

## 3 Mineral and Power Resources



08582103



Fig. 3.1: Loading of a truck in a coal mine

Kiri was visiting Sukant in his native place near Dhanbad. Kiri was amazed to see that large areas were black. "Sukant, why is this place so black and dusty?" she asked. "This is because of the coal mines nearby. Do you see the trucks? They are carrying the mineral coal", replied Sukant.

"What are minerals?" asked Kiri. Sukant replied, "Have you ever seen a baker baking biscuits? The flour, milk, sugar and sometimes eggs are mixed

together. While eating the baked biscuits can you see these ingredients separately? Just as in the biscuits, there are a number of things that you cannot see, rocks on this earth have several materials called minerals mixed in them. These minerals are scattered throughout the earth's rocky crust".

A naturally occurring substance that has a definite chemical composition is a **mineral**. Minerals are not evenly distributed over space. They are concentrated in a particular area or rock formations. Some minerals are found in areas which are not easily accessible such as the Arctic ocean bed and Antarctica.

Minerals are formed in different types of geological environments, under varying conditions. They are created by natural processes without any human interference. They can be identified on the basis of their physical properties such as colour, density, hardness and chemical property such as solubility.

### Do you know?

The salt in your food and graphite in your pencil are also minerals.



## TYPES OF MINERALS

There are over three thousand different minerals. On the basis of composition, minerals are classified mainly as metallic and non-metallic minerals (Fig. 3.2).

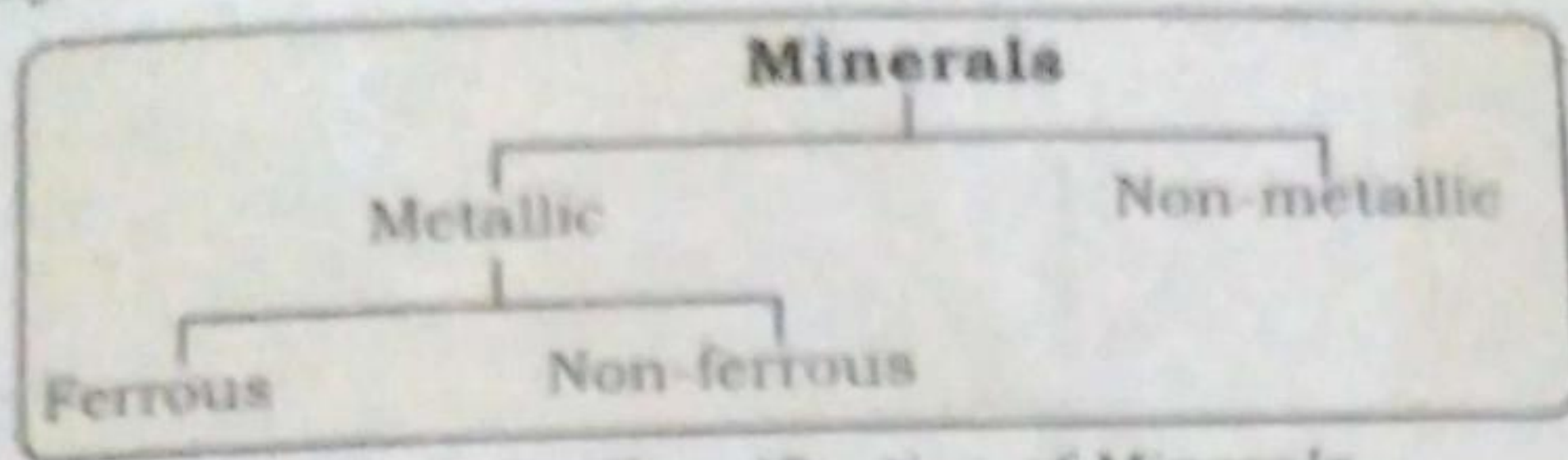


Fig. 3.2: Classification of Minerals

**Metallic** minerals contain metal in raw form. Metals are hard substances that conduct heat and electricity and have a characteristic lustre or shine. Iron ore, bauxite, manganese ore are some examples. Metallic minerals may be ferrous or non-ferrous. **Ferrous** minerals like iron ore, manganese and chromites contain iron. A **non-ferrous** mineral does not contain iron but may contain some other metal such as gold, silver, copper or lead.

