-).

Chemical Properties Metals :

What is required? a strip of magnesium, a candle, ash, a match box, a pair of tongs, a flask

What to do?

- Hold the magnesium strip with the help of a pair of tongs over flame of the burning candle and heat it.

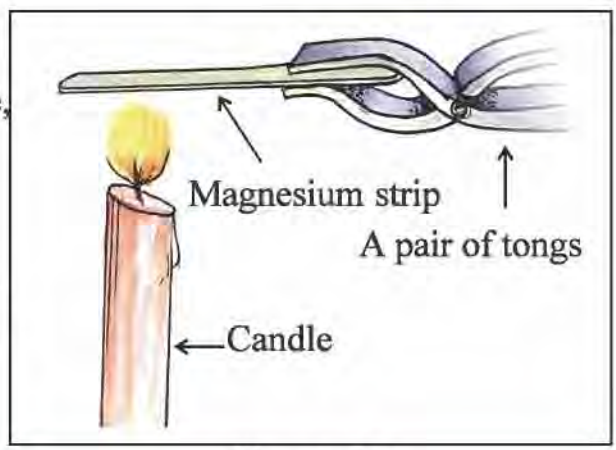


Figure 3.2

- Magnesium strip starts burning with bright flame. (If the magnesium strip does not start burning,cut the strip straight and then keep it over the flame of the candle).
- Collect the ashes of the burnt magnesium strip in a flask.
- Pour some water in the flask and then dissolve the ash in it.
- Test the solution obtained by dissolving the ash with litmus papers.
- What did you see? Note it down here.

(1) Reactions of Metals with Oxygen :

With the reactions of metals with Oxygen, metal oxides are obtained.

eg. $2Mg + O_2 \longrightarrow 2MgO$

Magnesium + Oxygen → Magnesium Oxide

$4Na + O_2 \longrightarrow 2Na_2O$

Sodium + Oxygen → Sodium Oxide

$4Al + 3O_2 \longrightarrow 2Al_2O_3$

Aluminium + Oxygen → Aluminium Oxide

You must have seen rusted iron. When iron reacts with Oxygen from air, it gets rusted.

$4\,Fe + 3O_2 \longrightarrow 2Fe_2O_3$

Iron + Oxygen → Iron Oxide

(2) Reactions of Metals with Chlorine :

Metals react with Chlorine and give metal Chlorides.

eg. $2Na + Cl_2 \longrightarrow 2\,NaCl$

Sodium + Chlorine → Sodium Chloride

$$\underset{\text{Magnesium}}{Mg} + \underset{\text{Chlorine}}{Cl_2} \longrightarrow \underset{\text{Magnesium Chloride}}{MgCl_2}$$

$$\underset{\text{Calcium}}{Ca} + \underset{\text{Chlorine}}{Cl_2} \longrightarrow \underset{\text{Calcium Chloride}}{CaCl_2}$$

$$\underset{\text{Aluminium}}{2Al} + \underset{\text{Chlorine}}{3Cl_2} \longrightarrow \underset{\text{Aluminium Chloride}}{2\,AlCl_3}$$

(3) Reactions of Metals with Hydrogen :

Some active metals react with hydrogen and make hydride of metal.

$$\underset{\text{Sodium}}{2Na} + \underset{\text{Hydrogen}}{H_2} \longrightarrow \underset{\text{Sodium Hydride}}{2NaH}$$

(4) Reaction of Metal with Acid :

Most of the metals react with acids. During the reaction, Hydrogen from acid is liberated as gas.

If a magnesium strip is dipped in acid, some bubbles come out and it is hydrogen gas.

$$\underset{\text{Magnesium}}{Mg} + \underset{\text{Hydrochloric acid}}{2HCl} \longrightarrow \underset{\text{Manesium Chloride}}{MgCl_2} + \underset{\text{Hydrogen}}{H_2}$$

$$\underset{\text{Aluminium}}{2\,Al} + \underset{\text{Hydrochloric acid}}{6HCl} \longrightarrow \underset{\text{Aluminium Chloride}}{2AlCl_3} + \underset{\text{Hydrogen}}{3H_2}$$

Chemical Properties of Non Metals :

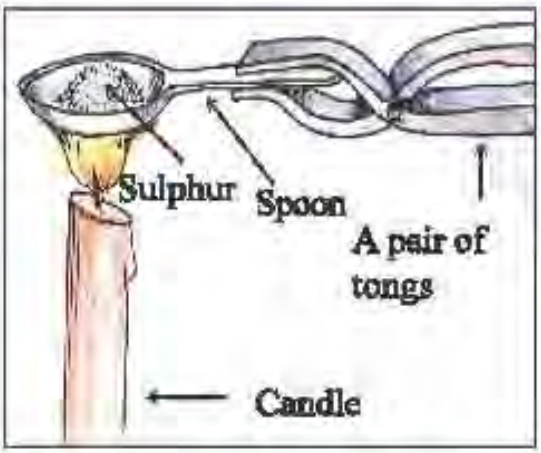
Chlorine reacts with oxygen

What is required? Sulphur, a spoon, a candle, a match box, a transparent glass, a lid, pair of tongs.

What to do?

- Take some sulphur powder in a spoon.
- As shown in the figure 3.2, keep the spoon over the flame of the candle and heat it.

- Once sulphur starts burning quickly, put the spoon in the transparent glass and cover it with a lid so that the smoke does not go out.
- Remove the lid a little and add some water in the glass and then cover the glass with the lid again.
- Shake the glass a little.
- Test this solution with litmus papers.
- What did you see? Make a note of that.



(1) Reactions of Non Metals with Oxygen :

With the reactions of non metals with Oxygen, Oxides of non metal are formed.

$$\underset{\text{Sulphur}}{S} + \underset{\text{Oxygen}}{O_2} \longrightarrow \underset{\text{Sulphur dioxide}}{SO_2}$$

In the above activity sulphur burns in the presence of Oxygen from air and the smoke produced is sulphur dioxide.

$$\underset{\text{Carbon}}{C} + \underset{\text{Oxygen}}{O_2} \longrightarrow \underset{\text{Carbon dioxide}}{CO_2}$$

$$\underset{\text{Nitrogen}}{2N_2} + \underset{\text{Oxygen}}{5O_2} \longrightarrow \underset{\text{Nitrogen Pentoxide}}{2\,N_2O_5}$$

$$\underset{\text{Phosphurus}}{P_4} + \underset{\text{Oxygen}}{5O_2} \longrightarrow \underset{\text{Phosphurus Pentoxide}}{2\,P_2O_5}$$

(2) Reactions of Non Metals with Chlorine :

With the reactions of non metals with chlorine, chlorides of non metal are formed.

$$\underset{\text{Phosphurus}}{P_4} + \underset{\text{Chlorine}}{10Cl_2} \longrightarrow \underset{\text{Phosphorus Penta chloride}}{4PCl_5}$$

(3) Reactions of Non Metals with Hydrogen :

With the reactions of non metals with hydrogen, hydrides of non metal are formed.

$$\underset{\text{Nitrogen}}{N_2} + \underset{\text{Hydrogen}}{3H_2} \longrightarrow \underset{\text{Ammonia}}{2NH_3}$$

(4) Reaction of Non Metal with Acid :

There is no effect of acid on all the non metals.

Uses of Metals :

Metals are useful in many ways. Discuss with your friends and prepare a useful list of the uses of metals.

No.	Name of Metal	Where it is used?
1.	Iron	
2.	Copper	
3.	Gold	
4.	Silver	
5.	Aluminium	
6.	Sodium	
7.	Potassium	
8.	Mercury	

Uses of Non Metals :

Non metals or its compounds are used in different forms.

- Allotropes of Carbon are used in different forms, such as graphite is used in the preparation of pencils, as electrode poles, coal is used as fuel and diamond is used in preparation of jewellery and ornaments. Diamond is also used as a glass cutter.
- Red phosphorus is used to prepare match sticks, crackers explosives and even insecticides.
- Compounds of phosphorus are used such as
  - Zinc phosphide - to prepare drugs to kill rats.
  - Aluminium phosphide - for preserving grains
  - Phosphurus pentoxide - as a strong absorbent of humidity.
- Uses of Sulphur
  - To prepare sulphuric acid.
  - In the gun powder for preparing crackers.
  - For the preparation of explosives.
  - For the preparation of insecticides and fertilizers.
  - For the preparation of cream for skin diseases and disinfectants.
  - For vulcanization of rubber.
- You will learn later on about the uses of the non metals which are in the form of gas like Oxygen, Hydrogen and Nitrogen.

Ordinary Alloys and their uses :

More than one metals are heated together till they turn into a homogeneous mixture. This mixture is called alloy. Some of the physical properties of the basic metals in the combination of an alloy are changed.

- Copper is soft hence a metal like tin is mixed with it and hard as well as corrosion resistant alloy like bronze is obtained.
- The ornaments made from pure gold are such that if pressure is exerted on them, their shape changes. Therefore eleven parts of gold are mixed with one part of other metals like silver, copper or zinc and gold of 22 carat is prepared which is suitable for making ornaments.

- Chromium and Nickel metals are mixed with Iron and corrosion resistant alloy called stainless steel is obtained.
- Nickel and Titanium metals are mixed together and an alloy Nitinol is prepared. It possesses a wonderful unique property of 'Shape Memory'. Different uses of it are also found.

Simple Compounds :

- You have all ready learnt about compounds in standard 7. The chemical formula shows the elements and their number present in it.
- For example, the chemical formula for water is H_2O.
- Here H suggests the atom of Hydrogen and O suggests the atom of Oxygen. The subscript of H '2' suggests that there are 2 atoms. But there is nothing written in the subscript of O means there is only one atom of Oxygen.
- The molecular formula for carbon dioxide is CO_2. C suggests one atom of carbon but O and the digit 2 of the subscript suggest that there are two atoms of Oxygen which combine together.
- The chemical formula for sodium chloride (common salt) is NaCl. From the formula we come to know that there is one atom of sodium Na and one atom of Chlorine Cl.

The Chemical formula for Ammonia is NH_3 .What can be said about the elements and the number of atoms contained in the compound.

Some Chemical Reactions :

Oxidation : The chemical process in which either Oxygen is added or Hydrogen is removed is called 'Oxidation'.

(1) $2H_2 + O_2 \longrightarrow 2H_2O$ (Addition of Oxygen in Hydrogen)

(2) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$ (Reduction of Hydrogen)

Reduction : The chemical process in which either Oxygen is removed or Hydrogen is added is called 'Reduction'.

(1) $H_2 + CuO \longrightarrow Cu + H_2O$

(Oxygen is separated from CuO)

(2) $2H_2 + O_2 \longrightarrow 2H_2O$

(Addition of Hydrogen to Oxygen)

Sometimes, oxidation and reduction both the reactions occur in one Chemical process. This is known as redox process. Such as,

$$2H_2 + O_2 \longrightarrow 2H_2O$$

As a result of such chemical processes different compounds are formed.

Q.1 State whether the following statements are True or False :

(1) Mercury is a liquid metal.

(2) Wires can be drawn from coal.

(3) Stainless Steel is an alloy.

(4) Process of addition of oxygen is called oxidation.

(5) Chemical formula is the same as chemical structure or molecular formula.

Q.2 Match the pair correctly :

Element	Use
Mercury	as a fuel
Carbon	in a thermometer
Gold	preparing ornaments
Iron	in the preparation machinery
Aluminium	for the conduction of electricity for making utensils

Q.3 Answer the following questions :

(1) Mention any two uses of metals.

(2) Where do we use phosphorus?

(3) Give full name of NaCl.

(4) What is ionization?

(5) What is reduction?

Q.4 Discuss about Oxidation and Reduction in the chemical process given Below :

$$H_2 + CuO \longrightarrow Cu + H_2O$$

Hydrogen Copper oxide Copper Water

Q.5 Discuss in detail about 'Metals and Non Metals in our life'.

4 Lens

Introduction of Lens :

Lens

The transparent object like glass or plastic having both the surfaces curved (Slightly out ward or inward) is called lens.

In some lens, one surface is plane and other surface is slightly curved outward.

Lenses are of two types:

(1) Convex Lens

(2) Concave Lens

Observe concave and convex lens and note difference between the two.

Convex Lens

The lens for which both the surfaces are curved outward is called convex lens.

Figure 4.1

Concave Lens

The lens for which both the surfaces are curved inward is called concave lens.

Figure 4.2

What is required ? Prism (two), laser torch (two) drawing paper

What to do?

- Take two prisms. Place both the prisms on the drawing paper as shown in figure.
- As shown in Fig. 4.3, arrange prisms so that base should be in contact.
- Now, with the help of two different lasers incident ray AB from one side and ray PQ from other side remaining in contact with drawing paper.

