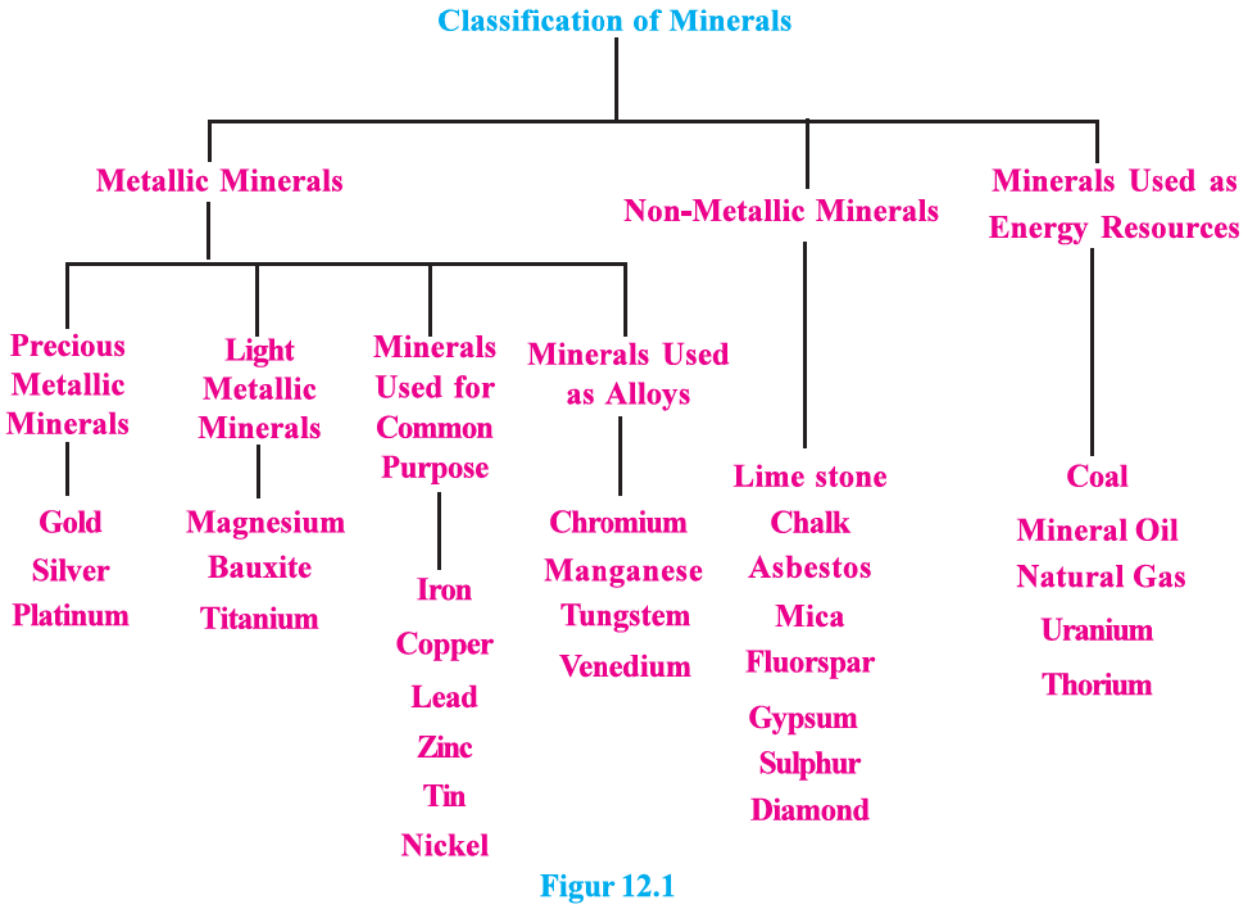
12 India : Minerals and Energy Resources

Requirements of primitive man were limited. He worked only to sustain his life. Man conquered the heights of evolution. Minerals have a large role in the human progress. Mineral is a natural resource. The human evolution process is divided into various ages, such as stone age, bronze age, iron age and modern age i.e. atomic age. In stone age, man used stones for hunting but now he is travelling into space. Man's relation with minerals is very old and strong. Today, minerals are considered to be the backbone of economic development of any nation. U.S. and Russia have become world powers only due to proper use of minerals. Both countries are rich in variety of minerals and prosperity. Even though our country has the potential huge reserves of minerals, a long term dependence and the absence of tehchnical knowledge resulted in lesser economic development.