**Non-metallic** minerals do not contain metals. Limestone, mica and gypsum are examples of such minerals. The mineral fuels like coal and petroleum are also non-metallic minerals.

Minerals can be extracted by mining, drilling or quarrying (Fig 3.3).

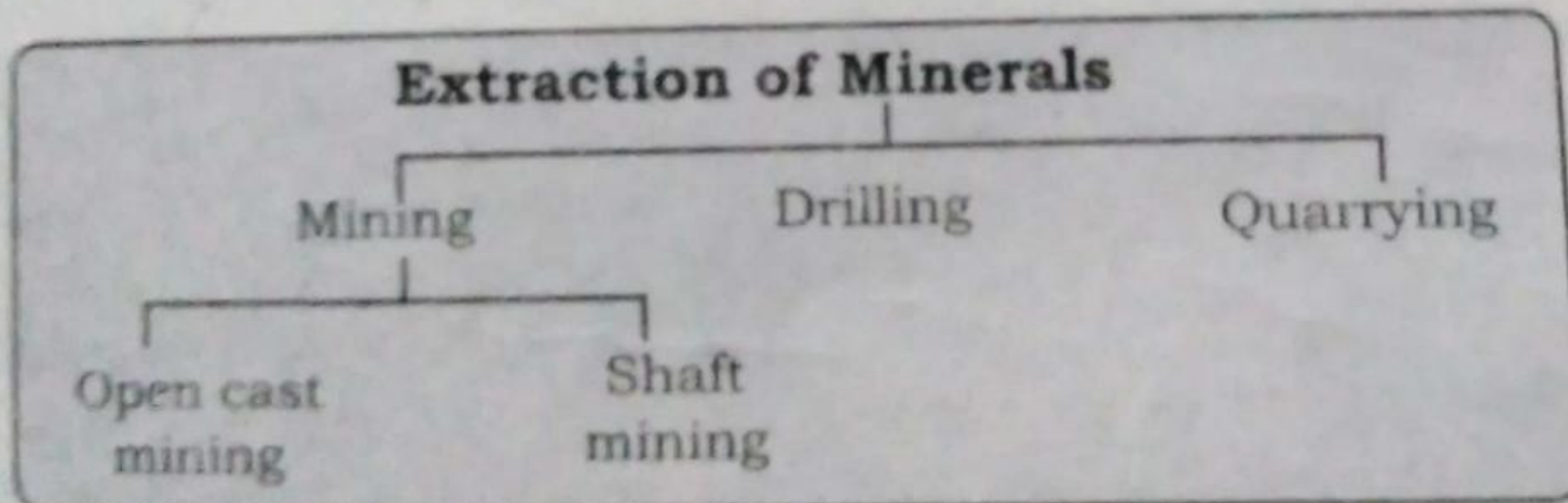


Fig. 3.3: Extraction of Minerals

The process of taking out minerals from rocks buried under the earth's surface is called **mining**. Minerals that lie at shallow depths are taken out by removing the surface layer; this is known as **open-cast mining**. Deep bores, called **shafts**, have to be made to reach mineral deposits that lie at great depths. This is called **shaft mining**. Petroleum and natural gas occur far below the earth's surface. Deep wells are bored to take them out, this is called **drilling** (Fig 3.4). Minerals that lie near the surface are simply dug out, by the process known as **quarrying**.

**Do you know**  
A **rock** is an aggregate of one or more minerals but without definite composition of constituent of mineral. Rocks from which minerals are mined are known as **ores**. Although more than 2,800 types of minerals have been identified, only about 100 are considered **ore** minerals.