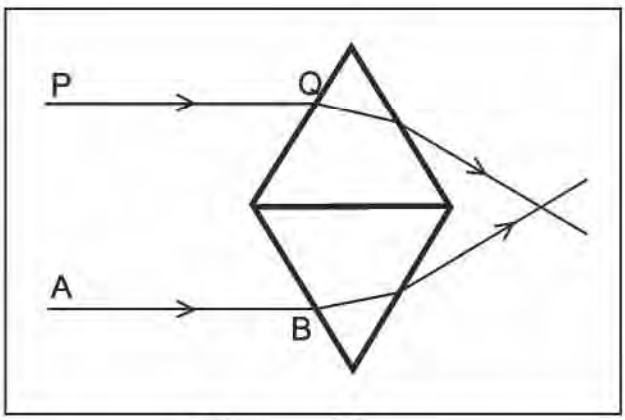


Figure 4.3

- Note observation.

- What is observed when light ray of laser is incident on prism?

- Note your observation for emergent rays of both prisms.

In above activity, if different transparent solids are placed between both prisms as shown in the figure and the ray of light is incidented,the following is observed.

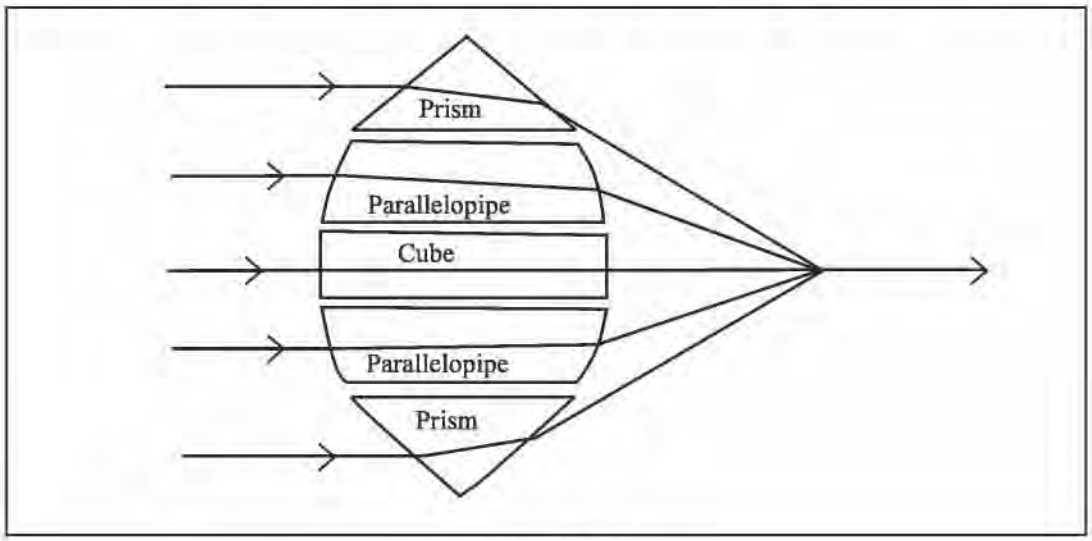


Figure 4.4

The device formed in figure is like convex lens.

Lets get information about the terminology associated with convex lens.

Observe the following figure.

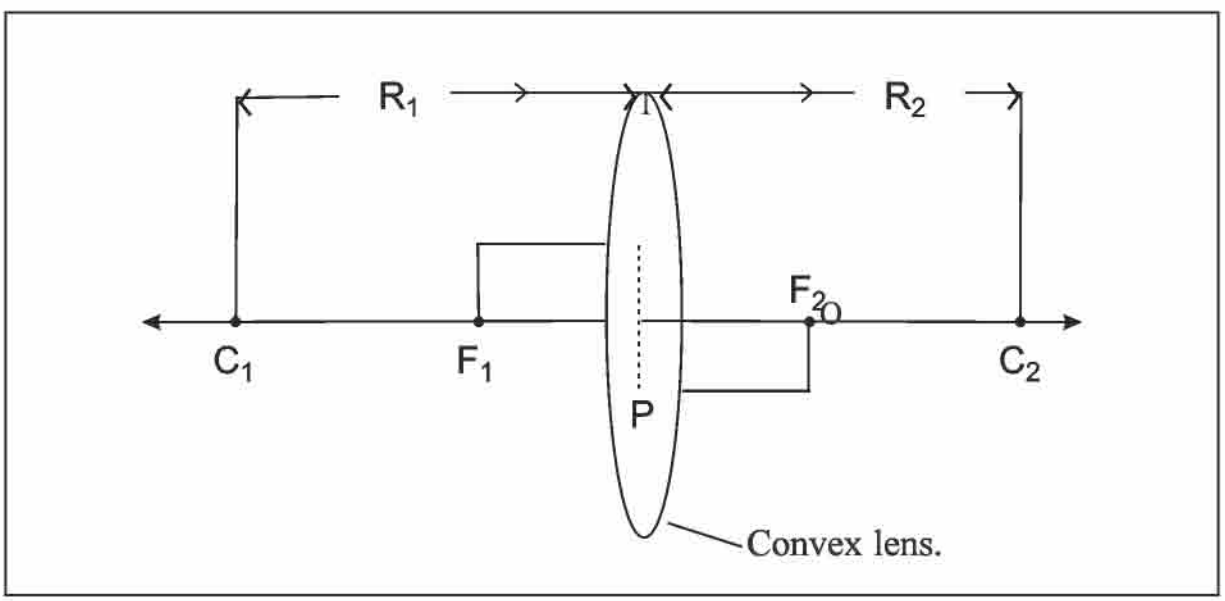


Figure 4.5

Centre of Curvature

Curved surfaces of lens are part of two spheres, the centre of that sphere as called centre of curvature of the lens.

Lens have two centres of curvatures. In fig. 4.5 C_1 and C_2 are centres of curvatures.

Principal Axis

The imaginary line passing through the centre of curvatures C_1 and C_2 is called principal axis.

Optical Centre

The centre of lens on the principal axis is called optical centre of lens. In fig. 4.5 P is the optical centre of lens.

Radius of curvature :

The radius of the sphere of which curved surface of lens is a part, is called radius of curvature of that lens. R_1 and R_2 are radius of curvature in Fig. or the distance between optical centre and centre of curvature is called radius of curvature.

Now do an activity

What is required? a convex lens, a torch, a drawing paper, a stand

What to do ?

- Take a convex lens. Put it on a stand on plane surface.
- Incident light on it with torch.
- As shown in the figure, adjust the screen of drawing paper behind the lens in such way that point like image is formed.

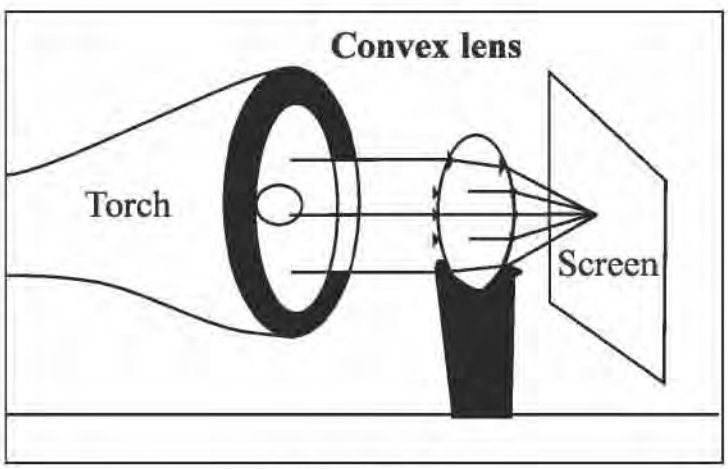


Figure 4.6

Focal Point

The point at which the incedent rays parallel to principal axis, converges after refraction is called focal point of lens.

Lens have two focal points In fig. 4.5, F_1 and F_2 are focal points of convex lens. Focal point of concave lens is virtual.

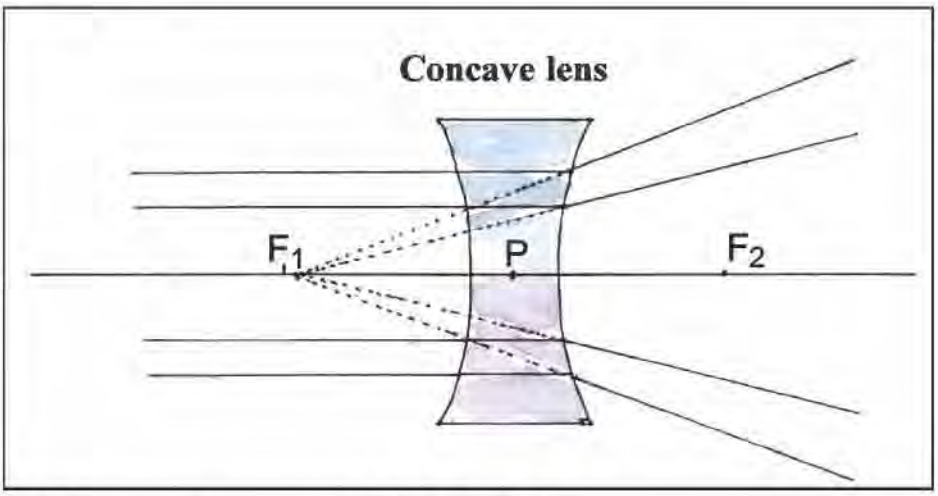


Figure 4.7

For a concave lens as shown in fig. 4.7, the refracted light rays does not meet at a point but if refracted rays are extended in opposite direction, they seem to meet at a point.

This point is focal point of lens, which is virtual.

Focal lengths

The distance between optical centre and focal point is called focal length. In fig. 4.5, PF_1 and PF_2 are focal lengths.

Now, let's make a Convex lens.

What is required? card paper, wax, nail, dropper, water

What to do?

- Take a small piece of card paper.
- Rub wax on a small part of this piece.
- Then make a hole using nail in the waxed part.

Figure -4.8

- Now with the help of dropper, place a drop of pure water on the hole.
- With the help of this device, see small letters from water droplet.

How are the letters seen? Small/ large

- Of which objects can lens be made?

Image formed with the help of convex lens.

What is required? Convex lens, a candle, a match box, a drawing paper.

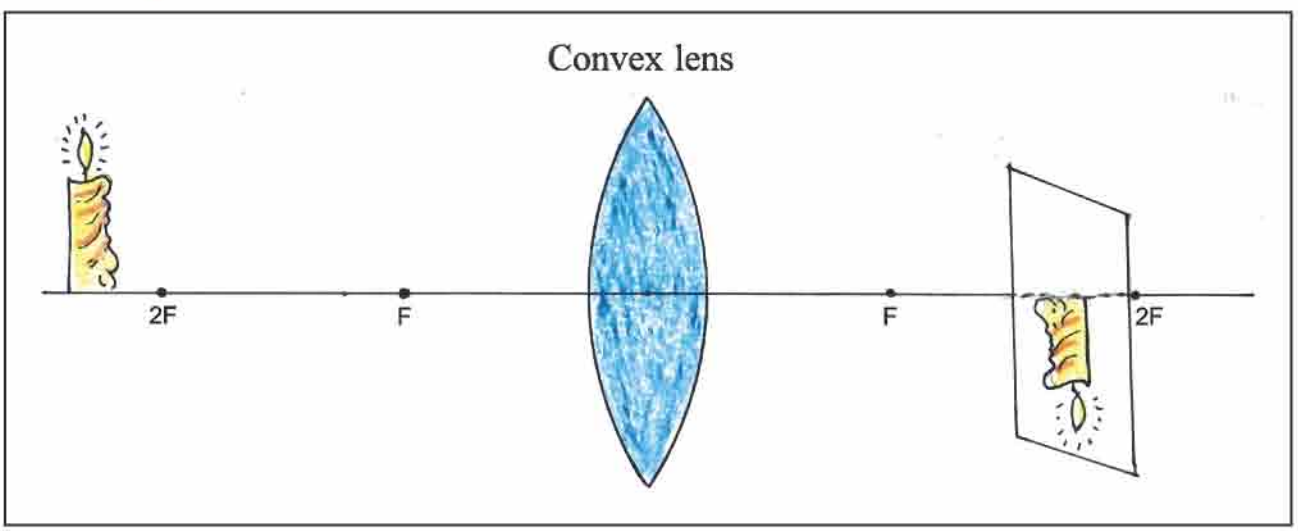


Figure 4.9

What to do?

- Take a convex lens.
- Place stand on plane surface and put lens on it.
- Now, on one side of lens, away from 2F, place a candle and light it up, on the other side of lens (the side where candle is not placed) on the drawing paper form the image of flame of candle and observe it.
- Position of candle.
- Position of image
- Size of image
- How is the image? Inverted / straight vertical
- Type of image: Virtual / Real

In above activity, the path of light rays from flame of candle is as following figure.

