CLASS X, GEOGRAPHY, CHAPTER-5
MINERALS AND ENERGY RESOURCES

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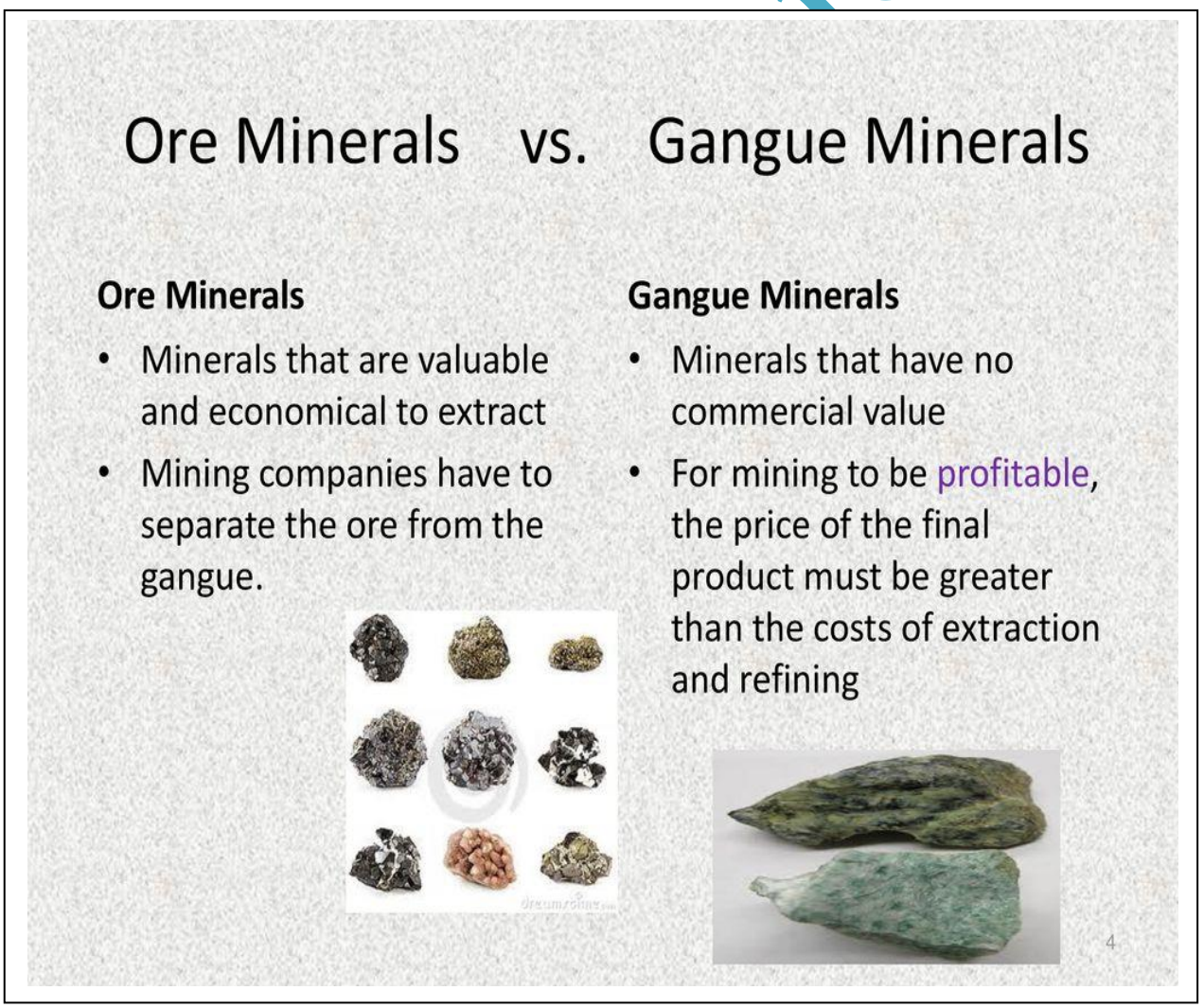
What is a mineral?

- A homogeneous, naturally occurring substance with a definable internal structure is called mineral.
- Minerals are found in varied forms in nature, ranging from the hardest diamond to the softest talc.
- Why are they so varied?
- It is because the formation of minerals depend upon physical and chemical conditions that results in a wide range of colours, hardness, crystal forms, lustre and density of a mineral.