Fig. 3.4: Off shore drilling of oil

## CONSERVATION OF MINERALS

Minerals are a non-renewable resource. It takes thousands of years for the formation and concentration of minerals. The rate of formation is much smaller than the rate at which the humans consume these minerals. It is necessary to reduce wastage in the process of mining. Recycling of metals is another way in which the mineral resources can be conserved.



Recycle

Think and Act

## POWER RESOURCES

Sunny's mother begins her day by switching on the geyser. She irons Sunny's school uniform before waking him up. She then rushes to the kitchen to prepare a glass of orange juice for him in the blender.

"Sunny, have you finished taking bath? Come and have your breakfast", calls out mother while preparing breakfast on the gas stove for Sunny.

While going to school Sunny forgets to switch off lights and fans. When mother switches them off she thinks that life in the cities may be more comfortable, but its dependency on more and more gadgets all of which consume energy has led to a wide gap between the demand and the supply. With the advent of science and technology the life styles are changing very fast.

Power or energy plays a vital role in our lives. We also need power for industry, agriculture, transport, communication and defense. Power resources may be broadly categorised as conventional and non-conventional resources.

### Conventional Sources

401

Conventional sources of energy are those which have been in common use for a long time. Firewood and fossil fuels are the two main conventional energy sources.

#### Firewood

It is widely used for cooking and heating. In our country more than fifty per cent of the energy used by villagers comes from fire wood.

Remains of plants and animals which were buried under the earth for millions of years got converted by the heat and pressure into fossil fuels. **Fossil fuel** such as coal, petroleum and natural gas are the main sources of