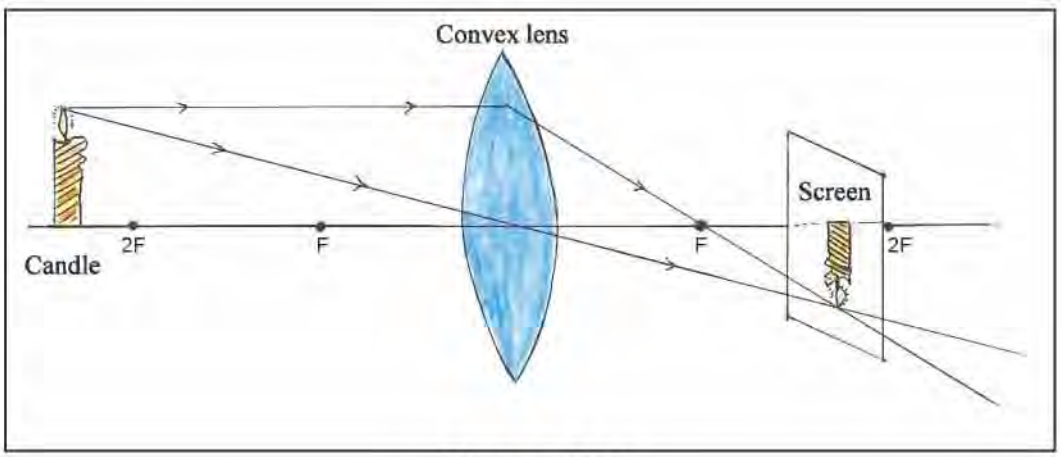


Figure 4.10

If the lighted up candle is placed away from 2F, the ray of beam from flame parallel to principal axis passes through focal point F_2 after refraction. The ray of beam passing from focal point F_1 propagates parallel to principal axis after refraction and where both the rays meet each other, the image of object is formed there.

Now in above activity keep, the position of object as given in following table and note observations of images.

Position of object		(Observation of Image)		
	Position of image	Small /Large/ point like object / like to compare to object	Type of Image Real / Virtual	Image Inverted/ Vertical
At infinite distance	On the focal point F	Vertical	(Real)	
At 2F				
Between F and 2F				
At focal point F				

Observe the following figure.

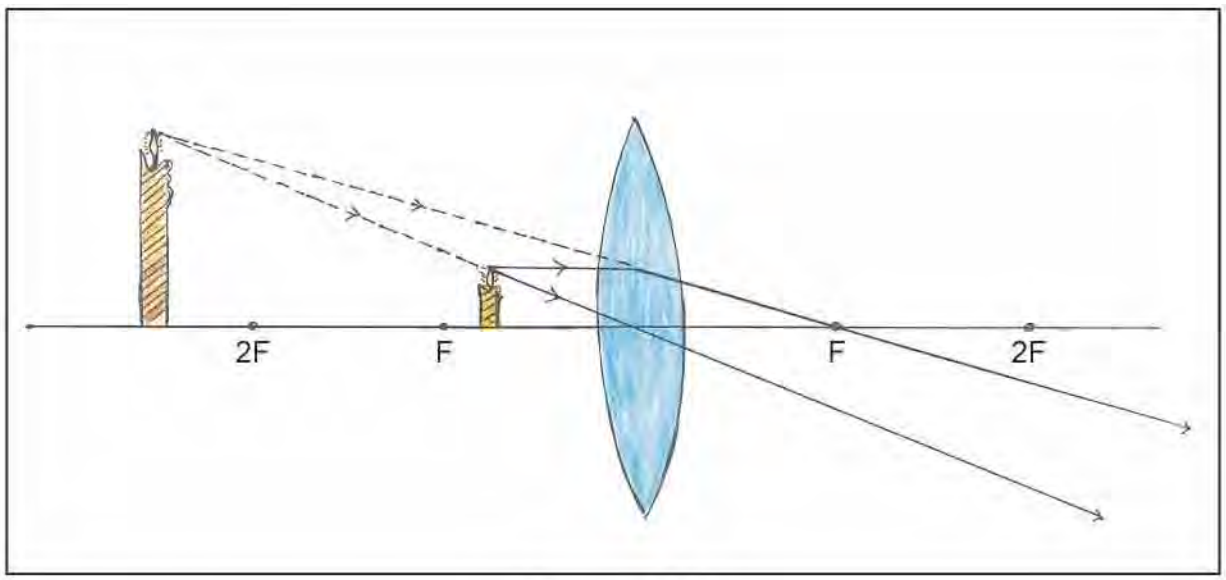


Figure 4.11

From the figure it, is seen that when any object is placed between lens and F, the rays from the top of object do not meet during propagation after passing through lens, but if are extended in backward direction, they appear to meet. The virtual and erect image is formed there.

Virtual image can not obtain on screen

- **Image formed by concave lens.**

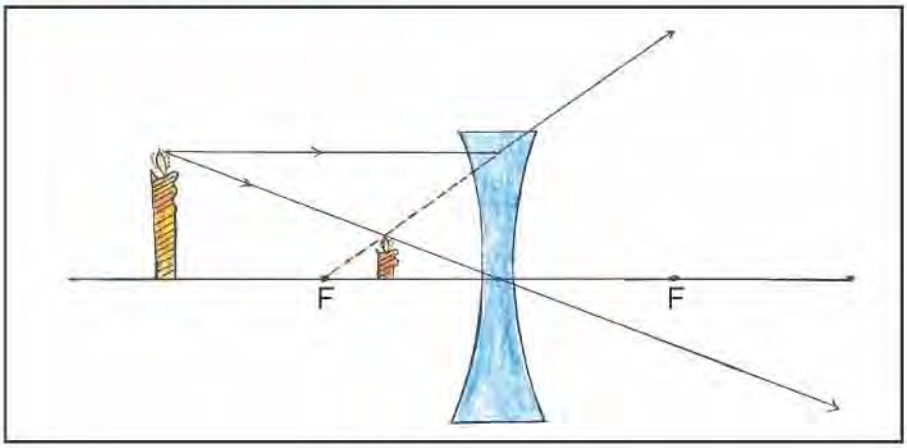


Figure 4.12

The emerging rays from concave lens after refraction do not converge but diverge with respect to principal axis. So image formed by concave lens is always virtual, erect and smaller than object, which can be seen in figure.

Where is the convex lens used?

Let's make simple telescope.

What is required? PVC pipe, Convex lens, Adhesive, News paper.

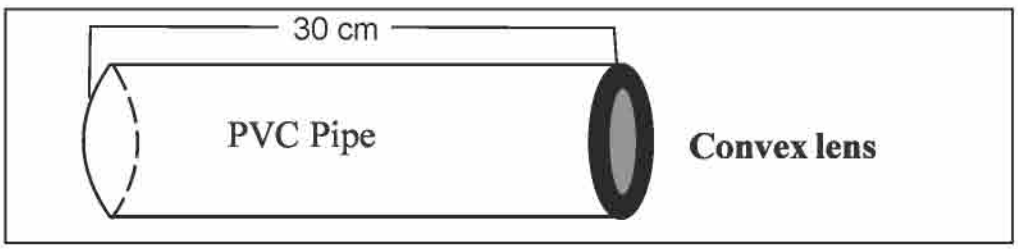


Figure 4.13

What to do?

- Take a PVC pipe of length 30 cm having diameter of 25 mm (Approximately 1 ench). At one of its end, stick the convex lens of proper size as shown in figure.

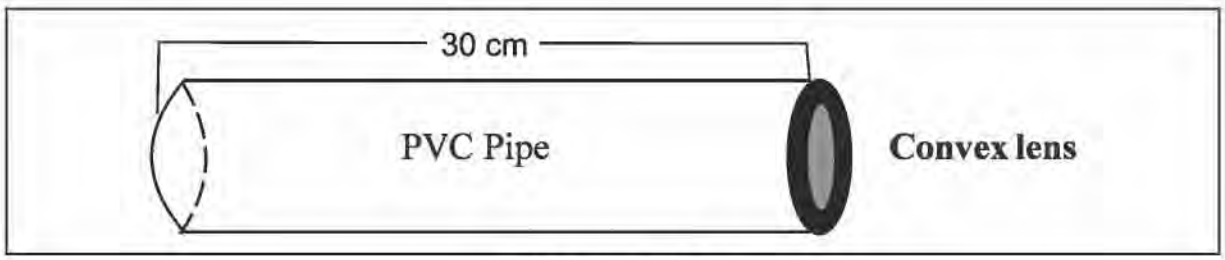


Figure 4.15

- Then take another PVC pipe of length 40 to 45 cm having diameter 18 mm (three fourth inch). At one of its end, fix a the convex lens of proper size as shown in figure.

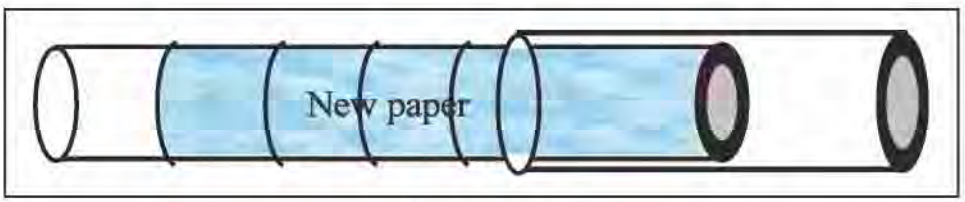


Figure 4.16

Now insert the end with lens of pipe with smaller diameter in the pipe of larger, diameter from its open end.

In the space between two pipes wrap news paper in such a way that the smaller pipe can move in or out.

The instrument made in this way is called telescope. See the distant object with it and note your observation.

- How is the distante object seen with telescope?

- Where is the telescope used? Discuss it with your friends and teacher.

Let's make another instrument :

What is required? a box of card board, convex lens, a cutter, a wire, a holder, a lamp, a card paper.

What to do?

- Take a box of card board as shown in figure. On one surface of it, make a hole of the size of convex lens.
- Make a slit between F and 2F of convex lens on the upper surface of box as shown in fig. 4.17
- Now, in the hole made far convex lens, insert a pipe of card paper and stick it then fix a convex lens in the pipe as show in fig. 4.18
- Make an arrangement for bulb with holder in side the box towards the lens as shown in the figure. Take a wire of bulb out through a hole from card board and affix a plug.
- The device as shown in fig. 4.20 is formed. Now, place an inverted picture of proper size in the slit and switch on the bulb.

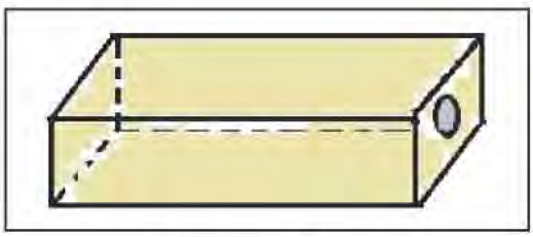


Figure 4.16

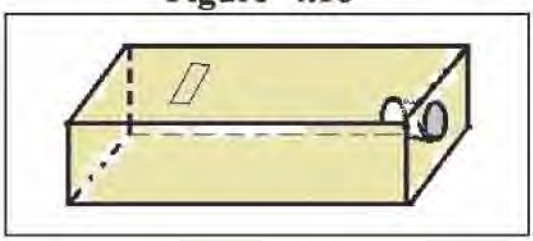


Figure 4.17

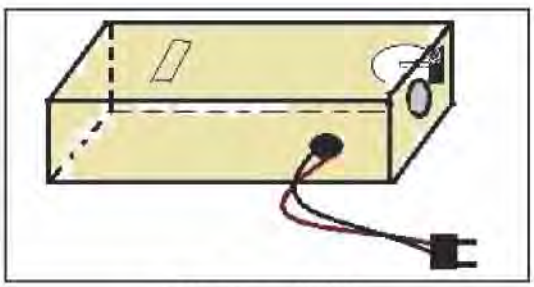


Figure 4.18

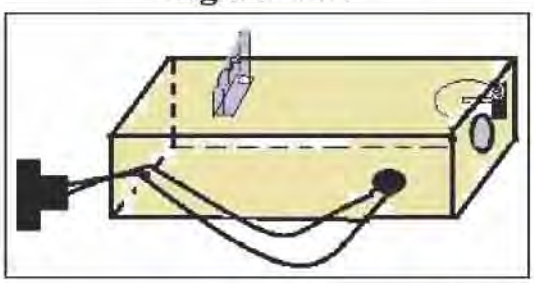


Figure 4.19

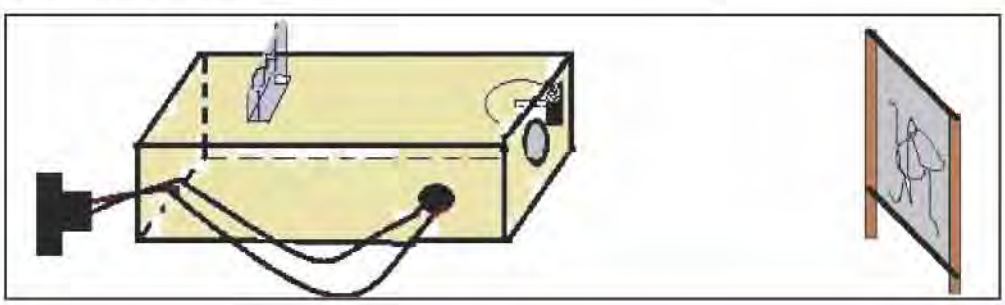


Figure 4.20

- Adjust a screen at proper distance from the convex lens, see the image of a picture which you placed. This instrument is called Episcope.

In the Episcope prepared in this way, place different pictures and see the image on screen.

Where will you use this instrument?

Q.1 Give names of instruments used in our day to day life in which lens is used.

Q.2 Using local resources and with the help of your teacher and friend, make telescope, write the method.

