

## Ch. 2 Minerals and Energy Resources

[A homogeneous, naturally occurring substance with a definable internal structure is called mineral.] ← Mineral

⇒ Rocks are the combination of minerals. Some rocks consist of single mineral, but most of them consist of several minerals in different quantity.

⇒ Formation of mineral depend upon physical & chemical conditions. that in turn, results in a wide range of colours, hardness, crystal forms, lustre & density of a particular material.

### READERS VENUE

#### "Uses of Minerals in Daily Life"

⇒ Materials of daily use are made of minerals like toothpaste contains silica, limestone, phosphate, etc.

⇒ They are also needed by our body.

⇒ They are basis of all economic activities.

⇒ They are also studied to know the formation, age & composition of the Earth.

# u Mode of Occurrence of Minerals

- ⇒ Minerals are usually found in ores.
- ⇒ Ore ⇒ An ore is a naturally occurring material having one or more minerals in sufficient concentration mixed with other elements.
- ⇒ Minerals occur in these forms -
- ① Veins & lodes.
  - ② Beds & layers.
  - ③ Decomposition of surface rocks.
  - ④ Alluvial deposits.
  - ⑤ Ocean waters.

## READERS VENUE

### ① Veins & lodes

- ⇒ In igneous & metamorphic rocks, minerals occur in cracks, crevices, faults or joints.
- ⇒ Smaller occurrence are called veins and larger are lodes.
- ⇒ Metallic mineral like tin, copper, zinc & lead are obtained from it.

### ② Beds & layers

- ⇒ In sedimentary rocks, minerals occur in the form of beds & layers as a result of deposition, accumulation & concentration in horizontal layers of rock.

⇒ Coal, some forms of iron ore, gypsum, potash & sodium salts are formed in bed & layers.

### ③ Decomposition of Surface rocks

⇒ It occurs with the removal of soluble constituents, the residual mass of weathered material left behind contains mineral ores.

⇒ Bauxite is formed in this way.

### ④ Alluvial Deposits

⇒ Some minerals found in sands of valley floors & at the base of hills. These are known as placer deposits.

⇒ They are not corroded by  $H_2O$ , eg. gold, silver, platinum and tin.

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### ⑤ Ocean Waters

⇒ These contains many minerals

⇒ Common salt, magnesium & bromine are derived from ocean waters.

⇒ Whereas, manganese nodules occurs in oceans beds.

# "Distribution of Minerals in India"

→ India is fortunate to have fairly rich & varied mineral resources, but these resources are unevenly distributed.

→ Distribution of minerals in India is discussed below-

## ① Peninsular Plateau

→ Peninsular rocks contain most of the reserves of coals, metallic minerals, mica non ferrous mineral & non-metallic minerals.

## ② Gujarat & Assam

→ Sedimentary rocks in Gujarat & Assam have most of the petroleum deposits.

## ③ Rajasthan

→ It has reserves of many non-ferrous minerals.

## ④ Northern plains

There is very little or no economic minerals in vast alluvial plains of North India.