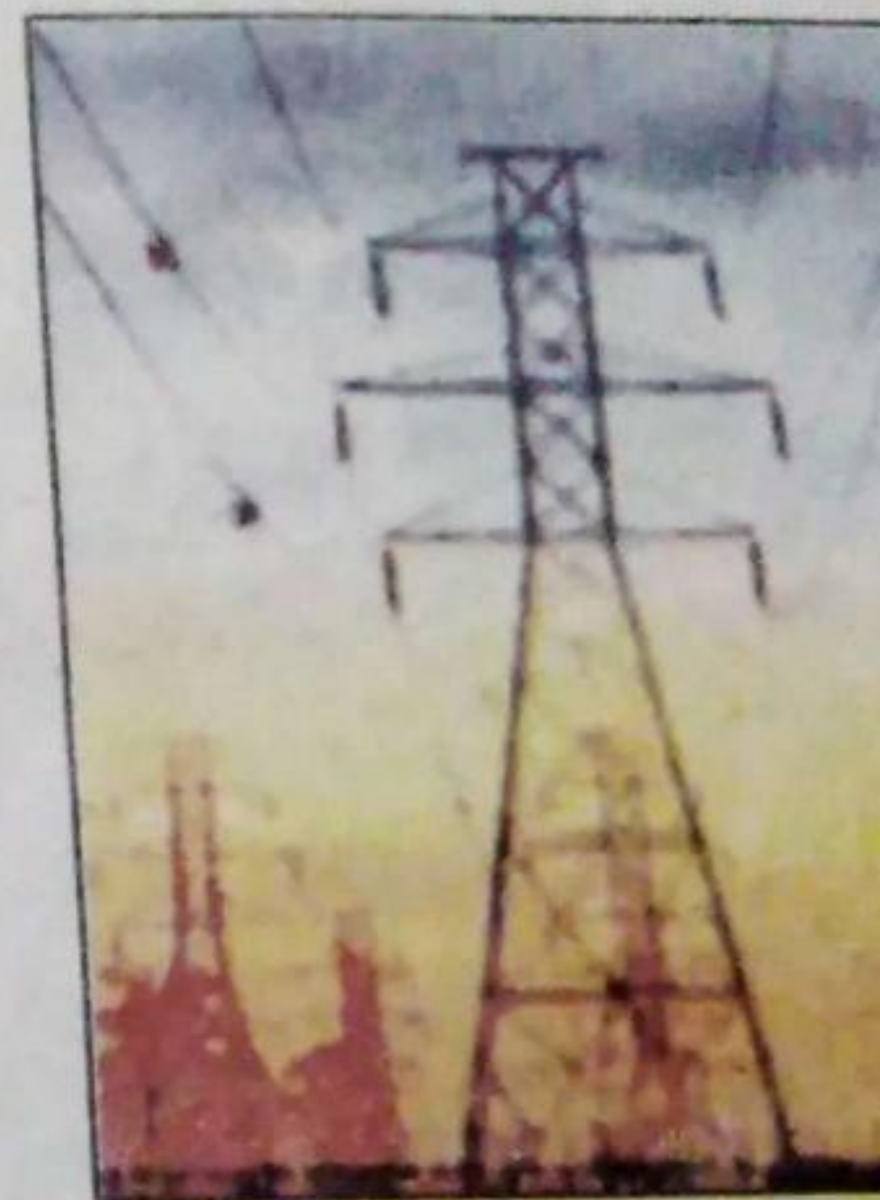


Fig. 3.7: National Grid to supply Ele

## Petroleum

The petrol that keeps your car running as well as the oil that keeps your cycle from squeaking, both



Fig 3.11: Crude Oil

began as a thick black liquid called Petroleum. It is found between the layers of rocks and is drilled from oil fields located in off-shore and coastal areas. This is then sent to refineries which process the crude oil and produce a variety of products like diesel, petrol, kerosene, wax, plastics and lubricants. Petroleum and its derivatives are called **Black Gold** as they are very valuable. The

chief petroleum producing countries are Iran, Iraq, Saudi Arabia and Qatar. The other major producers are USA, Russia, Venezuela, and Algeria. The leading producers in India are Digboi in Assam, Bombay High in Mumbai and the deltas of Krishna and Godavari rivers.

## Natural Gas

4 (ii)

(Natural gas is found with petroleum deposits and is released when crude oil is brought to the surface) It can be used as a domestic and industrial fuel. Russia, Norway, UK and the Netherlands are the major producers of natural gas.

In India Jaisalmer, Krishna Godavari delta, Tripura and some areas off shore in Mumbai have natural gas resources. Very few countries in the world have sufficient natural gas reserves of their own.

The sharp increase in our consumption of fossil fuels has led to their depletion at an alarming rate. The toxic pollutants released from burning these fuels are also a cause for concern. Unchecked burning of fossil fuel is like an unchecked dripping tap which will eventually run dry. This has led to the tapping of various non-conventional sources of energy that are cleaner alternatives to fossil fuels.

### Word Origin

The word petroleum is derived from Latin words - *Petra* meaning rock, *oleum* meaning oil. So, petroleum means rock oil.

### Do you know?

Compressed natural gas (CNG) is a popular eco-friendly automob fuel as it causes less pollution than petroleum and diesel.

### Do you know?

Norway was the first country in the world to develop hydroelectricity.

## Hydel Power

Rain water or river water stored in dams is made to fall from heights. The falling water flows through pipes inside the dam over turbine blades placed at the bottom of the dam. The moving blades then turn the generator to produce electricity. This is called hydro electricity. The water discharged after the generation of electricity is used for irrigation. One fourth of the world's electricity is produced by hydel power. The leading producers of hydel power in the world are Paraguay, Norway, Brazil, and China. Some important hydel power stations in India are Bhakra Nangal, Gandhi Sagar, Nagarjunsagar and Damodar valley projects.

### Do you know?

The site of the world's first solar and wind powered bus shelter is in Scotland.