Instruments :

Procedure to make telescope :

Q.3 Obtain point like object of the sun using convex lens. What have you done to get this image? prepare a note.

Q.4 Give name of instruments in which concave lens is used.

Revision 1

Q.1 Write down the uses of oxygen gas.

Q.2 Note down the properties of hydrogen gas.

Q.3 Explain that reactivity of an element depends on the number of electrons found in its outermost. orbit.

Q.4 Specify the difference between a molecule of a compound and a molecule of an element.

Q.5 What type of prediction can be done on the basis of the atomic number of an element?

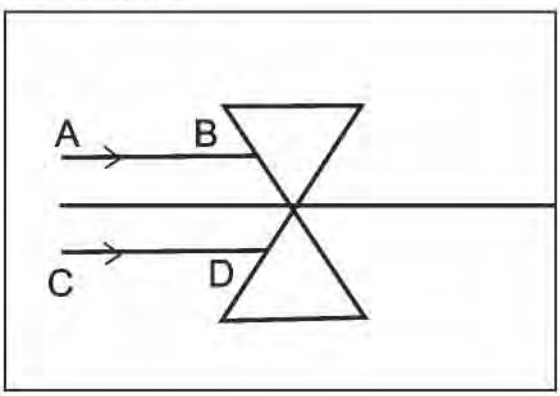
Q.6 Explain 'Metals generally show the tendency of producing positive iron'.

Q.7 Explain the Non-metals generally show the tendency of producing negative iron.

Q.8 Discuss oxidation and reduction in the following reaction.

$2H_2 + O_2 \longrightarrow 2H_2O$

Q.9 Incident a light beem with the help of a laser torch on the two prisms after arranging them as shown in the diagram. Note down your observation.



5 Reproductive System and Excretory System

Reproductive system

We can grow a neem plant from a neem seed. A cat gives birth to a kitten of her own kind. Thus each organism can produce a young one of its own king.

Every organism produce a new organism to maintain the existence of its own species. The process of the organisms to produce a new organism of its own kind is called reproduction. various organs are involved in the process of reproduction.

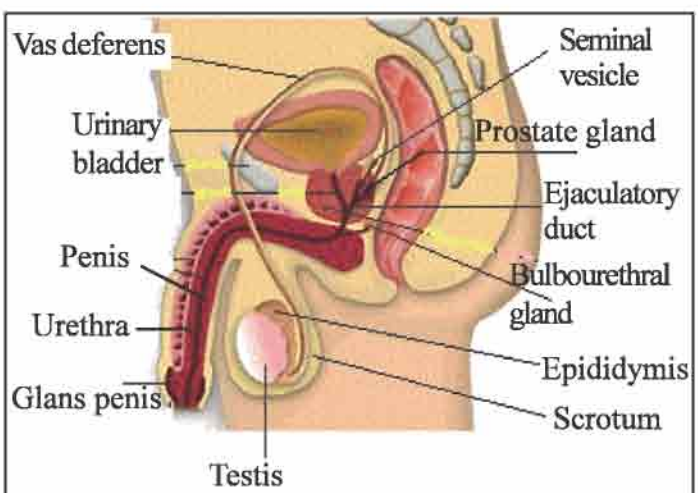
In human being, man and woman have different sex organs. The system formed by different sex organs together known as reproductive system. We will understand the human reproductive system.

Male reproductive system

Male reproductive system is shown in the diagram. Testis is the main organ in it. Vas deferens, penis, prostate gland, bulbo urethral gland etc are included as accessory reproductive organs.

Testis

- It is the main organ of male reproductive system.
- Man has a pair of testis
- They are located in the scrotum outside the body.
- Testis are oval shaped bodies.
- Sperms are produced in testis.



Male reproductive system

Figure 5.1

- Spermatogenesis occurs in male for the entire life.

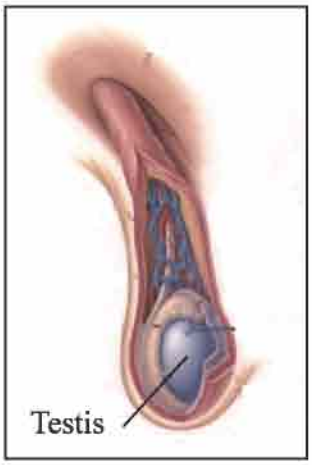


Figure 5.2

Vas deferens

- One vas deferens arises from each testis.
- Vas deferens is a simple and muscular structure
- Vas deferens opens in to seminal vesicles.
- Sperms produced in the testis pass through the vas deferens

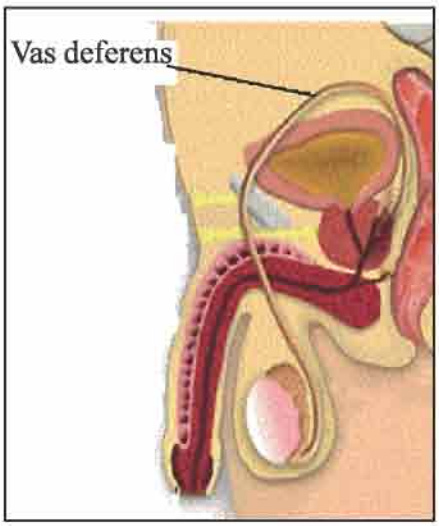


Figure 5.3

Seminal vesicles

- Seminal vesicles are located near the base of urinary bladder in male.

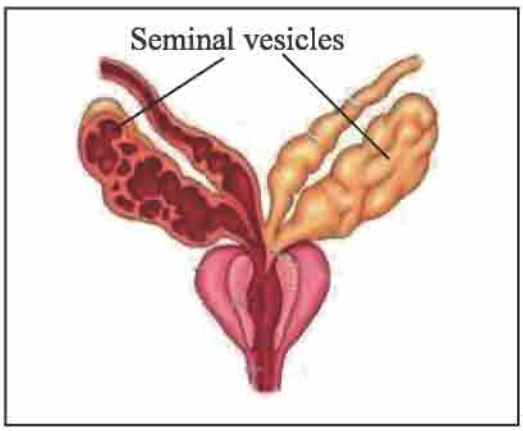


Figure 5.4

Prostate gland

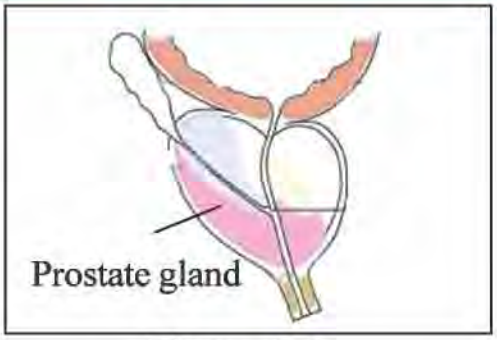


Figure 5.5

- It is an accessory reproductive gland
- Prostate gland is located behind the urinary bladder.
- When sperms enter into urino gential duct, different secretions are added from Bulbourethral gland, seminal vesicle and prostate gland.
- This liquid is known as semen. It is milky, thick liquid.
- The secretions provide mobility to the sperms to reach the ovum.

Penis

- Penis is a cylindrical organ found infront of scrotum.
- The distal part of the penis is known as glans penis
- In males, urine and sperms are released through a common opening hence urinary duct is known as urinogenital duct.
- Urinogenital duct passes through the testis and it opens at the tip of glans penis.
- Penis get exited during the copulation and sperms are released through it.

Figure 5.6

Sex hormones play a very crucial role during the reproduction. They regulate the spermatogenesis. Sequential changes during the teen age results into the development of reproductive organs. Boys attains puberty between the age of 13 and 14 years. Following minor characters are shown by the male due to the influence of sex hormones.

- Development of hairs on mustache, beard and other organs.
- Deepe voice
- Opposite sex attraction
- Development of muscles and sex organs.

Female reproductive system

Female reproductive system consists of a pair of Ovaries, pair of Fallopian tube, uterus vegina and vulva.

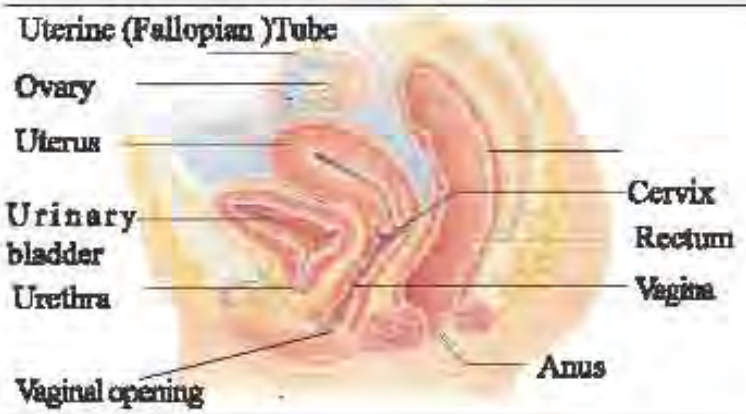


Figure 5.7

Ovary

- Ovaries are located in the abdominal cavity.
- Abdominal cavity of female has a pair of ovaries. Ovaries are brown in colour.
- Ovaries are almond shaped structures.
- Both ovaries produce one ovum each alternately every month as soon as they become mature.

Figure 5.8

Oviduct

- Both oviducts start from the ovary and opens in the uterus at its distal end.
- Oviduct is required for the transport and fertilization of ovum.

Figure 5.9

Uterus

- Uterus is a hollow muscular, sac like structure.

  Implantation of developing embryo occurs here.

- Uterus opens by cervix into vagina

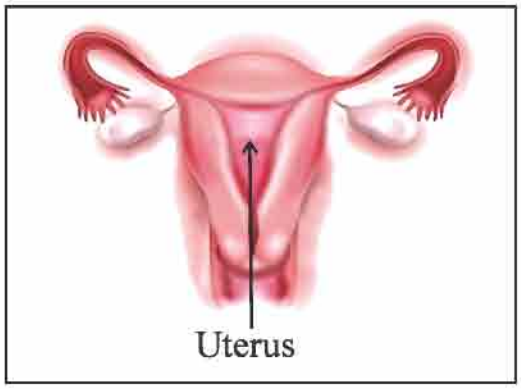


Figure 5.10

Cervix

- The distal, narrow opening of uterus is known as cervix. (Opening of uterus)

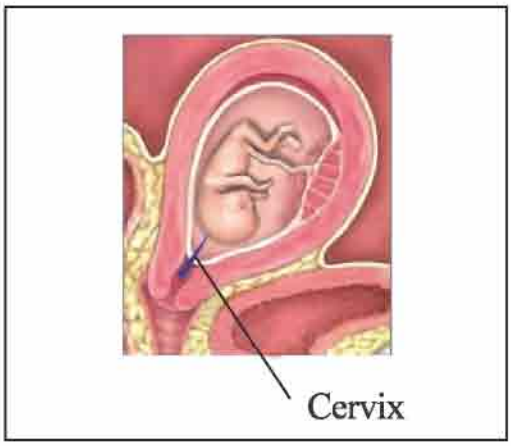


Figure 5.11

Vagina

- Vagina is a tubular passage following the uterus, It opens through vulva on the outer side of body.
- Vagina serves as a passage for child birth.
- The distal end of vagina is known as vestibule

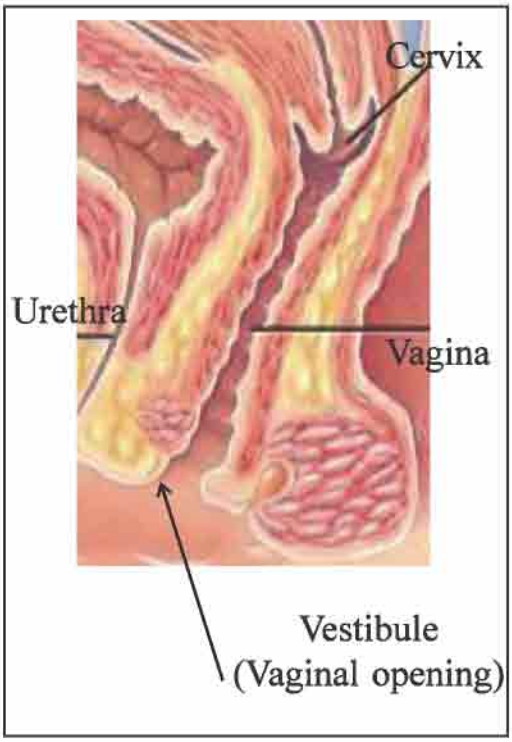


Figure 5.12

Now, we know that sex hormones play an important role in reproduction. They regulate the ovulation. The organs of reproductive system develop gradually during the teen age. Girls attain puberty between 10 to 12 years of age. Due to sex hormones, females show minor sex characters which are as follows.

Secondary sex characters

- Sweet and deeper voice
- Development of hairs in the underarms and around sex organs.
- Menstruation secretions occur.
- Development of sex organs.

- One ovum matures every month in the females between the 12 to 45 years of he age. (every 28 to 30 days)
- If fertilization does not occur, the wall layers of uterus break down which comes out through vulva and it is know as mensturation secretion.
- Generally 12 to 13 years old girl shows the tendency of mensturation secretion and it is a very usual and natural process.
- The first menstruation secretion is celebrated as a day of joy in the states of southern India.
- Urinary duct opening and genital opening are separate in the female.