## "Mining"

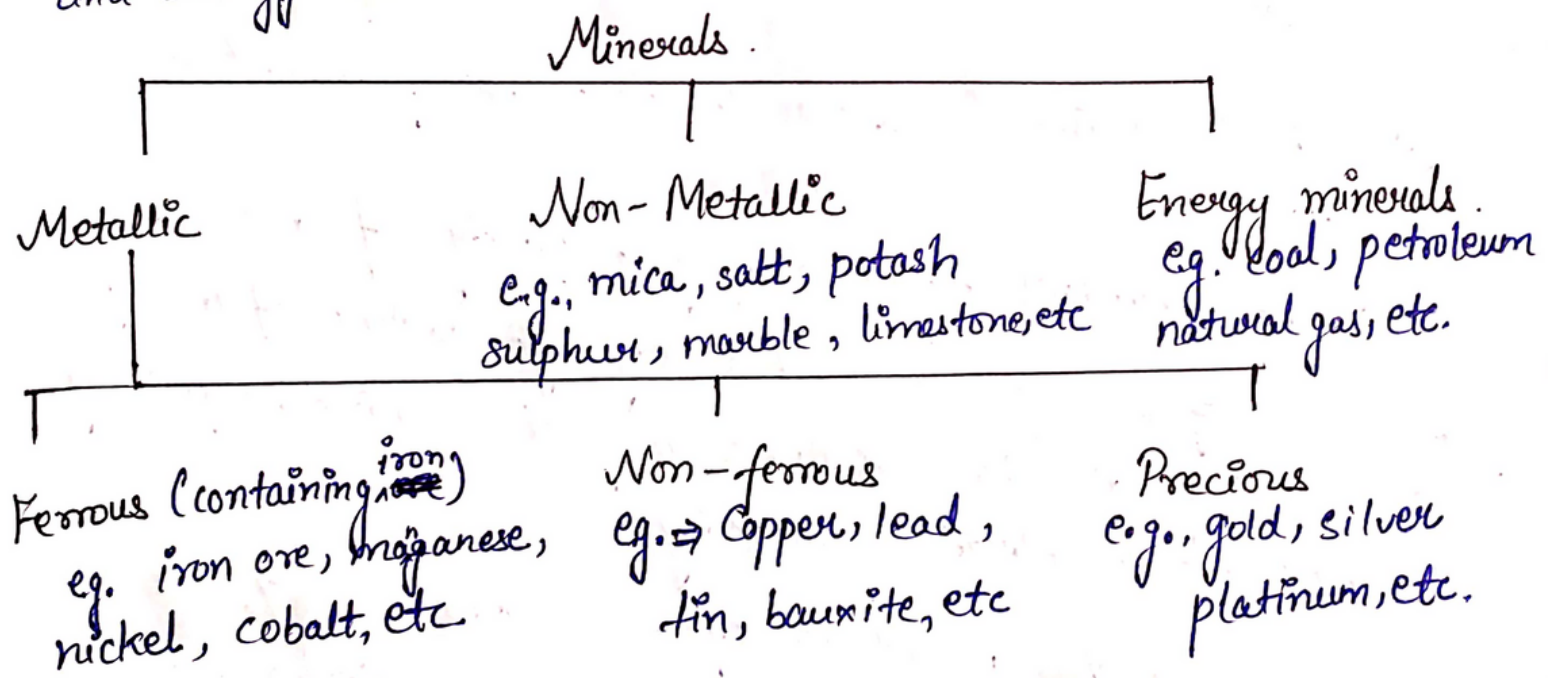
Economic Activity of extraction of minerals from below the earth's surface is called mining.

→ Most of the minerals in India are nationalised and their mining is possible only obtaining due permission from the government. But most of the tribal areas of North-east India, Minerals are owned by individual & communities. (5)

→ In Meghalaya, there are large deposits of coal, iron ore, limestone & dolomite, etc. Coal mining in Jowai & Cherapunjee is done by family members in the form of a long narrow ~~hole~~ tunnel, known as 'Rat-hole' mining.

#### Classification of Minerals

→ Minerals are mainly classified as metallic, non-metallic and energy minerals.



#### ① "Metallic minerals"

Minerals containing metals are called metallic minerals, like gold, silver, tungsten, etc. They are 2 types - ① Ferrous ② Non-ferrous

## ① Ferrous Minerals

- Metallic minerals having iron content are called ferrous minerals.
- These minerals account for about three fourth of the total value of the production of metallic minerals.
- India exports a fairly large amount of ferrous minerals.
- These minerals provide a strong base for the development of metallurgical industries.
- Distribution of ferrous minerals -
  - ① Iron Ore
  - ② Manganese

## READERS VENUE

### ① Iron Ore

- It is basic mineral & also the backbone of industrial development.
- India has abundant resources of good quality of iron ore.
- Finest ore of is Magnetite, with a very high content of iron upto 70%. Magnetite has excellent magnetic qualities, especially valuable in the electrical industry.
- Haematite ore has a content of iron upto 50-60%. It is the most important industrial iron ore in terms of the quantity used, but has slightly lower iron content than magnetite.

## "Iron ore belts in India"

Major iron ore belts in India are -

### ① "Odisha-Tharukhand Belt"

→ Badampahar mines in the Mayurbhanj & Kendujhar districts of ~~Orissa~~ Orissa have high grade hematite Ore. Additionally, Hematite<sup>iron</sup> Ore is mined in Guo & Noamundi in Singhbhum district of Tharukhand.

### ② "Durg-Bastar-Chandrapur Belt"

→ It lies ~~also~~ in Chhattisgarh & Maharashtra. The Bailadila range of hills in the Bastar district of Chhattisgarh have very high grade hematite Ore. This hilly range has 14 deposits of super high grade hematite ore. Iron from these mines is exported to Japan & South Korea via Vishakapatnam port.

### ③ "Bellary-Chitradurga-Chikkamagaluru-Tumakuru Belt"

→ It lies in Karnataka. The Kudremukh mines located in the Western Ghats are a 100% export unit.  
→ The ore ~~for~~ from these mines is transported as slurry through a pipeline to a port near Mangalore.