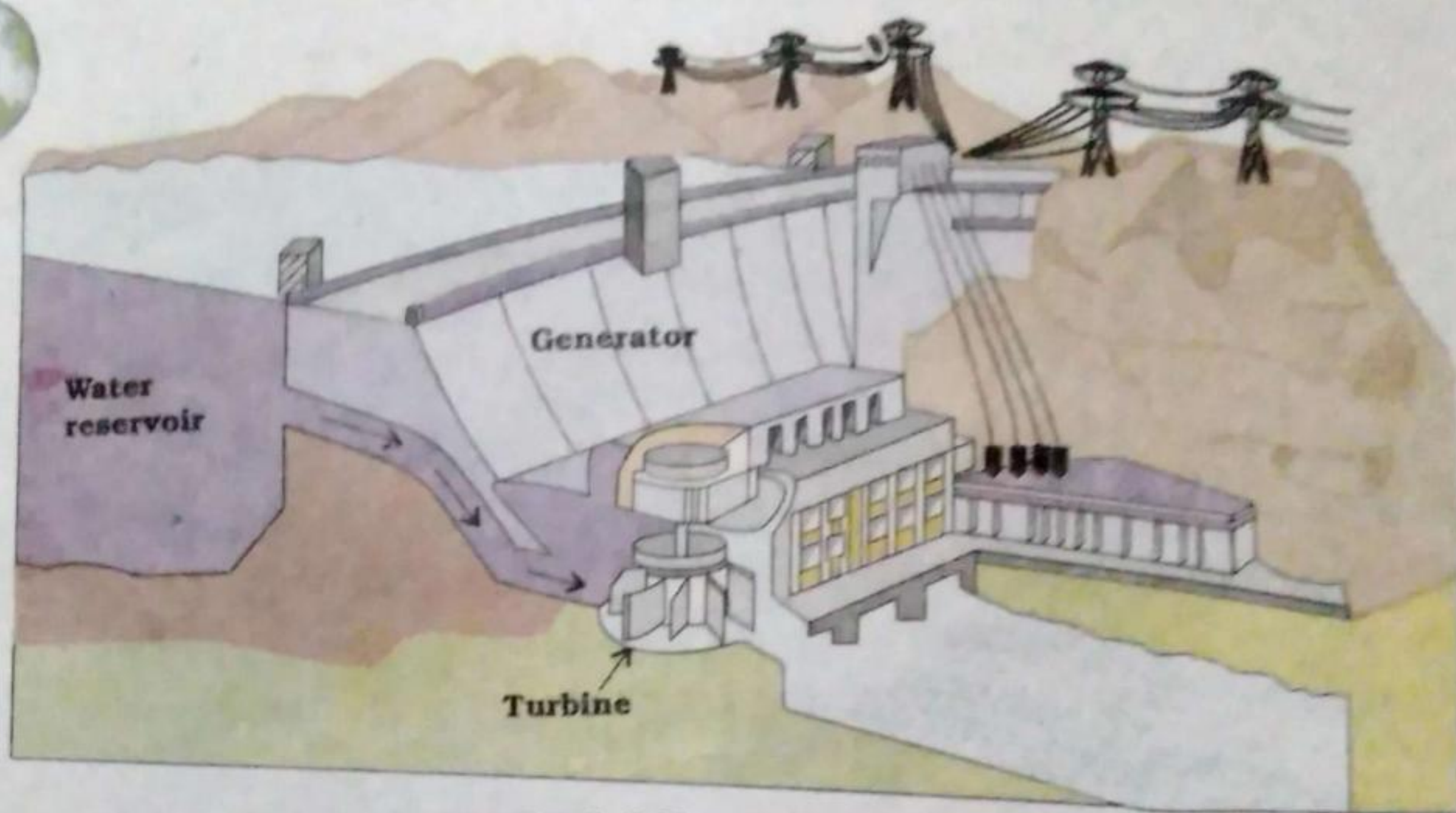


Fig. 3.12: Hydel Power

## NON-CONVENTIONAL SOURCES OF ENERGY are alternative

The increasing use of fossil fuels is leading to its shortage. It is estimated that if the present rate of consumption continues, the reserves of these fuel will get exhausted.

Moreover, their use also causes environmental pollution. Therefore, there is need for using non-conventional sources such as solar energy, wind energy, tidal energy which are renewable.