What is Mineral ? :

The matter which is formed due to inorganic process and has a certain chemical composition is called a mineral.

This is a result of abiotic process which took place in the interior of the earth since the infinite time. The solid, liquid or gaseous matter, which is formed due to specific abiotic process within the rocks in the interior of the earth, has a certain chemical composition and homogeneous constitution and specific atomic structure is called 'mineral.' Iron, Manganese, Gold, Silver etc. are solid minerals, Mercury, Petroleum etc. are liquid minerals and natural gas is included as gaseous mineral. The type of minerals that are available from the interior of the earth depends on how the crust of the earth originated; e.g. Iron, Copper, Zinc, Gold and Silver etc. are found in igneous rocks. Diamonds are found in metamorphic rocks.



Figur 12.1

Iron Ore : Iron is considered to be the base of industrial development of modern world. It is used very widely in the making of small pins to large machines, cars, trucks, ships, railway, bridges, buildings and weapons. It is cheaper, strong and durable. It is easily available in most of the countries. It has a virtue to mix with other minerals hence it is considered to be an important mineral.

Iron is found in impure condition so it is mixed with cock and lime and heated in large furnaces for refining. The pure iron thus obtained is known as Pig iron.

There are four types of iron ore found in India : (1) Hematite (2) Magnetite (3) Limonite and (4) Siderite.

Maximum iron ore is obtained from Karnataka state in India. Orissa, Jharkhand, Chhattisgarh and Andhra Pradesh are other producers respectively. Besides, Iron ore is also found in Goa, Rajasthan, Tamil Nadu, Maharashtra, Madhya Pradesh, Kerala, Uttar Pradesh and Assam states.

Manganese : It is an important mineral for iron and steel industry. It is mainly used to make steel from iron. Its other uses are in chemical industry such as bleaching powder, insecticides, dry battery cells and tiles. It is also useful in leather industry, glass industry, matchbox industry, photography, china clay utensils and coloured bricks. The rails made out of steel and rods become more flexible and strong when manganese is mixed with it. Steel is used in the machines to break rocks and also in grinding machines.

Odisha, Karnataka, Madhya Pradesh and Goa can be counted as major states of manganese producers. Besids, Manganese is also obtained from Andhra Pradesh, Jharkhand, Rajasthan and Gujarat states.

Copper : Copper is used since primitive times. This was the first mineral used by man. It is more important because of its mixing property. It forms bell metal when mixed with Tin and makes Brass when mixed with Zinc. It is used mostly in the making of electric equipment, telephone, radio, television, refrigerator and air conditioners. It is good conductor of electricity. It is also used in insecticides, explosive, coloured glass, coins and in printing.

Copper is produced mainly by Jharkhand, Madhya Pradesh and Rajasthan states in India. Sikkim and Andhra Pradesh also produced it. Copper is also found in Bihar, Karnataka, Maharashtra, Tamil Nadu, Himachal Pradesh and Uttarakhand states.

Bauxite : This is an aluminium ore. It was found for the first time at Les Baux in 1921 in France. Alluminium is obtained from Bauxite. It is useful due to its special properties. It is very light in weight, strong, durable, good conductor of electricity, rust-free and easily ductile. It is widely used in the making of domestic utensils, electrical gadgets, colours and in ship building.

Bauxite is obtained from Odisha, Chhattisgarh, Maharashtra, Jharkhand and Gujarat. This mineral is found in the geological structure of Deccan Trap. Ranchi in Jharkhand and Jamnagar, Bhavnagar, Junagadh, Amreli, Surat and Sabarkantha districts in Gujarat produce Bauxite.