MODE OF OCCURRENCE OF MINERALS

- Minerals are usually found in '**ores**'
- **What is an ore?**

  An ore is an accumulation of any mineral mixed with other elements. The mineral content of the ore must be in sufficient concentration to make its extraction commercially viable.
- Minerals generally occur in the following forms:
  - **Veins and lodes**: In igneous and metamorphic rocks minerals may occur in the cracks, crevices, faults or joints. The smaller occurrences are called veins and the larger are called lodes. Examples are minerals like tin, copper, zinc, lead etc.
  - **Beds or layers:** In sedimentary rocks a number of minerals occur in beds or layers. They have been formed as a result of deposition, accumulation and concentration in horizontal layers of the rock. Coal, some forms of iron ore, gypsum, potash, sodium salts etc.
  - **Decomposition of surface rocks**: When the decomposition of surface rocks occurs with the removal of soluble constituents, it leaves a residual mass of weathered material containing mineral ores. Bauxite is formed in this way.
  - **Alluvial deposits/ placer deposits:** Some minerals are found in sands of valley floors and the base of hills. These deposits are also called as 'placer deposits'. They are not corroded by water. Examples are: gold, silver, tin and platinum.
  - **Ocean waters:** The ocean waters contain vast quantities of minerals, but most of these are spread over a wide area. Therefore they are economically not viable. However, common salt, magnesium and bromine are largely derived from ocean waters. The ocean beds, too, are rich in manganese nodules.

Distribution of Minerals in India

- India is fortunate to have fairly rich and varied mineral resources. However, these are unevenly distributed.
- **Peninsular Plateau:** Peninsular rocks contain most of the reserves of coal, metallic minerals, mica and many other non-metallic minerals.
- **Gujarat and Assam:** Sedimentary rocks on the western and eastern flanks of the peninsula, in Gujarat and Assam have most of the petroleum deposits.
- **Rajasthan:** It has reserves of many non-ferrous minerals.
- **Northern Plains:** The vast alluvial plains of north India are almost devoid of economic minerals.

- These variations exist largely because of the differences in the geological structure, processes and time involved in the formation of minerals.
- **What is mining?**
- The economic activity of extraction of minerals from below the earth's surface is called mining.
- the concentration of mineral in the ore, the ease of extraction and closeness to the market play an important role in affecting the economic viability of a reserve. Thus, to meet the demand, a choice has to be made between a number of possible options. When this is done a mineral '**deposit'** or '**reserve'** turns into a **mine**.
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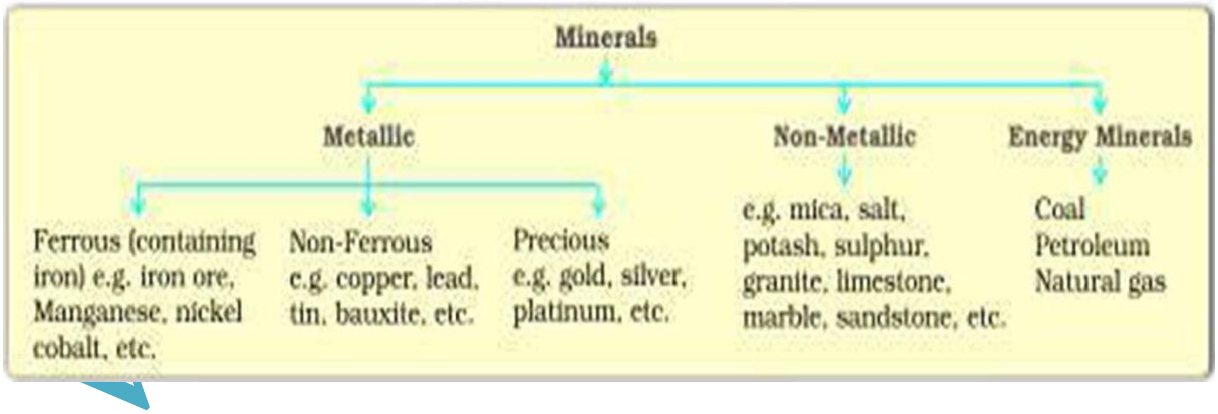
Who owns minerals?

What is Rat-Hole mining?

