Chapter 5
Minerals and Energy Resources

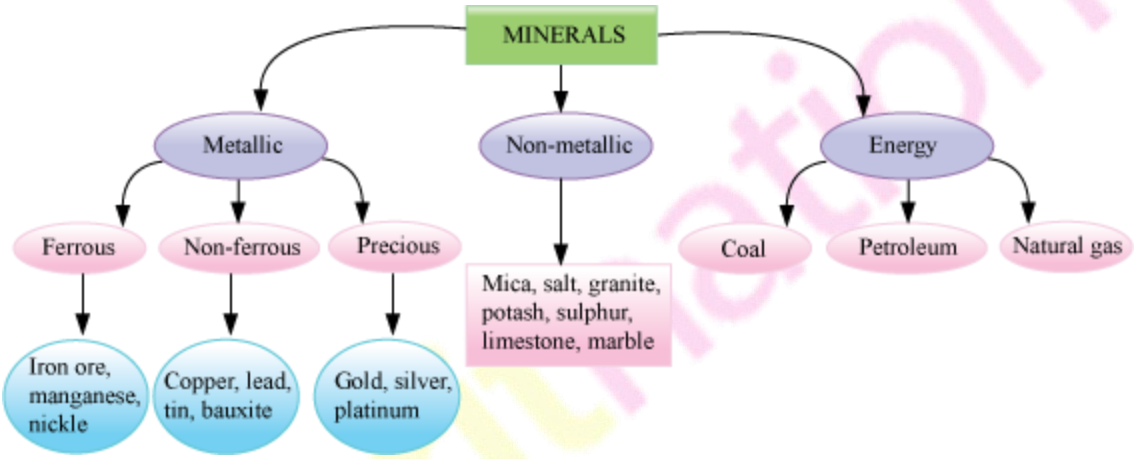
❖ **Minerals**

Minerals are naturally occurring substances that have a definite internal structure.

- They are found in various forms and are used for a variety of purposes.
- E.g., Diamond, limestone, fluoride, aluminium etc.

❖ **Rocks**

They are a combination of minerals along with impurities. A rock can contain either a single mineral or a number of minerals.



❖ **Ores**

An accumulation of any mineral mixed with elements. They are the source of minerals. Minerals are extracted from their ores by various processes.

❖ **Occurrence of Minerals**

- **In igneous and metamorphic rocks:** Cracks, crevices, faults or joints called veins or lodes. E.g., Zinc, copper and lead.
- **In sedimentary rocks:** Beds and layers as a result of deposition and accumulation. E.g., Coal, iron, gypsum and sodium.
- **Decomposition of surface rocks:** In the form of residual mass containing ores. E.g., Bauxite.
- **In sands of valleys:** As alluvial deposits called *placer deposits*. E.g., Gold, silver, tin and platinum.
- **In oceans:** In diffused form. E.g., Salt, magnesium, bromine etc.

❖ **Distribution of Minerals in India**

- Petroleum deposits: Gujarat and Assam
- Non-ferrous minerals: Rajasthan
- Coal, metallic minerals and non-metallic minerals: Peninsular plateau

❖ **Mine**
It is a large area having an abundant quantity of mineral deposits that can be easily and economically extracted.

❖ **Ferrous Minerals**

- **Iron Ore**
  - India is rich in iron ore deposits.
  - **Ores**
    Magnetite: 70% iron content
    Hematite: 50 to 60% iron content
  - **Iron ore belts**
    (1) **Orissa–Jharkhand:** Badampahar, Mayurbhanj, Kendujhar, Singhbhum, Noamundi and Gua are the major mines.
    (2) **Durg–Bastar–Chandrapur:** In Chhattisgarh and Maharashtra, high quality hematite ores are found that are exported to Japan and South Korea.
    (3) **Bellary–Chitradurga–Chikmanglur–Tumkur:** In Karnataka, Kudremukh mine is the most important. It is a 100% export unit.
    (4) **Maharashtra–Goa:** Ratnagiri mines have rich deposits of iron ore.
- **Manganese**
  - Used in manufacturing
    1. Steel
    2. Bleaching powder
    3. Insecticides
    4. Paints
  - Largest producer: Orissa

❖ **Non-Ferrous Minerals**

- India is not rich in non-ferrous minerals.
- **Copper**
  - India is deficient in copper.
  - Malleable, ductile and a good conductor of electricity.
  - **Used in**
    Electrical cables
    Electronics
    Chemical industries
  - Largest producer: Balaghat mines in Madhya Pradesh produce 52% of India's copper.
  - Singhbhum in Jharkhand and Khetri in Rajasthan are also important copper producing areas.
- **Bauxite**
  - An ore of aluminium.
  - Found in Amarkntak plateau, Maikal hills and Katni.

- Largest producer: Orissa (45% of total bauxite production)
- Koraput in Orissa has the largest reserve of bauxite in the country.