Fertilization

Sperms reach oviduct after they are liberated in to vagina. Any one sperm fertile the ovum. This process is known as fertilization. Newly formed cell after fertilization is known as zygote. This zygote now moves towards uterus and it gets implanted on the wall of uterus. Here in the uterus zygot develops in to embryo gradually, which develops into a child during the development period of 280 days (approximately 9 months)

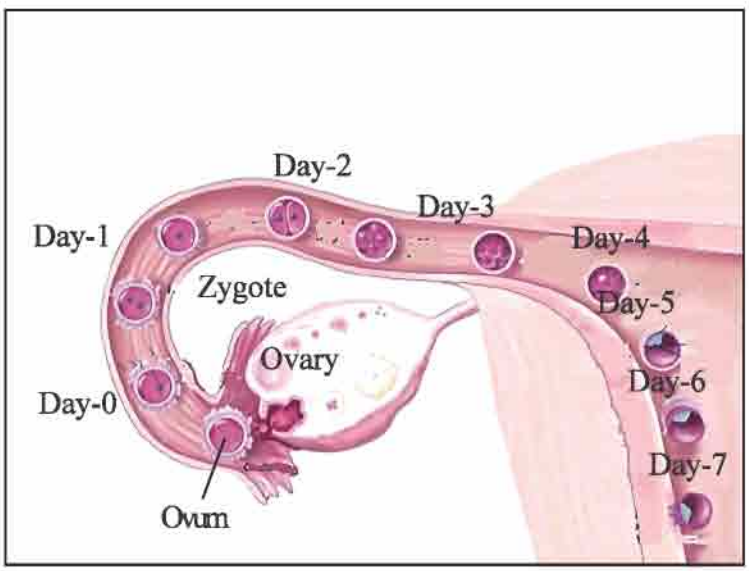


Figure 5.13

Excretory system

- Do you know about the digestive system and respiratory system? Undigested food in the form of stool in the digestive system and carbon dioxide in respiratory system is thrown away from our body. Stool and carbon dioxide are useless and harmful things.

What is the need to discard useless and harmful liquid substances?

- Discuss the above mentioned question with your teacher and note down.

Thus the removal of useless, harmful liquid substances from our body is known as excretion. Organs involved in the excretion are known as excretory organs. The system formed by excretory organs is known as excretory system.

Major organs of excretory system.

1. Kidney 2. Ureter 3. Urinary bladder 4. Urethra

Kidney

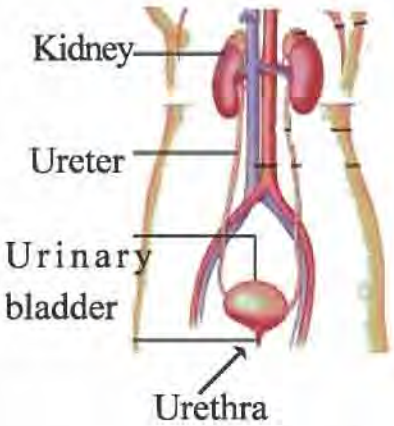
There are two kidneys found in our body. They are located on the lateral sides of vertebral column in the back region.

- The shape of kidney is like bean seed. It is dark brown in colour.
- Many nephrons are found in the structure of kidney.
- Such nephrons filter out blood.
- During the process of filtration, liquid excretory substances are separated from the blood.

Kidney

Figure 5.14

- Some times, one kidney becomes disfunctional, we can copeup with the other kidney. In case of failure of both the kidneys, kidney donated by any other person can be transplanted.



Excretory System)

Figure 5.15

Ureter

You can see in the diagram that one tube comes out from each kidney. Ureter links kidney to the urinary bladder. The main function of ureter is to conduct urine to the urinary bladder from the kidney.

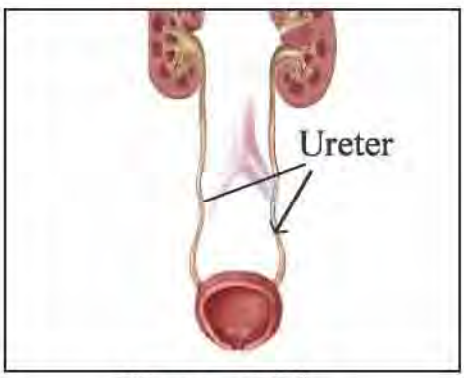


Figure 5.16

Urinary bladder

- The ureter coming out from kidney, opens in to a small sac like structure known as urinary bladder.

  The major function of urinary bladder is to collect urine.

Figure 5.17

Urine is stored here for some time. Urine is eliminated time by time due to contraction of muscles. Urine contains water as well as unnecessary substances like urea, uric acid and ammonia. Such substances harm our body if they remain in our body for long time. Thus we should not stop natural discharge (Stool, urine)

Urethra

Urethra passes through the penis in male and it opens on the tip of penis. In female it opens separately.

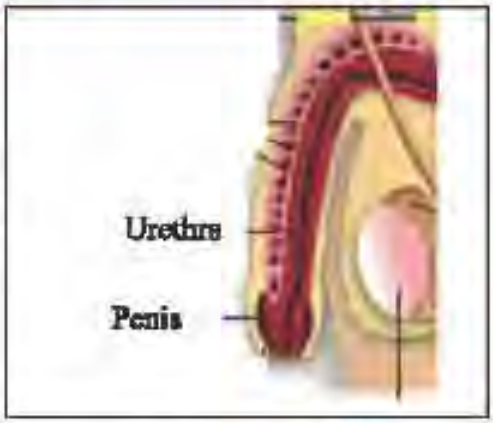


Figure 5.19

Other organs of body also play an important role in the excretion. Let us know about them .

Role of lungs in excretion

Carbon dioxide and additional humidity is eliminated by lungs through exhalation. Some amount of water is released in this way. This discharge is less during the humid atmospheric condition but it is high during the dry and cold season.

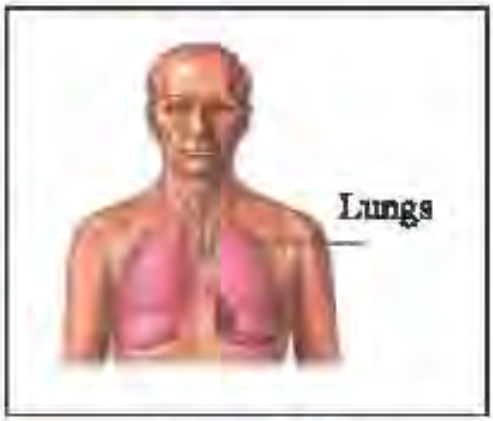


Figure 5.20

Role of skin in excretion

Our skin contains sweat gland and sebaceous gland. Sweat comes out from the sweat gland. Sweat consists of dissolved sodium chloride, urea, glucose and amino acid. The proportion of sweat depends on the temperature of atmosphere and the body condition. Main role of sweat gland is to maintain body temperature. Secretion of sebaceous gland keep our skin sticky and oily.

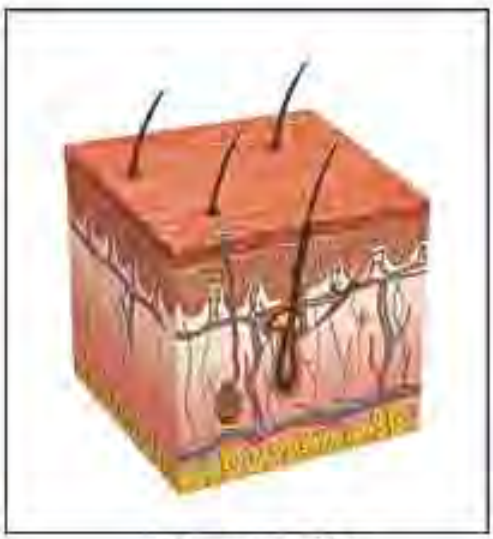
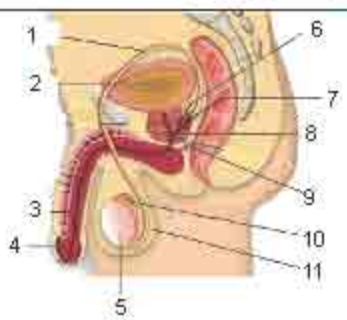


Figure 5.20

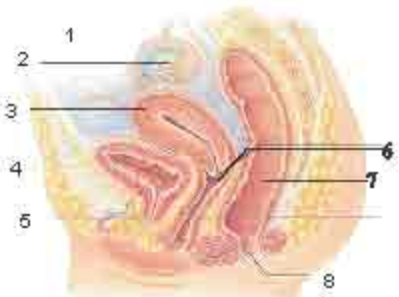
- To maintain the activity of kidney and to keep the excretory system healthy, we must drink 4 to 5 liter water daily.
- Abuses like chewing of tobacco and addiction of any other drugs can harm our liver and kidney. Sometimes they become inactive and cause death.

Q.1 Label the following diagram :



Male reproductive system

1. ____ 7. ____
2. ____ 8. ____
3. ____ 9. ____
4. ____ 10. ____
5. ____ 11. ____
6. ____ 12. ____



Female reproductive system

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____

Q.2 True or false :

(1) Kidney is dark brown in colour ____

(2) Oviduct is essential for the transport and fertilization of ovum ____

(3) Ureter connects kidney and uterus ____

(4) We should not stop natural discharge ____

6 Combustion

What is required? a magnesium strip, a candle, a match box, pair of tongs.

What to do?

- Hold the magnesium strip with a pair of tongs.
- Now place the magnesium strip over the flame of a lighted candle.

Figure 6.1

What did you see?

_____

_____

_____

- Why it happened so?

_____

_____

_____

Figure 6.2

Combustion : A chemical process in which a substance reacts with Oxygen and produces heat and light is called combustion.

What is required? a straw from a broom, a match box, a paper, nails, a card board, straw, a glass, a stone, a candle, a pair of tongs.

What to do?

- First of all, light a candle.

- Keep each substance turn by turn on the flame of the burning candle with the help of a pair of tongs.
- Make note of the obtained observation in the following table.

No	Name of the substance	Burns	Does not burn
1	Straw from a broom		
2	Match stick		
3	Paper		
4	Card board		
5	Nail		
6	Straw		
7	Glass		
8	Stone		

A substance which catches fire is called a 'Combustible Substance'. eg. Wood, Paper.

Prepare a list of combustible substances.

A substance which does not catch fire at a normal temperature is called a 'Non Combustible Substance'. eg.Iron, Stone.

Prepare a list of non combustible substances.

In our body, the food we take combine with Oxygen and produce heat energy.This is a 'Slow combustion'. Here during combustion light is not produced.

What is required? Three candles, three transparent plastic bottles, a match box, three saucers, water

What to do?

- As per the condition manifested in the figure, arrange the apparatus.
- In the first condition, keep a candle straight in the saucer and fill it with water.
- Light the candle and cover it with a bottomless cut plastic bottle.
- Keep the lid of the bottle open. Make note of the observation done.

Figure 6.3

- In the second condition, perform the same experiment again but this time keep the lid of the bottle closed.

Figure 6.4

Do both the candles extinguished in same time? Why?

Figure 6.5

- In the third condition, keep the lid of the bottle open and cover the lighted candle with it in such a way that the air can enter just from below.

Make note of the observation made.

- Did the candle get extinguished? Why?

For the combustion of any substance, the oxygen of air should be continuously available.

Burn the paper and the piece of wood turn by turn with the help of the candle. Which substance takes time to burn? Why?

For the combustion of any substance three matters are required.

1. **It should get oxygen of air (O_2) continuously.**
2. **The substance should attain definite temperature.**
3. **It should get sufficient amount of fuel.**

What is required? a paper cup (Ice cream cup) , a candle, a tripod, a match box.

What to do?

- First of all, take some water in the cup such that it is sufficient to cover the bottom of the cup. Now put the cup on the tripod and heat it with the help of a candle.

- Keep it for some time as it is.
- Make note of the observation made.

Figure 6.6

- Why did it happen like this?
- When does the cup start burning? Why?

A substance catches fire at a definite temperature. This temperature is called 'Ignition Point'.

If, the temperature of a substance does not reach till its ignition point, the substance does not start burning. Due to this reason, the cup does not start burning as long as there is water in it.

What is required? a currency coin, a candle, a match box, a handkerchief, a pair of tongs.

What to do?

- First of all, cover the coin with the handkerchief as shown in the figure.
- Light the candle and then keep the coin covered with the handkerchief on the flame of the candle.

Figure 6.7

- Note down your observation.

- Did the kerchief burn? [ ] Why?

Note : This activity should be performed keeping your teacher with you.

You might have seen a fire broken out in a house, a shop or a factory. If you have seen such an unfortunate event, describe it.

- You must have heard the name of the fire extinguishing force (Fire Brigade). Their main work is to extinguish fire.
- The fire brigade tanks with big hose pipes reach the place of the fire and start putting water on the fire with hose pipes, therefore the contact of the fire with the air (Oxygen) is cut down. Since the air (Oxygen) is not available the fire gets extinguished.