Mica : India ranks first in the world in Mica production. It is fire resistant and a bad conductor of electricity, so it is used in making electrical goods, such as electric motors, dynamo, radio, telephone, cars, steamers etc.

Bihar, Jharkhand, Andhra Pradesh and Rajasthan are major producers of Mica in India. Mica is also found in Karnataka, West Bengal and Tamil Nadu. There is a large reserve of muscovite type of Mica found in India.

Lead : The Lead ore is called galena. It is soft and heavy in weight. It is used to make alloys, electric wires, colour, weapons, glass, rubber and storage battery.

In India lead is available in Rajasthan, Andhra Pradesh and Tamil Nadu. It is also found in West Bengal, Madhya Pradesh, Uttar Pradesh, Orissa, Maharashtra, Meghalaya and Sikkim states.

Even though Mica is produced in sufficiant quantity, our demands are not met with, so it has to be imported.

Lime Stone : Lime stone is used in large quantity in the production of cement. Besides that it is also used for iron melting, chemical industry, soda ash, soap,colour-chemicals, building construction, paper and in sugar refining.

Andhra Pradesh, Rajasthan, Madhya Pradesh, Gujarat and Tamil Nadu produce about 70 % of Lime Stone of the country. Besides these, Chhattisgarh, Karnataka, Maharashtra, Himachal Pradesh are other states producing Lime stone.

In Gujarat. Jamnagar, Kachchh, Amreli and Kheda districts are major Lime stone producing districts. Other districts which also have Lime stone reserves are Banaskantha, Mahesana, Sabarkantha, Vadodara, Panchmahal, Bharuch, Narmada, Surat, Bhavnagar and Rajkot. The rocks in Jamnagar districts contain about 97 % lime content.

Minerals of energy resources

Energy resources hold an important place in the economic development of any nation. They keep the industries and the economy throbbing. These minerals include Coal, Mineral oil, Natural gas and Atomic minerals.

Classification of energy resources

Energy resources can be classified in different ways, such as conventional and non-conventional energy resources, commercial and non-commercial energy resources.

Coal, Mineral oil, Natural gas and Atomic minerals are considered as conventional or commercial energy resources. These are also non-renewable resources. Electricity is generated through these resources. Hydro energy, wind energy, solar energy, bio-gas, geothermal energy and tidal energy are non-conventional energy resources. These are also renewable resources. Peat coal, firewood, dung etc. are non-commercial energy resources.

Coal : Man has been using coal as an energy resource since ancient times. A question may arise in our mind as how the coal was formed in the interior of the earth ? In earlier times, vegetation prevailed

over the earth. Due to tectonic movements, this vegetation was buried in the interior. As a result, the trees containing carbon contents and some animals underwent gradual combustion due to the internal heat and pressure. Due to this, the vegetation was transformed into coal. The period before about 25 crore years known as carboniferous period. During this time, the gradual combustion of trees took place and it led to the formation of coal.

Usage of coal increased with the invention of steam engine. Means of transportation like railway and steamer were now easy to use. With the invention of electricity, coal became an important mineral for producing thermal electricity.

Some by products are available from coal, like coal-tar, ammonia gas, benzoyl and crude oil.

It is available from stratified rocks. On the basis of carbon, coal can be divided in to four types : (1) Anthracite coal (2) Bituminous coal (3) Lignite coal and (4) Peat coal.

Indian coal reserves : Major states producing coal in India are Jharkhand, Orissa, West Bengal, Chhatisgarh, Madhya Pradesh and Jammu Kashmir. Besides, Rajasthan, Tamil Nadu, Assam and Gujarat also produce coal.

Coal fields of Gujarat are located in Kachchh, Bharuch, Mahesana, Bhavnagar and Surat. Lignite coal is available here.

Mineral oil : It is found in the stratified rock strata containing lime stone, shale etc. In ancient times, animals and vegetation were buried in the interior of the earth and were converted into hydro-carbons. This form was in almost liquid form. Due to tectonic movements the layers of these forms were gradually elevated towards the surface. Some of them went towards the sea floor while some strata came up from the interior.

