



The crust of the Earth consists of rocks. All rocks are composed of one or more minerals. Minerals are naturally occurring substances formed of one or more chemical elements with a definite range in chemical composition. They may usually have a crystal form. Rocks may have minerals mixed like flour, milk and sugar in a baked biscuit having a large amount of a particular mineral. Minerals are created by natural processes in different types of geological environments, under varying conditions.

A rock which has a large concentration of a particular mineral (of sufficient economic value) is called the ore of that mineral. Although more than 2800 types of minerals have been identified, only about 100 are considered ore minerals.

Minerals can be identified on the basis of their physical properties such as colour, density, hardness and chemical properties. Hardness refers to resistance to scratching, breakage and cleavage (cutting). It depends on the strength of bonds between atoms.

Types of Minerals

Based on composition, minerals are classified mainly as metallic and non-metallic minerals. The **metallic minerals** contain metal in raw form. **Metals** are malleable substances that conduct heat and electricity through them. They also have a characteristic lustre or shine as they reflect light. For example, iron, aluminium, copper. The ore of aluminium is called as bauxite. Metals are further classified as ferrous and non-ferrous. **Ferrous** metals have magnetic properties like iron, chromium and manganese. Metals other than ferrous metals are called **non-ferrous** metals like gold, silver, copper, zinc. Their minerals are known by different names.

Non-metallic minerals do not contain metals. For example, limestone, gypsum, mica, salt, graphite. Mineral fuels like coal and petroleum are also non-metallic minerals. Coal and petroleum are called minerals as they are mined or extracted from the Earth. Mineral fuels are also called as fossil fuels or energy fuels.

Extraction of Minerals

The method of extraction depends on the type of mineral and the depth at which it is located in the Earth's crust. Usually commercially valuable minerals are extracted. Over one hundred minerals are mined. The process of taking out minerals from rocks buried under the Earth's surface is called **mining**. Mining is limited to the site where the mineral is found in concentration otherwise it would not be economically profitable to extract it.

Minerals that lie at shallow depths are taken out by digging, removing the surface layer and then further digging. This is known as open-cast mining. Such mines are called **open-pit mines** or **quarries**. Deep wide bores or holes called **shafts** are made to reach mineral deposits that lie at great depths. Miners use lifts to reach down the shafts into the underground chambers at the sides of the shafts. This is called **shaft mining**. Petroleum and natural gas occur far below the Earth's surface. Deep wells are bored to take them out of the Earth. This process is known as **drilling**. These wells are known as **oil and gas wells**.



Fact File

The gems in your jewellery, graphite in your pencil and the salt in your food are also minerals.

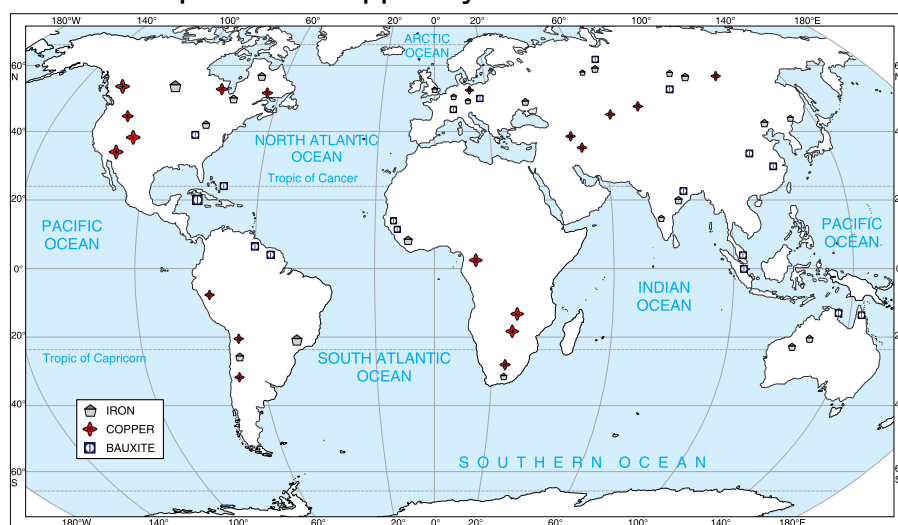
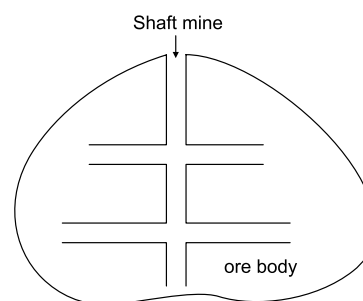
Distribution of Minerals World Wide

Metallic minerals are usually found in igneous and metamorphic rock formations that form large plateaus. (Igneous rocks are formed from the cooling of lava. When igneous rocks or sedimentary rocks are buried under the Earth under high pressure and temperature they are changed to metamorphic rocks). For Example, iron ore in north Sweden, iron, nickel, chromites and platinum in South Africa, copper and nickel deposits in Ontario, Canada. Sedimentary rocks are formed by the collection of sediments on sea beds, lower layers under the pressure of upper layers.