### ④ "Maharashtra Goa Belt"

→ This belt includes the State of Goa & Ratnagiri district of Maharashtra.  
→ The ores in these mines are not of very high quality.  
→ They are exported through Mormugao port.

## ② Manganese

- It is a metallic element used in manufacturing of steel, ferro-manganese alloys.
- It is also used in manufacturing in pesticide, bleaching powder, insecticides & paints.
- India ranks fifth in the world in production of manganese.
- Odisha is the largest producer of manganese ores in India.

## ② Non-Ferrous Minerals

- Minerals that do not contain iron content are called non-ferrous minerals. **READERS VENUE**
- India has only a few reserves of non-ferrous minerals.
- Distribution of non-ferrous minerals -
  - ① Copper
  - ② Bauxite

### ① Copper

- It is an important mineral due to its excellent electrical conductivity.
- It is used in manufacturing of electrical cables & in electronics and chemical industries.
- Leading producer of Copper in India -
  - ① Khetri mines, Rajasthan
  - ② Balaghat mines, M.P.
  - ③ Singhbhum district, Jharkhand



## ② Bauxite

- It is used for obtaining aluminium that is formed by decomposition of rocks rich in aluminium silicates.
- It is a clay-like substance from which alumina is extracted ~~at~~ firstly & later alumina becomes aluminium.
- Aluminium is known for its strength & lightness.
- It is widely used in manufacturing of utensils, electrical goods, etc.
- Amarkantak plateau, Maikal hills & the plateau region of Bilaspur Katni are the main area of bauxite deposits of Madhya Pradesh & Koratpur in Odisha.

## READERS VENUE

## ③ Non-metallic minerals

Basic characteristic of non-metallic minerals is that they don't yield new products on melting.

These are generally associated with sedimentary rocks, e.g. granite, etc.

Distribution of non-metallic minerals are -

- ① Mica
- ② Limestone.

### ① Mica

- It is used in electrical & electronics industries due to its dielectric strength, insulating properties & resistance to high voltage.
- Mica occurs in the form of plates or leaves, which can be split into thin sheets. It can be brown, clear, black, green, red.
- Its deposits are mainly found in the Northern edge of Chota Nagpur plateau. Nellore mica belt of Andhra Pradesh is also an important producer in the country.

## Limestone

- ⇒ It is a rock mineral found in sedimentary rocks & is composed of  $\text{CaCO}_3$  or Ca & magnesium carbonates.
- ⇒ It is used for smelting iron ore in blast furnaces of steel plants & is the basic raw material for manufacturing of cement.
- ⇒ It is mainly found in Karnataka & Andhra Pradesh.

## READERS VENUE

### "Hazards of Mining"

- ⇒ Mining is a hazardous industry.
- It is known as killer industry due to the following reasons:
  - ① No natural light inside the mines make working together.
  - ② Risk to life due to collapse of roofs, overflow of  $\text{H}_2\text{O}$ , fire is always there.
  - ③ Slurry from mines damage the farmland & roads.
  - ④ Mining causes respiratory diseases & pulmonary disorders to miners.

### "Conservation of Minerals"

- ⇒ Mineral resources are finite & non-renewable.
- ⇒ So, there is need to conserve our mineral resources & use it judiciously in the following ways -

- ① Minerals resources should be used in planned & sustainable manner.
- ② Technologies should be developed to use lower grade minerals at lower costs
- ③ Metals should be recycled & alternative materials should be used so that minerals can be conserved.

## Energy Resources

- ⇒ Resources, which are used as power to run industries are called energy resources.
- ⇒ Fuel minerals like coal, petroleum, natural gas, uranium & electricity can generate energy.
- ⇒ Energy resources can be either conventional or non-conventional.

### ① "Conventional resources of energy"

- Like firewood, cattle dung cake, coal & petroleum, natural gas, have been used for a long time.
- They take millions of years to form again.
- Thus, they are finite & non-renewable.

Some prominent conventional sources of energy -

- ① Coal → It is a raw material for heavy industries & thermal power stations. It is bulky due to which these industries located near coalfields.

→ Depending on the degrees of compression, the depth & time (12) of burial during its formation, there are following varieties of coal - Peat, Lignite, Bituminous & Anthracite.