In 1866, first oil well was dug in Assam to find out oil. After mineral oil was obtained from Makum(Assam) in 1867, more oil fields were also located in different parts of India.

The oil fields of India are divided into five zones : (1) Oil fields of North-East (2) Oil fields of Gujarat (3) Oil fields of Bombay High (4) Oil fields of Eastern Coast (5) Oil fields of Rajasthan.

Oil fields of Gujarat :

After Independence, oil was first struck at Lunej of Kheda (now in Anand dist) district in 1958. There after, oil was found at Ankleshwar, Mahesana, Kalol, Navagam, Kosamba, Sanand, Ahmedabad, Gandhinagar, Vadodara, Bharuch and Bhavnagar.

Mineral oil refining :

In India, the refineries are located at Guwahati, Barauni, Koyali, Kochi, Chennai, Mathura, Kolkata and Haldia. The largest oil refinery of the world is located at Jamnagar in Gujarat.

Natural Gas : Natural gas is associated with mineral oil. It is separated from it. It is cheaper and considered to be a non-pollutant source of energy. The reserves of natural gas in our country are found in Khambhat basin, Kaveri basin and Jaisalmer (Rajsthan). Ankleshwar of Gujarat is considered to have the largest natural gas reserve.

Non-conventional Energy Sources :

Resources like coal or mineral oil are available in limited quantity. Attempts have started to conserve them for a longer time. Wind energy, solar energy, bio-gas, tidal energy and geothermal energy are included as alternate resources. These are all renewable energy resources. Some identify them as inexhaustible resources.

Many countries in the world have taken steps in this direction. U.S., Russia, France, Canada, Australia, Nethelands and Japan are advancing in this field effectively. In 1981, Commsion for Additional Sources of Energy (CASE) was established in India. Gujarat Energy Development Agency (GEDA) is working in this direction.

Solar Energy : Sun is considered to be the main source of energy on the earth. It is visible during most of the days of the year. The biosphere on the earth throbs due to solar energy. India has progressed well due to solar energy technology. Solar cooker is used for cooking, solar heater for heating the water and solar panels are used to generate electricity.

Gujarat state gets maximum solar energy in India.GEDA (Gujarat Energy Development Agency) has established a solar cold storage near Chhani (Vadodra) with a capacity of 10 tonnes. Today, solar panels are fixed to provide street lights in those villages without electricity, for irrigation to the farms and for television. A solar energy plant has been installed at Madhopur near Bhuj in Gujarat for desalination of saline ocean water. Use of equipment working on solar energy is on increase in the country today.

Wind Energy : The Sun provides thermal energy on the surface of the earth. Winds are formed due to the high and low pressure pockets formed in the atmosphere. In our country, wind energy is obtained through the windmills at the sea coasts and in open space. India has become fifth country in the world to produce energy through wind.

Gujarat, Tamil Nadu, Maharashtra, Andhra Pradesh, Odisha, Karnataka, Madhya Pradesh and Kerala states in India produce wind energy.

In Gujarat, Wind farms are operated at Lambha village near Jamnagar and at the sea coast near Mandavi in Kachchh. Electricity is generated at the windmills founded in Devbhumi Dwarka, Jamnagar, Kachchh, Rajkot, Porbandar districts.

Bio-Gas : Useless agriculture materials, molasses (remains of sugar cane), other vegetation, dung and human excreta are used to produce bio-gas. The methane gas is released after these material get decomposed. This is an inflammable gas. Precious fertilizer without any virus is obtained after it is used up. Thus, the energy as well as fertilizer both can be obtained. This is a non-conventional source of energy resource. Solar energy and bio-gas can change the traditional life style of villages of India. Villages can be cleaner and the scarcity of their domestic energy can be removed.

Uttar Pradesh and Gujarat hold first and second places respectively in the bio-gas production. The largest bio-gas plant has been installed at Maithan near Siddhpur in Gujarat which is run on collective basis. Other bio-gas plants in operational conditions are located at Rudratal of Daskroi taluka of Ahmedabad and at Dantiwada in Banaskantha districts. Moreover, plants which are used increasingly and funded by individul or collectivelly.