Figure 6.7

To extinguish fire, besides water, soap-foam, sand and Carbon dioxide (CO_2) are also used. Their main work is to cut down the contact of air so the fire can be extinguished.

- You must have seen the fire extinguishier. Have a discussion with your teacher to know how does it extinguishes a fire.
  Caution : Water is used to put out fire, but every time it is not true.
- In case, the fire is broken out due to the electricity, water is not used to put it out because there is a risk of getting electric current (electrocution).
- If the fire is broken out due to petrol or acid, water is not used because the fire does not get extinguished and there is a risk of getting burned.

Figure 6.9

Figure 6.10

Figure 6.11

Figure 6.12

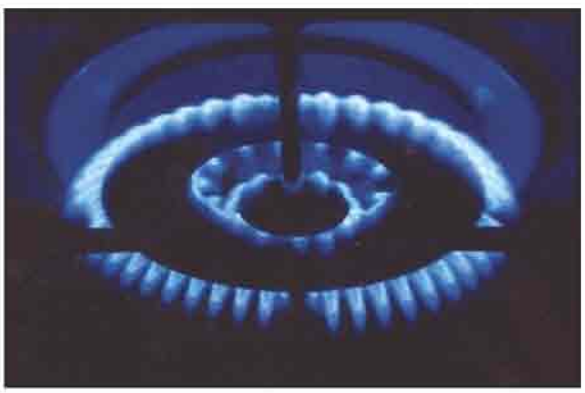


Figure 6.13

Watch both the above pictures (6.12 and 6.13) carefully and make note of differences visible between them.

When a substance gets sufficient amount of Oxygen, the substance burns with a blue flame, it is called 'Complete Combustion'. **e.g. combustion of L.P.G.**

- Substances having complete combustion do not spread pollution. When a substance does not get sufficient amount of Oxygen, it burns with a yellow flame, it is called 'Incomplete Combustion'. **e.g.combustion of wood.**
- Substances having incomplete combustion spread pollution.

There are other two types of combustion :

(1) Rapid combustion (2) Slow combustion

(1) In rapid combustion, heat and light both are produced.

(2) In slow combustion, heat is produced but light is not produced.

- Write the name of the substances under going complete combustion.

- Write the names of the substances under going incomplete combustion.

- Watch the figure carefully. How many parts of the flame are visible? Which are they?

Section 1: The outermost Zone

- Blue flame
- Complete combustion
- Maximum heat

Section 2: Middle Zone

- Yellow flame
- Incomplete combustion
- Less heat
- Goldsmith makes use of the central portion of the flame with the help of a blow-pipe.

Section 3: The Innermost Zone

- Black portion
- Area without any combustion

Q.1 Light a candle and observe its flame carefully.

- How many parts are visible?
- Which are they?

Q.2 Why is water not used to put off the fire caused due to electricity?

Q.3 For cooking, why are L.P.G. / P.N.G. fuels better than the other fuels?

Q.4 What will you do if a fire is broken out in the house of your neighbour?

Q.5 In which places do we find 'Fire extinguishers'?

Q.6 Why do we have holes in the formation of lantern / primus / gas stove?

7 Fossil Fuels

Write the uses of the Substances given below:

- Petroleum

- Kerosene

- C. N. G.

Millions of years ago, plants and animals either living or dead were buried under the earth. Due to the heat and the pressure of earth's crust they were converted into fossils. The fuels formed from such fossils are called 'Fossil Fuels'

There are mainly three types of fossil fuels :

(1) Mineral Coal

(2) Petroleum (Mineral Oil)

(3) Natural gas

(1) Mineral Coal :

Millions of years ago, vegetations like plants and trees were buried under the earth. Due to the natural processes and because of high pressure and high temperature under the earth, they were compressed and converted into mineral coal.

There are four types of Mineral Coal :

1. Peat Coal :

- This coal is of a very low quality and it is brownish in colour.
- It is useful to soak oil fallen on the land or water.
- Peat coal is not useful for burning in the factories.

2. Lignite :

- It is brown or gray in colour hence it is called brown coal.
- It is very smoky and makes plenty of ashes. If the moisture is reduced in it, it breaks into powder.
- It is mainly used in themal power stations and railways.

3. Bitumen :

- It is generally in black in colour but sometimes it is dark brown. It is less hard.
- Bitumen (tar) is obtained from it, hence it is called Bitumen coal.
- From it natural gas, coke etc, are obtained.
- This coal is mostly used in railways and factories.

4. Anthracite :

- It is the best quality rank of coal.
- It is hard and black in coloured coal.
- It is mainly used in the houses and industries to obtain heat.

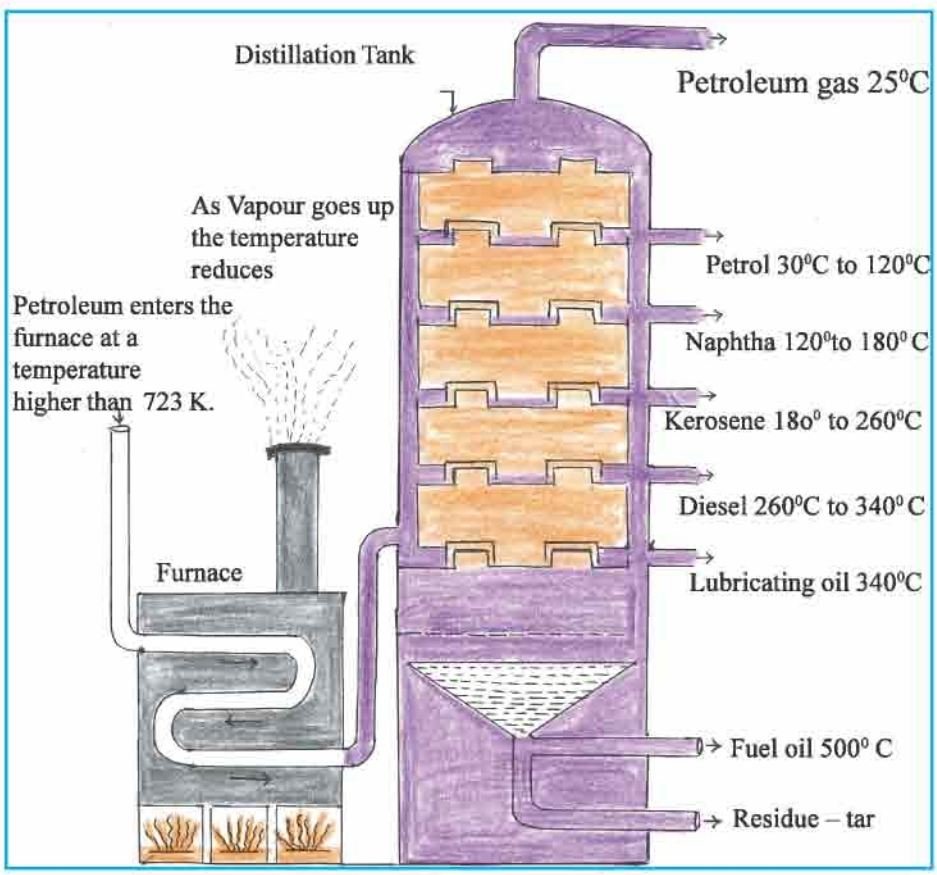
(2) Petroleum :

- On the earth, many times there were very big storms in the oceans. Due of this, in the coastal areas the microscopic aquatic creatures were buried under the silt of the oceans. Under the high pressure and the high temperature (heat) of the earth, they were converted into Petroleum.
- Petroleum is highly inflammable substance.
- Petroleum is a complex mixture of petroleum gas, petrol, diesel, kerosene etc.
- All these substances are separated by fractional distillation of petroleum.

Fractional Distillation of petroleum :

Petroleum is heated in a furnace. On heating and passing it through distillation tower, the different constituents substances are separated at different boiling points.

Observe the given picture and make note of it.



Fractional Distillation of petroleum.

- What is obtained at the uppermost portion of the fractional distillation tower?

At which temperature is it obtained?

- At which temperature does petrol get separated?

- At 260^0 C temperature, which substance is separated?

- At the end of fractional distillation, which substance is left out as a residue?

Thus, through the fractional distillation of petroleum, the following substances are obtained: Petroleum Gas, Petrol, Naphtha, Kerosene, Diesel, Lubricating oil, Fuel oil and tar.

Petroleum Gas :

- In the fractional distillation first of all at 25^0C, Petroleum Gas is separated.
- Mainly it is used in vehicles and as a fuel for cooking foods. It is known as L. P. G. (Liquified Petroleum Gas).

Petrol (Gasoline) :

- Petrol is separated at 30^0 C to 120^0 C.
- It is used as fuel in vehicles.

Naphtha :

- Naphtha is separated at 120^0 C to 180^0 C
- It is used in chemical processes.

Kerosene :

- Kerosene is separated at the temperature 180^0 C to 260^0 C.
- It is used in the cooking of foods and as fuel in engines.

Diesel :

- Diesel is separated at the temperature 260^0 C to 340^0 C.
- It is used as fuel in the vehicles like truck, tractor etc.

Lubricant Oil :

- Lubricant oil is separated at the temperature 340^0 C.
- It is used as motor oil and also to prepare grease.

Fuel Oil :

- Fuel Oil is separated at the temperature 500^0 C.
- It is used as fuel in industries.

Coaltar :

- At the end of fractional distillation, coaltar is obtained at the temperature 600^0C
- It is mainly used in surfacing roads.

Petroleum is an energy source which is non-renewable because it takes millions of years to form. The stock of petroleum is such that it will last for a few years only.

Furthermore, due to the uses of the substances that are obtained from petroleum, like petrol, diesel the pollution has increased. Which are the gases in the smoke of the exhaust of the vehicles, due to which the proportion of pollution has increased?

If we make extravagant use of petrol, diesel,there is a probability that it will exhausted in the near future. Therefore, we must use these substances sparingly and very cautiously.

Make note of your opinion in the following table and have a discussion with other students :

Advantages of the use of Petroleum as a fuel	Disadvantages of the use of Petroleum as a fuel

Q.1 Answer the following questions in short :

(1) How many types of fossil fuels are there? Which are they?

(2) State the types of Mineral coal.

(3) Which substances are obtained by fractional distillation?

(4) State the uses of Petroleum Gas.

(5) Which type of coal is used in Thermal Power stations and Railways?

Q.2 Answer the following questions to the point :

(1) We must use the substances like petrol, diesel sparingly and very judiciously. Give reason.

(2) How can we use the substances like petrol, diesel judiciously?

Q.3 State whether the following statements are true or false :

(1) Lignite is known as a brown coal also.

(2) Peat coal is useful in factories.

(3) Lubricant oil is useful in vehicles and as a fuel in cooking foods.

(4) Anthracite is the best quality rank of coal.

8 Solar Equipment

What is required? Two saucers, water

What to do?

- Pour some water in both the saucers.
- Place one saucer in continuous sun light.
- Place another saucer at a place where there is no sun light.
- Keep both saucers at their respective places for 45 minutes.
- Touch water in both the saucers and note your observation.
- **Which water is hotter?**

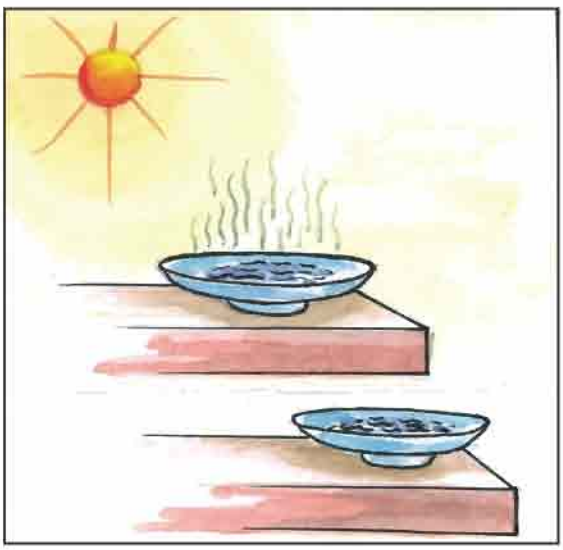


Figure 8.1

- **Why?**

Our sun will supply energy for four and half billion years.

- The energy obtained from the sun in called solar energy
- Sun is the main source of energy available on the earth.
- The sun is inexhaustible energy source.
- Use of the solar energy does not cause pollution.
- The solar energy is free of cost.

Human being has developed some equipments to use solar energy. They are known as solar equipments.

Solar cooker

What is required? a card board, adhesive, a mirror, water colour, box, transparent glass

What to do?

- Make a box using card board.
- Paint box with black colour from inside and outside.
- Fix the mirror inside the box as shown in figure.
- Take a small container and point it with black colour form outside.
- Put that container in box and cover it with transparent glass.
- Principle: Conversion of solar energy to heat energy.