Sedimentary rock formations of plains and young fold mountains contain non-metallic minerals and mineral fuels. For example, lime stone deposits of Caucasus region of France, phosphate beds of Algeria, oil in West Asia.

Asia : China, Malaysia and Indonesia are among the world's leading tin producers. China also leads in the production of lead, antimony and tungsten. India and China have large iron ore deposits. Mineral deposits of bauxite, copper, manganese, nickel and zinc are also found in Asia.

Europe : Russia, Ukraine, France and Sweden have large iron ore deposits. It makes Europe the leading producer of iron ore in the world. Mineral deposits of copper, lead, zinc, manganese and nickel are found in eastern Europe and European Russia.



World: Distribution of Iron, Copper and Bauxite

Africa : Africa is the world's largest producer of diamonds, platinum and gold. A large portion of the world's gold is produced by South Africa, Zimbabwe and Zaire. Minerals containing copper, iron, aluminium, chromium, cobalt and uranium are found in Africa. Mineral oil is found in Libya, Nigeria and Angola.

North America : Ores of iron, nickel, copper, gold and uranium are extracted in the Canadian Shield region (north of the Great Lakes), coal in the Appalachians region. Western cordilleras (mountain ranges) have vast deposits of copper, gold, silver, lead and zinc.

South America : Brazil and Bolivia are among the world's largest producers of tin. Chile and Peru are leading producers of copper. Brazil is the largest producer of high grade iron ore. Large deposits of bauxite, mica, asbestos, manganese, zinc, chromium, silver, gold, platinum and diamond are also found in South America. Oil is found in Venezuela, Argentina, Chile, Peru and Columbia.

Australia : Australia is the largest producer of bauxite in the world. It is a leading producer of gold, diamond, iron ore, tin and nickel. Kalgoorlie and Coolgardie in western Australia have the largest deposits of gold. Australia is also rich in copper, lead, zinc and manganese.

Antarctica : Iron ore, gold, silver, oil and coal are present in sufficient quantities.

Distribution of Minerals in India

The chief minerals of India are found in the states mentioned against them.

Mineral	Location
Iron	Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, Maharashtra, Goa, Karnataka
Bauxite	Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, Maharashtra, Goa, Karnataka
Copper	Rajasthan, Madhya Pradesh, Jharkhand, Karnataka, Andhra Pradesh
Manganese	Maharashtra, Madhya Pradesh, Chhattisgarh, Orissa, Karnataka, Andhra Pradesh
Gold	Kolar in Karnataka (extraction is very expensive as the mines are among the deepest in the world)
Mica	Jharkhand, Bihar, Andhra Pradesh, Rajasthan (India is the largest producer and exporter of mica in the world)
Limestone	Bihar, Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, Rajasthan, Gujarat, Tamil Nadu
Salt	Coasts of Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu from sea water, Rajasthan (Sambhar lake and wells in Falaudi near Jodhpur)
Gypsum	Rajasthan, Gujarat, Himachal Pradesh, Tamil Nadu
Diamond	Madhya Pradesh (Panna), Andhra Pradesh (Golconda), (also found in Orissa and Chhattisgarh)

Uses of Minerals

Minerals have vast and varied uses. Minerals are used in the manufacture of utensils, machinery, building materials, fertilisers etc. For example, copper and steel are used in everything from coins to pipes. Silicon, obtained from quartz is used in computers. Aluminium, obtained from bauxite is used in automobiles and airoplanes, cooking utensils, buildings etc. Coloured, transparent hard minerals are used as gems in jewellery. Coal, petroleum and natural gas are principal energy resources. Even minerals like clay, gypsum, quartz, sand, limestone, asbestos and mica find a vast use.



Quarrying of limestone

Conservation of Minerals

The stock of the minerals in nature is limited. They are non-renewable. It takes thousands to millions of years for the formation and concentration of minerals. The rate of formation is much smaller than the rate at which they are being consumed. The developed countries with just ten per cent of world's population use up more than seventy per cent of aluminium, copper and nickel extracted in the world. Mining and processing of minerals cause a great harm to our environment in the form of dust, chemicals and gases. They are hazard to human health. Quarrying can become a major environmental concern. It causes landslides, disturbance of ground water, etc.