- Most of the minerals in India are nationalised and their extraction is possible only after obtaining due permission from the government.
- But in most of the tribal areas of the north-east India, minerals are owned by individuals or communities.
- Meghalaya is rich in the deposits of coal, iron ore, limestone and dolomite etc.
- Coal mining in Jowai and Cherapunjee is done by family member in the form of a long narrow tunnel, this is known as '**Rat hole'** mining.

CLASSIFICATION OF MINERALS



Ferrous Minerals

- Metallic minerals having iron content are called Ferrous Minerals.
- These minerals account for about three fourths of the total value of the production of metallic minerals.
- They are the strong base for the development of metallurgical industries.

Iron Ore

- Iron ore is the basic mineral and it is the backbone of industrial development.
- India is rich in good quality iron ores.

Magnetite:

- Magnetite is the finest iron ore with a very high content of iron up to 70%.
- It has excellent magnetic qualities.
- It is valuable in the electrical industry.

Hematite:

- It is the most important industrial iron ore in terms of the quantity used.
- But it has slightly lower iron content than magnetite. (50-60 per cent).

Iron ore producing areas in India:

1. Odisha-Jharkhand Belt:

High grade hematite ore is found in **Badampahar** mines of **Mayurbhan**j and **Kendujhar** districts of Odisha and **Gua** and **Noamundi**mines of Singbhumdistrict of **Jharkhand**.

2. Durg-Bastar-Chandrapur Belt:

- It lies in Chhattisgarh and Maharashtra.
- The **Bailadila**hills of theBastar district of Chhattisgarh look like the hump of an ox, and hence its name.
- Super high grade hematite iron ore is found in the **Bailadila**range of hills.
- It has the best physical properties needed for steel making.
- Iron ore from these mines is exported to Japan and South Korea via Vishakhapatnam port.

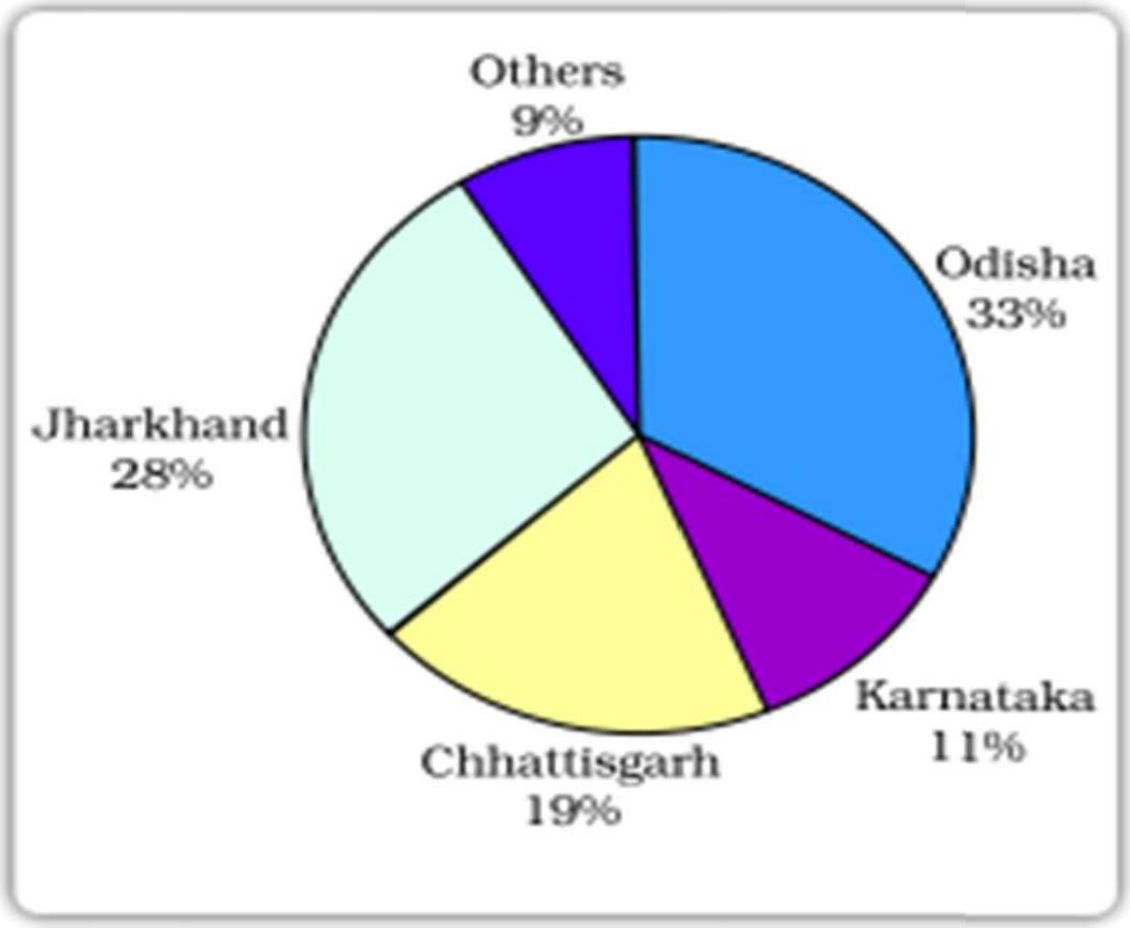
3. **Ballari-Chitradurga-Chikkamagaluru-Tumakuru**Belt:

- This belt in Karnataka has large reserves of iron ore.
- Kudre in Kannada means horse.
- The highest peak in the western ghats of Karnataka resembles the face of a horse.
- The Kudremukh mines located in the Western Ghats of Karnataka are a 100 per cent export unit.
- The iron ore from Kudremukh is transported as slurry through a pipeline to a port near Mangaluru.

4. Maharashtra-Goa Belt:

- It includes the state of Goa and Ratnagiri district of Maharashtra.
- The ores from this area are not of very high quality.
- Still they are very efficiently extracted.
- Iron ore from here is exported through Marmagao port.

Production of iron ore - state wise share in per cent, 2009-10

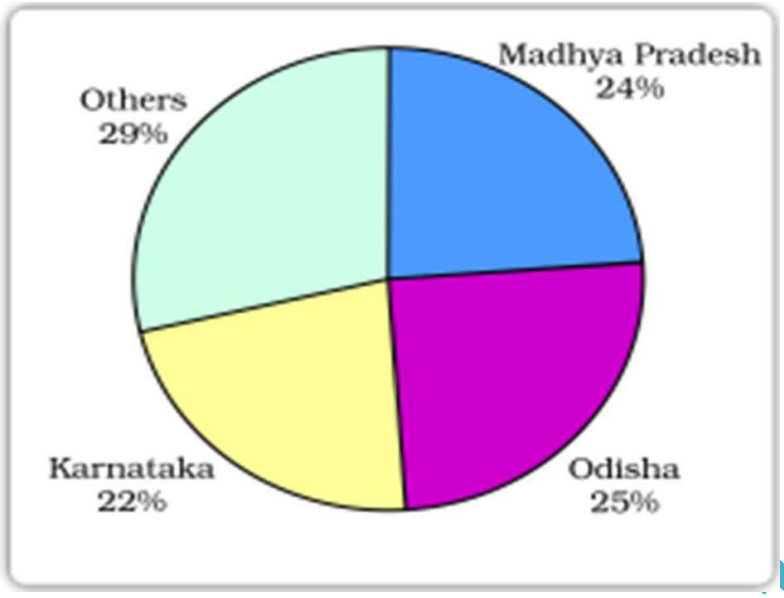


Manganese

- Manganese is mainly used in the manufacturing of steel and ferro-manganese alloy.
- For manufacturing one tonne of steel nearly 10 kg of manganese is required.
- It is also used in manufacturing bleaching powder, insecticides and paints.

Distributionof iron ore, manganese, bauxite and mica.

Production of Manganese showing state wise share in per cent, 2009-2010



What are Abrasive minerals?

An abrasive mineral is a substance or material capable of polishing or cleaning a hard surface. Example:silica, limestone, aluminium oxide and various phosphate minerals do the cleaning. Fluoride which is used to reduce cavities comes from a mineral fluorite. Most toothpaste are made white with titanium oxide, which comes from minerals called rutile, ilmenite and anatase. The sparkle in some toothpastes comes from mica.

Non-Ferrous Minerals

Non-ferrous minerals include copper, bauxite, lead, zinc and gold. These minerals play a vital role in a number of metallurgical, engineering and electrical industries.