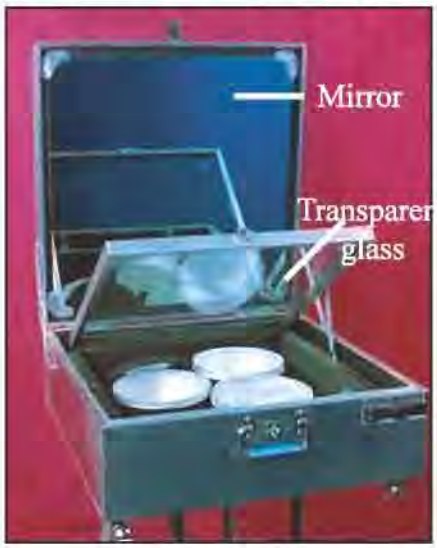


Figure 8.2

Construction :

- As shown in the figure, the box of solar cooker is made by non conducting substances like wood, plastic or fiber.
- Walls of box are coated with non conducting material, so energy is not wasted.
- Walls of box are coloured black, they so absorb more energy.
- The mirror placed inside the box, reflects the sun rays in side the box.
- The double layered glass cover makes the box air tight so the heat inside it is maintained.

Working :

- To cook or boil the substance it is placed in container and some water is added to it.
- Place this container in the box.
- Close the double layered glass cover over the container.
- Place this cooker in sun light for two to three hours in such a way that mirror of box should be towards the sun so the sun rays are reflected in to the box and heat in the box increases. The temperature in the box reaches up to 100^0 C to 140^0C.

Uses :

- It is useful to cook, to boil, to roast or to dry the food.
- It is houseful to cook pulse and rise.

Benefits :

- Fuel is not required.
- Pollution free.
- Maintenance cost is less.
- Vitamins are not destroyed, nutrients are retained and we get natural taste.
- During cooking of food, no need to take care of it.

Limitations :

- Food can not be prepared on cloudy day and at
- Time required to cook food is more.

Figure 8.3

Solar water heater :

Principle : Conversion of solar energy into heat energy.

Construction :

- As shown in the figure, overhead tank is connected with a small tank of solar water heater.
- Coil shaped copper tube is placed in box, so the area absorbing heat energy can be increased.
- For more absorption of heat, the outer surface of copper tube is coloured black.

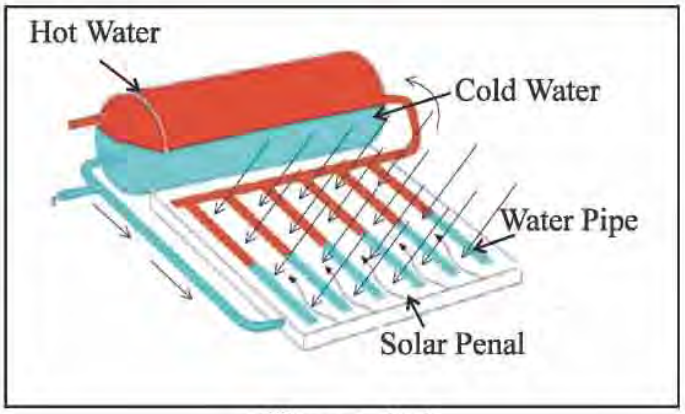


Figure 8.4

- One end of copper tube is connected at the bottom and other is connected at the middle of overhead tank.

Working :

- Due to the pressure difference between two ends of copper tube, the water from overhead tank continuously flows in the tube.
- Water flows slowly through tube, so it is heated with solar heat.
- In this way, water in small tank is heated slowly.
- Hot water is lighter so it remains at upper part of tank and from there it is used with the help of water tap.

Uses :

- Whenever hot water is requireit can be used.

Benefits :

- Maintenance cost is negligible.
- Does not cause pollution.
- Hot water is available 24 hours a day.

Limitations :

- In monsoon when atmosphere is cloudy for many days, it is difficult to get hot water.

Solar cell

Principal : Conversion of solar energy to electrical energy.

Figure 8.5

Construction :

- Solar cells used, are of size 2 cm x 2 cm
- There are many thin silicon layers in solar cell.
- When such solar cells are connected in series it is called solar panel.

Working :

- In the construction of solar cell, thin layers of silicon are used.
- At upper and lower and of it, electrodes are connected
- When solar energy is incident on solar cell, potential difference is developed between its electrodes.

Figure 8.6

- When it is connected in circuit electric current is obtained.

- **Kalyanpur village of Kheda district is self dependent in terms of energy. The solar power plant of 8 kilo watt supply electrical energy to 67 houses. Raliyati Gujar village of Panchmahal district has two solar power plant each of four kilo watt capacity.**
- **The solar plant at Charanka of Patan district is largest one in Asia. At Kadi solar panels are arranged on the canal and electrical energy is obtained. Due to it, evaporation of water decreases and land is not wasted.**

Uses :

- Useful in clock, calculator and toys.
- To operate traffic single.
- To operate street light.
- To operate electrical instruments in artificial satellite.
- To produce electricity at interior places where transmission of electricity is not possible or transmission is costly.
- Recently car operated with solar cell is developed.

Limitations :

- Silicon used to make solar cell is available in limited quantity.
- Technology to purify silicon is very costly.
- Solar cells are connected with each other by silver which is costly.
- Limitation of storage cell restricts the storage of solar energy.

Storage cell produce only DC current. For the devices working with AC current, DC should be converted in to AC, so efficiency decreases.

Solar Dryer

Principle : Conversion of solar energy into heat energy.

Figure 8.7

Construction :

- There is a black coloured box in solar dryer so tha absorbs more heat.
- To sustain the heat, there is a glass cover on it.
- When the sun light is incident on the front box the air inside the tube of the box becomes hot which passes through the vagetables, fruits palced in the main box.

Working :

- When solar dryer is placed in the sun light the sun rays are incident on the transparent cover and air inside it is heated.
- Hot air moves upward and removes the moisture of vegetables, grains, fruits, etc, placed in dryer.

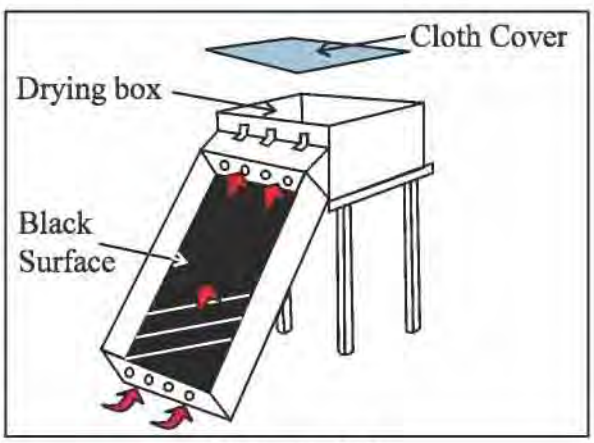


Figure 8.8

Uses :

- Grains, Fruits, Vegetables, are dried and dried fruits can be stored for long time.

Limitation :

- Can't be used at night.
- Can't be used in cloudy atmosphere.

Parabolic Solar Cooker :

Principle : Conversion of solar energy in to heat energy.

Construction :

- As shown in the figure, on the proper stand spherical or parabolic mirrors are adjusted.
- This arrangement is such that maximum solar energy is incident on its concave surface.

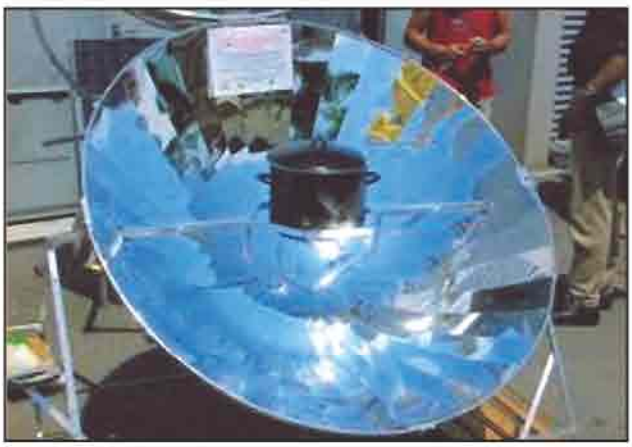


Figure 8.9

- Some parabolic cookers are adjusted in such a way that the mirrors move with the sun such that they allways face the sun.

Working :

- The solar energy incident on the large surface of mirror and after reflection converges to focal point.
- At the focal point of mirror, the container of cooking is placed.
- As per the type of mirror and place, the temperature of 180°C to 200°C is obtained.

Figure 8.10

Uses

Used for cooking food and roasting.

- Note other uses.

- Write the limitation of parabolic solar cooker.

Q.1 Make a model of solar dryer using card board and mirror.

Q.2 Write the benefits of usage of solar equipments.

Q.3 Write another use of parabolic solar cooker.

Q.4 Visit the persons in your village or city who uses solar energy. Note the name of instruments which they use.

Q.5 Take two saucers, pour equal amount of water in both. Adding black colour in water of one saucer makes it black. Keep both saucers in the sun light. After 45 minutes touch water of both saucers. Write observation.

9 Conservation of Environment

We have gone through the environment and its balance in previous standards. Now we will understand the conservation of environment.

Now, discuss the following points with your friends and prepare a note.

What is pollution?

What are the different kinds of pollution?

Where is plastic used?

What do you do with the waste of plastic after its use?

Look at the picture and note down the things found in it.

Figure 9.1

Plastic is used in uncontrolled manner now a days and it is one of the major factor responsible in disturbing the environmental balance.

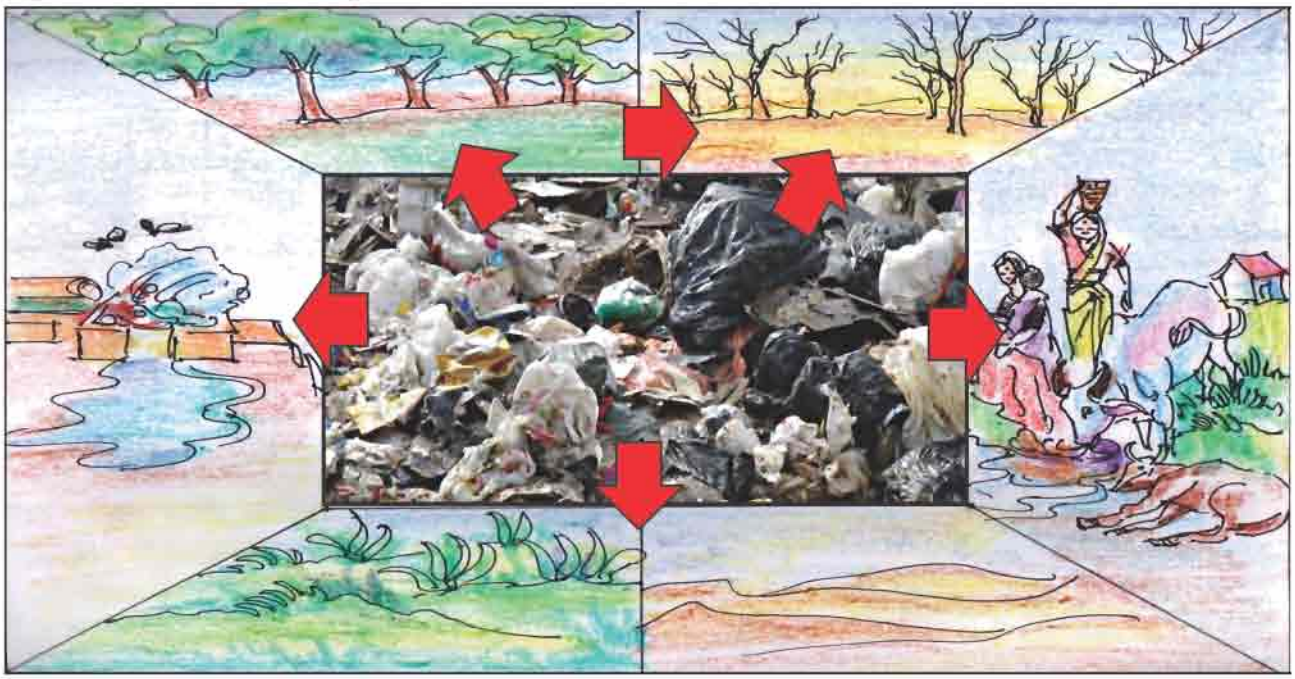


Figure 9.2

One plastic, many problems :

Now, we understand that to throw plastic everywhere, to burry it or to burn it can cause pollution. Thus plastic can disturb the environmental balance.

Thus, we can say that **SAY NO TO PLASTIC**

Let us celebrate a eco friendly week in our own school to encourage environmental awareness. We will conduct following activities during this week.

Day 1

We will send 4 to 5 groups of the students according to the strength of students in the class, to collect plastic waste in the surrounding of our school. We will gather all the plastic waste in our class room.

Let us think what can be done to the plastic waste

Day 2

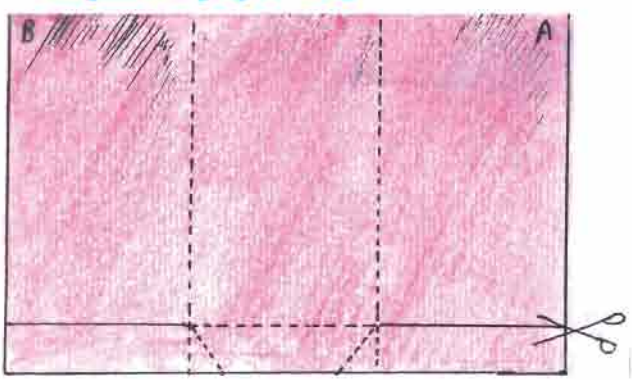
Teacher will divide the students into two groups. Each group will be asked to perform different activities as given bellow.