## Occurrence of Coal in India

### ① Gondwana coal

- This was formed over 200 million years ago.
- Major sources of Gondwana coal are located in the Damodar valley (West-Bengal Jharkhand).
- In this belt, Tharia, Raniganj & Bokaro are important coal fields.
- Coal deposits are also present in Gondwana Godavari, Mahanadi, Son & Wardha valleys.

## READERS VENUE

### ② Tertiary coal

- This was formed 55 million years ago & is found in the North - Eastern states of Meghalaya, Assam, Nagaland.

② Petroleum → It is known as mineral oil & 'liquid gold.' It is the 2nd highest energy source used in India after coal.

- 1st oil field in India was discovered in Assam in 1867.
- It is used as fuel. Petroleum refineries provide raw materials for synthetic textile, fertilisers, chemical industries.

## Occurrence of Petroleum in India

- Most of the petroleum occurrences in India are associated with anticlines & fault traps.
- In regions of folding, anticlines or domes, it occurs where oil is trapped in the crest of the upfold.
- Petroleum is also found in fault traps b/w porous and non-porous rocks.

## ③ Natural Gas

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- It is clean energy resource as it gives out very little carbon & pollutants on burning.
- Compared to coal & petroleum products, it burns with a very low ~~emission~~ emission of harmful gas & other pollutants.
- It provide energy for running of petrochemical industry besides being used as fuel for cooking & automobiles.
- It is mainly used by fertiliser & power industries.
- Offshore region of the Krishna-Godavari basin has largest amount of natural gas currently available in India

## ④ Electricity

It has a wide range of application in today's world. There are two ways through which electricity is generated. These are-

- ① Conventionally, electricity is generated by burning fossil fuels, that supply energy to drive turbines. There are over 30 thermal power plants in India

② Non-conventionally, electricity is generated by flowing H<sub>2</sub>O. It is pollution free & commonly used all over India like Bhakra Nangal, Damodar Valley & the Kopili Hydel project, etc

"Non-conventional sources of Energy"

- It have come into use recently.
  - These includes wind energy, solar energy, tidal energy, geothermal energy, atomic energy & biogas energy.
  - They are freely available, usually inexhaustible & renewable.
- Some prominent non-conventional sources of energy are -

① Solar Energy

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- India is a tropical ~~era~~ country.
- It has enormous possibilities of tapping solar energy.
- It is used for a variety of purposes like electric power generation & for heating purposes.
- India's largest solar power plant is located in Madhapur near Bhuj in Rajasthan.

② Nuclear or Atomic Energy

- It is generated by transforming the structure of atoms which is used to generate electric power.
- Uranium & thorium used in it are found in Aravalli ranges of Rajasthan & Tharhand & monazite sands of Kerala.

### ③ Wind Power

- ⇒ Wind Power is utilised to turn huge windmills to generate electric power.
- ⇒ These have been set-up in the windy areas of the country like the belt b/w Nagercoil & Madurai in Tamil Nadu as well as in Jaisalmer, Rajasthan.
- ⇒ Apart from these, Andhra Pradesh, Gujarat, Kerala have important wind farms.

### ④ Biogas

- ⇒ It is generated by the decomposition of organic matter like shrubs, farm waste, animal & human wastes in biogas plants.
- ⇒ It is a cheap, environment friendly & prevents loss of trees.
- ⇒ It is used as a fuel for cooking & lighting.

### ⑤ Tidal Energy

- ⇒ It is the energy generated by movement of oceanic tides, which can be harnessed to generate electricity.
- ⇒ In India, the Gulf of Khambhat, the Gulf of Kutch in Gujarat on the western coast & Gangetic delta in Sunderban regions of West Bengal provide ideal conditions for utilising tidal energy.

## 6) Geo-thermal Energy

- ⇒ Concentration of high temperature found near the earth's surface to generate electricity is known as geo-thermal energy.
- ⇒ When the geo-thermal gradient is high, high temperature found in these areas.
- ⇒ Ground water in such areas absorbs heat & produce steam
- ⇒ This steam when it rises to the earth surface is used to drive turbines & generate electricity.
- ⇒ Parvati valley near Manikaran in Himachal Pradesh & Puga valley in Ladakh are two experimental projects to produce geo-thermal energy.

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### 4) Conservation of Energy Resources

- ⇒ Energy can be conserved in the following ways -
  - ① Using public transport systems instead of individual vehicles.
  - ② Use of electric & hybrid vehicles instead of vehicles that run on hydrocarbon fuel.
  - ③ Switching off electricity when not in use.
  - ④ Using power saving devices.
  - ⑤ Using non-conventional energy sources.
- ⇒ After all "Energy saved is energy produced."