Extraction of salt from Sambhar lake in Rajasthan

To conserve minerals we must reduce their use, reuse their products in other ways and recycle metal waste to make new products. It will also reduce environmental pollution caused by them.

Key Words

- » Minerals : naturally occurring substances formed of one or more chemical elements.
- » Ore : a rock with a large concentration of a particular mineral.
- » Metallic Minerals : minerals that contain metal in raw form.
- » Non-metallic minerals : minerals that do not contain metal.
- » Ferrous Metals : metals having magnetic properties.
- » Non-ferrous metals : metals not having magnetic properties.
- » Mining : taking out minerals from rocks buried under the Earth's surface.
- » Shaft : Deep wide bore made to reach mineral deposits at great depths.
- » Drilling : boring of deep wells to take oil out of the Earth.

SUMMARY

- ▶ The crust of the Earth consists of rocks. All rocks are composed of one or more minerals.
- ▶ Minerals are naturally occurring substances formed of one or more chemical elements with a definite range in chemical composition .
- ▶ A rock which has a large concentration of a particular mineral (of sufficient economic value) is called the ore of that mineral.
- ▶ Based on composition, minerals are classified mainly as metallic and non-metallic mineral.

- ▶ The method of extraction depends on the type of mineral and the depth at which it is located in the Earth's crust.
- ▶ Mining is limited to the site where the mineral is found in concentration.
- ▶ Deep wide bores are made to reach mineral deposits which lie at great depths.
- ▶ Deep wells are bored to take oil and gas out of the Earth.
- ▶ Metallic minerals are usually found in igneous and metamorphic rocks while non-metallic minerals in sedimentary rocks.
- ▶ Minerals are used to manufacture utensils, machinery, building materials, fertilizers, etc.
- ▶ The stocks of minerals in nature is limited. To conserve minerals we must reduce their use, reuse their products in another way and recycle the metal waste.

Exercise Time

A. Tick (✓) the only correct choice amongst the following :

1. Which one of the following is not a producer of mica ?
 a. Rajasthan b. Karnataka c. Andhra Pradesh d. Jharkhand
2. Which one of the following is a leading producer of copper in the world ?
 a. Bolivia b. Ghana c. Chile d. Zimbabwe
3. Which one of the following is not a characteristic of mineral ?
 a. definite range of chemical composition b. uneven distribution
 c. they are renewable d. formed by natural processes
4. Largest producer of diamonds, platinum and gold is
 a. North America b. Australia c. Africa d. Europe

B. Fill in the blanks :

1. Coal and oil are found in _____ rocks.
2. _____ metals have magnetic properties.
3. _____ conduct heat and electricity through them.
4. Mineral fuels are _____ and _____.
5. Salt is made at _____ lake in Rajasthan.

C. Match the Following :

- | | |
|----------------------|----------------------------------|
| 1. Metallic minerals | a. Sedimentary rocks |
| 2. Coal | b. Drilling |
| 3. India | c. Igneous and metamorphic rocks |
| 4. Oil wells | d. Largest producer of diamonds |
| 5. Africa | e. Largest producer of mica |

D. Write true (T) or False (F) against the following statements in given brackets :

1. Coal is a non-metallic mineral.
2. Shaft mining is used for extracting petroleum.
3. Coal, petroleum and natural gas are principal energy resources.
4. Metals have a lustre.



5. Mining and processing of minerals do not harm our environment.

E. Define the terms :

1. Mineral
2. Ore
3. Shaft
4. Drilling
5. Mining

F. Write three countries for each where the following minerals are found :

1. Copper
2. Bauxite
3. Iron
4. Gold

G. Identify the following :

1. Coal, oil and natural gas
2. Ore of aluminium
3. Taking out minerals from the rocks buried under the Earth's surface
4. Name of the mine to extract minerals from shallow depths
5. Name of the rock where petroleum may be found

H. Answer in one word or one phrase :

1. Name a mineral fuel
2. What are principal energy resources ?
3. What is the name of the ore of aluminum ?
4. Which type of minerals an igneous rock may have ?
5. Where in India is gold extracted from mines ?

I. Answer these question briefly :

1. What is a mineral ? How are minerals mixed up in a rock?
2. How are minerals classified? Briefly describe each type.
3. State three properties of metals.
4. What is an ore ?
5. What is mining? Why is it limited to the site where the mineral is found in concentration ?
6. What is aluminium used for ?
7. How is a mineral extracted using a shaft ?

J. Differentiate between :

1. Metallic and Non-Metallic minerals
2. Ferrous and Non Ferrous metals
3. Shaft Mining and Drilling

PROJECT WORK

1. Make a survey of your surroundings and write mineral sources in the area.
2. Make a list of the minerals you use in your daily life without much modification.