Group 1 : Thread can be prepared by using the polythene bags collected on previous day after cleaning them. This thread can be utilized to produce doormats, sitting mats or thread and for the cots (Khatla).

Group 1 : Wrappers of chocolates, biscuits, wafers and soap,bags of powder, tea etc can be cut and can be woven with thread to prepare a Toran and thus class can be decorated. Hence, we can use the plastic waste and develop useful things.

Day 3

Prepare a paper bag



- Take A rectangle news paper.
- Side A and B are joint.
- Stick two ends as shown in the figure.

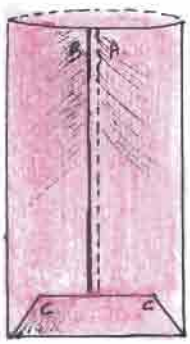


Figure -9.3

- Now twist the lower part of paper from C end and stick it.
- Thus, prepare a paper bag.

What are the benefits of preparing bags in such a way?

Day 4

Celebration of **'No plastic Day'**

Students and teachers will not use plastic in the school as well as at their homes on this day. Use alternative things on that day.

We can reduce use of the plastic

Reduce the use of plastic. Save the environment.

Day 5

A pit having 1 to 2 feet size is dug near the school to collect waste including plastic.

What do you find while digging?

Which things did you find in same condition?

Do you find any effect on plastic?

Decomposition of plastic takes long time. Thus plastic thrown on the land can harm the soil. Thus, we should bring awareness regarding the use of plastic.

Sq.	Type of waste	Time taken to decompose
1.	Fruit vegetables	3-4 weeks
2.	Paper	4-6 weeks
3.	Cloth	5-6 weeks
4.	Wood	6 months
5.	Metals	200-500 years
6.	Plastic / polythene	8-10 lakh years
7.	Glass	indefinite time

e Waste

Electronic equipments Figure -9.4

Electronic waste Figure -9.5

Notethe names of electronic items in your knowledge.

What do we do with the electronic items after its use?

Thus, wastage of electronic items is called e waste. e.g useless CD, old T.V., computer, mobile, calculator etc

E waste can not be destroyed by breaking or melting or burying it in soil

Electronic items contains circuit, IC, etc. This things are made up of metals like platinum, gold, mercury, soldering metal and chromium. Thus, it can cause pollution if it is thrown any where.

What type of solution can you find to reduce e-waste? Think.

Solution for e-waste control :

- Electronic items should be repaired and used for long time.
- Old items can be given back in exchange.
- Some merchants buy back e waste. They should be contacted and e waste can be sold.

- We can give things, which we do not use, to some needy person.

Figure -9.6

Bio Medical Waste :

For patients in dispensary or hospitals

- Things like syringe, needle, scalpel, scissors, slides, blood bottles, medicines, urobag, catheter, x ray film, operation equipments are used. These things are known as bio medical waste after they have been used.
- Some of them are sharp things eg. needle, slide, operation equipments etc
- Things like dressing material, blood samples, urine sample, removed tumor or organs are capable of spreading micro organisms.

Have you ever seen any special kind of method to collect waste in PHC, CHC, UHC, dispensary or hospital? Note down.

There are different coloured dust bins kept in the hospitals to collect different kind of waste. Waste is thrown in those dustbins as shown below.

Disposal of Bio medical waste according to its type :

Sr. no.	Colour of container	Type of waste	Disposal
1	Green	Additional food, paper waste	Bury in soil
2	Red	Plastic bag, plastic glows, plastic syring, other plastic etc.	Sterilize with chemical treatment or Radiation.
3	Yellow	Dressing material, Human organs, Tumor, Blood etc.	Burn them
4	White	Sharp thing like needle, blade, slide operation equipment etc.	Sterilize and break them.

Thus we can avoid air, water and soil pollution by disposal of biomedical waste, stop spread of disease and also secures public health.

Figure -9.6

Day 6

Visit any dispensary or hospital of your village or city. Discuss the following matters with any official.

Name of the place visited :

Does it have above given chart?

What type of arrangement is provided for the disposal of waste?

Do patients and staff use this arrangement properly?

Some institutions are actively working for the environmental awareness. One of them is center for environment education CEE at Thaltej, Ahmedabad

Q.1 What can you do to reduce plastic use? Note down.

Q.2 What happens if biomedical waste has not been disposed off properly?

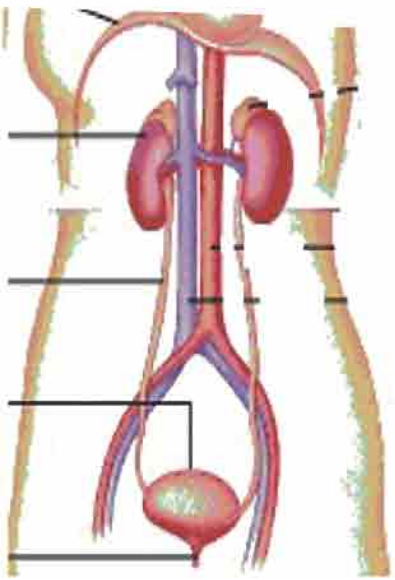
Q.3 Explain : "Excess use of plastic harms environment".

Q.4 Explain : It is our moral duty to conserve the environment.

Q.5 What happens if e-waste is not disposed off properly?

Revision 2

Q.1 Label the following diagram of excretory system :



Q.2 Give the function of following organs :

(1) Prostate gland : _____

_____

_____

(2) Uterus : _____

_____

_____

(3) Kidney : _____

_____

_____

(4) Urinary bladder : _____

_____

_____

Q.3 Visit the nearest fire station and ask them about their actions at the time of fire.

Q.4 Are we able to prepare a tea in a paper cup? Why?

Q.5 Explain 'Coal is fossil fuel'

Q.6 Explain 'Petroleum is fossil fuel'

Q.7 Give reason 'We must/should encourage the use of solar equipments'.

Q.8 Prepare a model of solar drier and dry potato chips in it.

Q.9 Why should the bio medical waste be destroyed properly.

Note

VII. Our Astronomical Heritage

Work of Ancient Indian Astronomers

Aryabhata

Aryabhata (5th and 6th Century AD)

An Indian mathematician and astronomer Aryabhata, in his treatise entitled Aryabhata, writes:

अनुलोमगतिः नौस्थः पश्यत्यचलं विलोमगं यद्वत् ।
अचलानि भानि तद्वत् समपश्चिमगानि लंकायाम् ।।

"Just as a man, moving in a boat downstream, sees the trees on the river bank go in the opposite direction, so it is with stars, which appear to move in the westerly direction when, in fact, they are fixed in space".

Aryabhata had thus independently discovered the fact of the earth's rotation on its polar axis as the cause of the rising and the setting of fixed stars. He also stated very clearly that our earth is spherical in shape, and is suspended in space, and explained the solar and lunar eclipses as shadow phenomena, interplay among the sun, moon and the earth. He was the discoverer of Trigonometry and was the first to determine the value of Pi fairly accurately. How he determined the value of Pi fairly accurately, is discussed earlier in the text. He also solved linear equations.

Aryabhata was born in Kerala and then migrated to Patna (Kusumapur). He was the Vice-Chancellor of Nalanda Vishwa Vidyapith.

Varahmihira

Varahmihira (6th Century A. D.)

Varahmihira was a scholar at the court of Ujjain, capital of Malva. Varahmihir was a famous astronomer of the 6th century A.D. He compiled all the knowledge in astronomy upto his time and wrote "Panchsiddhantika" and "Brihat Samhita". Brihat Samhita is an encyclopedia of knowledge about astronomy. Varahamihra was contemporary of Aryabhata. Varahmihira writes very highly of Aryabhata and his work.

Varahmihira was originally from the north-west and therefore, was referred to as Yavan.

In India Ujjain is centrally placed and is also located at the Tropic of Cancer and therefore the local time of Ujjain served as the standard time of the whole India in the ancient times.

Ujjain has been blessed by the great Parmanic River Kshipra and Mahakaal and many other Gods and Goddesses. Great Rishi Sandipani dwelled in Ujjain. Krishna and poor Brahmin Sudama of Porbandar came to the Ashram of great Sandipani to discuss themselves in various disciplines of Dharm lodge.

Brahmagupta (6th century A.D.)

Brahmagupta was a very great Indian mathematician of 6th century A.D and belonged to Bhinmaal (now located at the border of Gujarat and Rajasthan). He invented Algebra. He wrote the great books Brahma Sphut Siddhanta and Khanda Khadyakka. He profusely used the properties of zero and popularized them. At a young age, he was a harsh critic of the work of Aryabhatta, but in his later life he could realize the importance of the work of Aryabhatta. Hitherto he is considered Brahmagupta as great a mathematician and astronomer as Aryabhatta. He also solved the algebraic equation of the type $ax + b = 0$ and so on. He also came across equation of the type $ax^2 + b = 0$ but left it as an equation saying it is irrational, subsume. Later on the addition of this equation gave rise to imaginary and complex numbers.

Brahmagupta

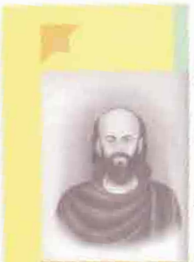
The books of Brahmagupta were translated into Arabic by Arab astronomers in the 8th & 9th century A.D. with name Al Hind Sind and Al Arkand. Brahmagupta's books introduced to Arabs the properties of mathematics in India, the knowledge and power of mathematics, zero, decimal system, algebra etc.

Brahmagupta also used Khandmeru to work out the expansion of $(a+b)^n$ for any positive integer n.

Kanad & Munjal

Rishi Kanad of 8th century researched the atoms and their structures.

Munjal was an astronomer in the 10th century A.D. who studied the precessional motion of axis of the earth, which is responsible for the shift of the zodiacal belt and hence the shift of Spring Equinox (First Point of Aries). He stated that the Sidereal belt shifts westward by 50 seconds of arc per year. This is very important and has to be taken into account for specifying the correct positions of stars in the sky, as the Spring Equinox is the origin of the reference frame with



Bhaskaracharya

Al-ma'mun Sun Library

reference to which the positions of stars are specified in the sky. As the origin itself shifts westerly by the amount of 50 seconds of arc per year, the positions of the stars also change slowly. So astronomers have to apply this correction for change of the origin to relocate the positions of stars in the sky. This is a cycle of about 25,600 years and is also responsible for change of the Pole Star, the cycle of change of the Pole star.

Bhashkaracharya (1114-1193)

Bhashkaracharya was a great Indian mathematician and astronomer of the 12th Century A.D. He belonged to Vijjalveed, Maharashtra. He researched gravitation. In the following shloka he says:

आकृष्ट शक्तिश्च मही तयायत्
खस्थं गुरुं स्वाभिमुखम्।
आकृष्यते तत्पततीव भाति
समे क्व यन्नात्क्व पतत्वियं खे ।।

The meaning of this shloka is that the earth has an attractive power. When a mango falls on the ground from a mango tree, it appears to be falling, but as a matter of fact, our earth attracts it, and that is the real reason that the mango appears to fall on the earth. It is probably owing to a lack of knowledge about the laws of motion that he could not formulate the theory of gravitation. Isaac Newton later did this in the 17th century.

Bhashkaracharya was also the discoverer of calculus, dx/dt, but could not elaborate it as a whole branch of mathematics with its applications in physics. Calculus was reinvented by Newton, and it was further advanced by French mathematician Leibniz.

Bhashkaracharya solved the equation of the type $2x^2 + 3x - 9 = 0$. In the most general form, the equation is $ax^2 + bx + c = 0$ where a, b and c are numbers. He also solved this equation in the most general form.

Bhashkaracharya also applied method of combinations and permutations to know how many ways are there to choose r things at a time out of n things. To choose 3 things at a time out of 10 things his formula was:

$$\frac{10\times8\times9}{1\times2\times3} = 10\times3\times4 = 120 \text{ ways}$$

Bhashkaracharya also used Khandmeru to get the expansion of $(a+b)^n$ for any positive integer n.

Raja Sawai Jai Singh-II

Raja Sawai Jai Singh II was the King of Amber and Jaipur. Even though he was a king, he was an astronomer par excellence. He was a contemporary of Newton. In order to correct the Almanac (Panchang), he wanted to study afresh the positions of some prominent stars. For this purpose, he constructed five observatories in India called Jantar-Mantar at Delhi, Jaipur, Varanasi, Mathura and Ujjain. There are scientific reasons why he constructed five observatories. By set up the huge masonry instruments in his observatories. By doing this, he did a great service to astronomy. He correctly observed the position of more than 1000 stars, also recalculated the inclination of the Ecliptic with the Celestial Equator.

Raja Sawai Jai Singh

Jantar Mantar Observatory - Jaipur