EX -

### Solar energy

Sun's heat and light energy can be felt by us every day. Solar energy trapped from the sun can be used in solar cells to produce electricity. Many of these cells are joined into solar panels to generate



Fig. 3.13: Salal Hydroelectric Project Jammu and Kashmir

openings of the sea. During high tide the energy of the tides is used to turn the turbine installed in the dam to produce electricity. Russia, France and the Gulf of Kachchh in India have huge tidal mill farms.

### 4. (ii) BIOGAS

Organic waste such as dead plant and animal material, animal dung and kitchen waste can be converted into a gaseous fuel called biogas. ~~The organic waste is decomposed by bacteria in biogas digesters to emit biogas which is essentially a mixture of methane and carbon dioxide.~~ Biogas is an excellent fuel for cooking and lighting and produces huge amount of organic manure each year.

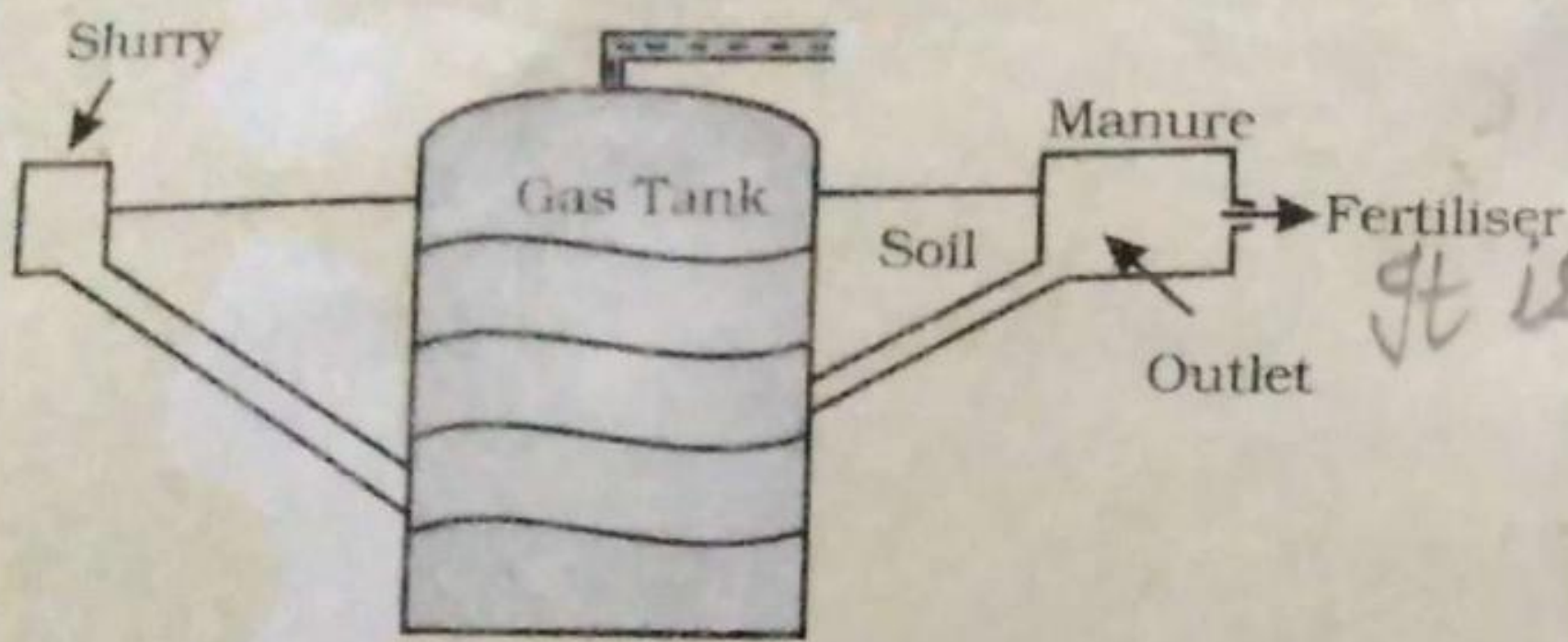


Fig. 3.21 : Biogas

Energy is everywhere but we can see that harnessing this energy is both difficult as well as costly. Each one of us can make a difference by not wasting energy. Energy saved is energy generated. Act now and make brighter energy future.