Geothermal Energy : The thermal energy from the interior of the earth comes to the surface of the earth in the form of geysers or hot springs. Due to heat, these are transformed into vapour. This vapour exerts upward pressure on the ground water which releases energy. By using this energy, the geothermal energy is obtained.

Hot water springs in Gujarat are located at Lasundra, Unai, Tuva and at Tulsishyam. There are possibilities of getting geothermal energy from them.

Tidal Energy : The process of tides and ebbs continues constantly in all oceans on the surface of

the earth due to the gravitational force exerted by the sun and the moon. Man utilises this power of water in generating electricity. Tidal waters have more power. A turbine is connected with it to generate electricity. In 1910, France started this project to get electricity with the help of tides and ebbs. As India has a long coastline, it has the potential to generate such energy.

This project has been started in the Gulf of Kachchh and the Gulf of Khambhat.

Mineral preservation :

Minerals are necessary for the existence and development of human beings. Man himself has to think about certain points about this. Man has to think about some aspects for the preservation of minerals. What is preservation ? The efficient and well planned use of minerals is the preservation of minerals. Today, every nation wants to increase its export for its own development. Minerals are used in unrestricted manner by exporting them to earn foreign exchange for its own development. That is why the preservation of minerals has become necessary.

Remedies for mineral preservation :

(1) Use of proper technology : If a proper technology is used to obtain the minerals, the wastage of minerals can be reduced.

(2) Recycling : The scrap of minerals like iron, copper, aluminium, and tin should be reused.

(3) Alternate use of minerals : Alternate option should be found out for those minerals which are found in less quantity; e.g. solar energy instead of electricity, alluminium instead of copper, CNG instead of petrol etc.

(4) Use of non-conventional means : The non-conventional sources like water, solar, wind, bio-gas etc. should be used increasingly.

(5) Sustainability : Maintain the purity of the environment and gift the clean environment to the future generation. Attempts should be made for pollution-free environment.

(6) After the reserves of the minerals is calculated, it can be used for a long period by planning it properly.

It is necessary to preserve and enhance the minerals.

Exercise

1. Answer the following questions in details :

(1) Give a detail information about mineral oil.

(2) State the remedies to preserve the minerals.

(3) Write about electricity in brief.

2. Answer the following questions pointwise :

(1) State the uses of limestone.

(2) State about Mica.

(3) Mention the utility of Copper.

(4) Write about the classification of minerals.

3. Answer the following questions in brief :

(1) 'Modern age is known as mineral age.' - Why ?

(2) Why there is an increase in the usage of non-conventional energy today ?

(3) State the major places where iron is available.

(4) Which states in India produce manganese ?

4. Select the correct option from the options given for the following questions and write answer :

(1) A school in Palanpur wants to show a bio-gas plant to its students of Std. 10. Which nearest place will it select ?

(A) Dhuvaran (B) Dantiwada (C) Maithan (D) Undrel

(2) Some officers from Government of India want to visit Gujarat to survey the possibility of using the geothermal energy in future in Gujarat. Which place they should avoid. ?

(A) Tulsishyam (B) Unai

(C) Saputara (D) Lasundra

(3) Match the correct pairs and find the answer :

(a) Silver, platinum	(1) A mineral of common use
(b) Magnesium, titanium	(2) A mineral used in mixed form
(c) Lead, nickel	(3) Precious metallic mineral
(d) Tungsten, vanadium	(4) Light metallic mineral

(A) (a - 1), (b - 3), (c - 2), (d - 4) (B) (a - 3), (b - 4), (c - 1), (d - 2)

(C) (a - 2), (b - 2), (c - 4), (d - 3) (D) (a - 4), (b - 1), (c - 3), (d - 2)

Activity

- Arrange a visit to a mine to get information about mining during the annual tour of your school.
- Collect the pictures about mining activity and prepare an album.
- Make a list of the things which are made from minerals and used in home or in the school.