❖ **Non-Metallic Minerals**

- **Mica**
  - Made of a series of plates.
  - It splits into thin sheets.
  - It can be black, green, red, yellow or brown in colour.
  - It has excellent di-electric strength, low power loss, good insulation and resistance to high voltage.
  - Used in electric and electronics industry.
  - **Found in**
    Koderma, Gaya and Hazaribagh (Jharkhand)
    Ajmer (Rajasthan)
    Nellore (Andhra Pradesh)

❖ **Rock Minerals**

- **Limestone**
  - Found in calcium carbonate sedimentary rocks.
  - **Used in**
    Cement industry
    Iron smelting
  - Largest producers are Andhra Pradesh, M.P. and Rajasthan.

❖ **Hazards of Mining**

- Pulmonary diseases caused by dust and noxious fumes from mines.
- Inundation and fires in mines and collapsing of the mine's roof pose a serious threat to miners' lives.
- Mining contaminates nearby water sources owing to dumping of waste and slurry.
- Land degradation is caused as land is dug deep for mining. This makes it unsuitable for any further use after the mining site is abandoned.

❖ **Conservation of Minerals**

Conservation of minerals is necessary because

- Mineral formation is an extremely slow process. Hence, rate of consumption should not overshoot the rate of replenishment.
- Only one percent of the total mineral deposits are accessible.
- Minerals are a limited resource and will get exhausted if not used judicially.
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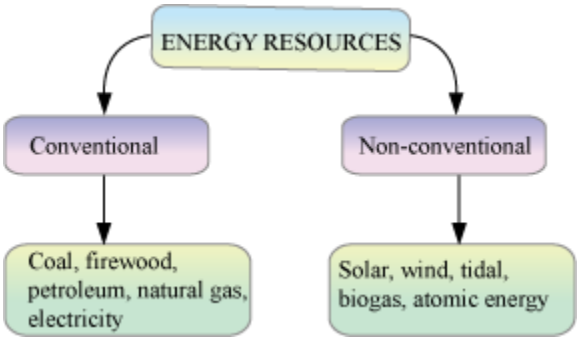

❖ **Coal**

- Most abundantly available fossil fuel in India.
- **Types of Coal**
  - **Lignite:** Low grade brown coal. It is soft with high moisture content. Found in Nevyeli in Tamil Nadu.
  - **Bituminous:** Most popularly used coal. Used in smelting iron in blast furnaces.
  - **Anthracite:** Highest quality coal.
- Found in Damodar valley (West Bengal, Jharkhand).
- Jharia, Raniganj and Bokaro are important coal fields.
- Coal is also found in Meghalaya, Assam, Arunachal Pradesh etc.

❖ **Petroleum**

- Found in the rocks of tertiary age.
- 63% petroleum comes from Mumbai High.
- 18% from Gujarat's Ankleshwar oil field.
- 16% from Assam's Digboi, Naharkatiya and Moram–Hugrijan oil fields.
- Digboi (Assam) is the oldest oil field of India.

❖ **Natural Gas**

- Environment friendly owing to low carbon dioxide emissions.
- Used as CNG (Compressed Natural Gas) in vehicles.
- **Found in**
  Krishna–Godavari basin
  Gulf of Cambay
  Andaman and Nicobar Islands
  Mumbai High
- Transported through pipelines.
- Hazira–Vijaipur–Jagdishpur is the longest (1700 km) pipeline that transports gas from Mumbai High to Bassien.

❖ **Electricity**

- **Hydroelectricity:** By the force of water.

Bhakra Nangal and Damodar valley projects generate hydroelectricity.

- **Thermal Electricity:** By coal, petroleum or natural gas.

❖ **Nuclear Energy**

- Obtained from the nuclear fission of radioactive elements such as uranium and thorium.
- Uranium and thorium are found in Jharkhand, Rajasthan and Kerala.
- India has six nuclear power stations. These are
  - **Rawatbhata** (Rajasthan)
  - **Naraura** (Uttar Pradesh)
  - **Kalpakkam** (Tamil Nadu)
  - **Tarapore** (Maharashtra)
  - **Kaiga** (Karnataka)
  - **Kakrapa**r (Gujarat)

❖ **Solar Energy**

- India is a tropical country and has enormous potential for solar power.
- Solar energy can be converted into electrical energy by using photovoltaic technology.
- Largest solar plant in India: Madhapur (Gujarat)
- Maximum potential: Rajasthan and Gujarat

❖ **Wind Power**

- India is a wind super power.
- Largest wind farm cluster: Tamil Nadu
- Nagacoil and Jaisalmer have large wind farms.
- Andhra Pradesh, Maharashtra, Gujarat, Kerala etc. have huge potential for tapping wind energy.

❖ **Biogas**

- Produced from farm waste, animal and human waste.
- Much effective than firewood, dung cakes and kerosene.
- Used mainly for domestic consumption in rural areas.
- Gobar gas plants are set up in rural areas which decompose organic waste and produce gas as well as provide manure for agricultural fields.

❖ **Tidal Energy**

- Energy of the oceanic tides is used for producing electricity.
- Gulf of Kuchchh (Gujarat) has a great potential for tidal energy.

❖ **Geo-Thermal Energy**

- It is the energy produced by using internal heat of the Earth.
- The hot springs in India are ideal sources for the generation of geothermal energy.
- Manikaran (H.P.) and Puga valley (Ladakh) have geo-thermal power projects.

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