### Exercises

#### 1. Answer the following questions.

- (i) Name any three common minerals used by you every day.
- (ii) What is an ore? Where are the ores of metallic minerals generally located?
- (iii) Name two regions rich in natural gas resources.
- (iv) Which sources of energy would you suggest for
  - (a) rural areas
  - (b) coastal areas
  - (c) Arid regions
- (v) Give five ways in which you can save energy at home.



**2. Tick the correct answer.**

- (i) Which one of the following is NOT a characteristic of minerals?
- (a) They are created by natural processes.
  - (b) They have a definite chemical composition.
  - (c) They are inexhaustible.
  - (d) Their distribution is uneven.
- (ii) Which one of the following is a leading producer of copper in the world?
- (a) Bolivia
  - (b) Ghana
  - (c) Chile
  - (d) Zimbabwe
- (iii) Which one of the following practices will NOT conserve LPG in your kitchen.
- (a) Soaking the dal for some time before cooking it.
  - (b) Cooking food in a pressure cooker.
  - (c) Keeping the vegetables chopped before lighting the gas for cooking.
  - (d) Cooking food in an open pan kept on low flame.

**3. Give reasons.**

- (i) Environmental aspects must be carefully looked into before building huge dams.
- (ii) Most industries are concentrated around coal mines.
- (iii) Petroleum is referred to as "black gold".
- (iv) Quarrying can become a major environmental concern.

**4. Distinguish between the followings.**

- (i) Conventional and non conventional sources of energy
- (ii) Biogas and natural gas
- (iii) Ferrous and nonferrous minerals
- (iv) Metallic and nonmetallic minerals

**5. Activity**

- (i) Use pictures from old magazines to show different kinds of fuels used by us in our lives and display them on your bulletin board.
- (ii) Design a poster highlighting energy conservation tips you would take for your school.
- (iii) Salma's class took up an action campaign to do an energy audit of their school by surveying electricity consumption. They prepared survey sheets for the students of the school.

Resources and Development

Que. 1.

Ans 1. Salt, petroleum and gold are the common minerals that are used by humans on a regular basis.

Ans 2. Ores are the rocks which are mined to extract minerals from them. Minerals occur in different types of rocks. Some are found in igneous rocks, some in metamorphic rocks while other occur in sedimentary rocks. The ores of metallic minerals are found in igneous and metamorphic rock formations that form large plateaus.

Ans 3. The United Kingdom and the Netherlands are the major producers of natural gas.

Ans 4. In rural Areas - Coal, solar energy, Biogas and firewood  
In coastal areas - wind power, petroleum,



and tidal power

In Arid Areas - Geothermal powers, and solar energy.

Ans 5. The five ways are followings:-

- (i) Switch off light, TV and fan when not in use.
- (ii) Close tap properly
- (iii) Use pressure cooker for cooking.
- (iv) Prefer walking or using bicycle for short distance.
- (v) Minimize the use of refrigerator, air conditioner and lifts.

Give Reasons: (Que 3)

(i) Construction of a huge dam creates large scale destruction of natural vegetation and wildlife in those areas, which get submerged. This is not good for the ecosystem.

(ii) Coal is an important source of energy

Don't believe in making right decisions. Take decisions & try to make them right.

and hence most of the industries are located around coal mines.

(iii) Petroleum is a thick black liquid and is a valuable resource for various industries. Hence, it is also known as "Black Gold".

(iv) Quarrying creates many problems. Fine dust particles spread in the air around a quarrying site. Dust particles from quarry can cause respiratory problems. It also destroys natural vegetation, and thus the home of many wild animals.