Copper

1. Malleable, ductile and good conductor of heat and electricity.
2. Mainly used in electrical cables, electronics and chemical industries.
3. The Balaghat mines in Madhya Pradesh, Khetri mines in Rajasthan and Singhbhum district of Jharkhand are leading producers of copper.

Bauxite

1. Bauxite deposits are formed by the decomposition of a wide variety of rocks rich in aluminium silicates.
2. Aluminium is obtained from bauxite. Aluminium has good conductivity and great malleability.
3. Deposits are mainly found in the Amarkantak plateau, Maikal hills and the plateau region of Bilaspur-Katni.

Non-Metallic Minerals

1. **Mica** is a mineral made up of a series of plates or leaves. It can be clear, black, green, red, yellow or brown.
2. Mica is the most indispensable minerals used in electric and electronic industries.
3. It has excellent di-electric strength, low power loss factor, insulating properties and resistance to high voltage.
4. Mica deposits are found in the northern edge of the Chota Nagpur plateau.

Rock Minerals

1. Limestone is found in rocks composed of calcium carbonates or calcium and magnesium carbonates.
2. It is the basic raw material for the cement industry and essential for smelting iron ore in the blast furnace.

Conservation of Minerals

Minerals are a non-renewable resource. It takes thousands of years for the formation and concentration of minerals. Continued extraction of ores leads to the depletion of minerals. So, it's important to take the necessary steps so that mineral resources can be used in a planned and sustainable manner.

ENERGY RESOURCES-

Energy resources can be classified as

1. **Conventional Sources:** It includes firewood, cattle dung cake, coal, petroleum, natural gas, and electricity.
2. **Non-Conventional Sources:** It includes solar, wind, tidal, geothermal, biogas, and atomic energy.

COAL

1. It is the most abundantly available fossil fuel.
2. It is used for power generation, to supply energy to the industry as well as for domestic needs.
3. **Lignite** is a low grade brown coal, which is soft with high moisture content. It is used for generation of electricity. Found in Tamil Nadu.
4. Coal that has been buried deep and subjected to increased temperatures is **bituminous coal**. It is used in Metallurgical industry.
5. **Anthracite** is the highest quality of hard coal.
7. Jharia, Raniganj, Bokaro are important coalfields.

Petroleum

1. It provides fuel for heat and lighting, lubricants for machinery and raw materials for a number of manufacturing industries.
2. Petroleum refineries act as a “nodal industry” for synthetic textile, fertiliser and numerous chemical industries.
3. Mumbai High(more than half of total production in India), Gujarat and Assam are major petroleum production areas in India.
4. Larger part of India’s petroleum need is met through import of oil.

Natural Gas

1. Natural gas is an important clean energy resource. It is considered an environment-friendly fuel.
2. The power and fertilizer industries are the key users of natural gas.
3. Compressed Natural Gas (CNG) will replace liquid fuels in near future.
4. Large reserves of natural gas have been discovered in the Krishna-Godavari basin.

Electricity

Electricity is generated mainly in 2 ways:

1. By running water which drives hydro turbines to generate **Hydro Electricity.** It is a renewable resource of energy. India has a number of multi-purpose projects like the Bhakra Nangal, Damodar Valley Corporation, the Kopili Hydel Project.
2. By burning other fuels such as coal, petroleum and natural gas to drive turbines to produce **Thermal Power.** It uses non-renewable fossil fuels for generating electricity.

Nuclear or Atomic Energy

Nuclear Energy is obtained by altering the structure of atoms. Uranium and Thorium are used for generating atomic or nuclear power. Thorium found in Jharkhand and Rajasthan are used for generation of nuclear power.

Solar Energy

Solar energy is produced by the Sun's light. Photovoltaic technology converts sunlight directly into electricity. Several solar power plants are being set up in different part of our country.

Wind Power

Wind Energy or Power is the use of wind to generate electricity. Wind turbines are used for this purpose. The largest wind farm cluster is located in Tamil Nadu from Nagarcoil to Madurai.

Biogas

Biogas is a type of biofuel that is naturally produced from the decomposition of organic waste. Biogas is the most efficient use of cattle dung. It improves the quality of manure. Bio gas plants are being established at municipality level, society level and individual level as well.

Tidal Energy

Tidal energy is the form of hydropower that converts the energy obtained from tides into useful forms of power, mainly electricity. In India, the Gulf of Khambhat, the Gulf of Kachchh in Gujarat on the western coast and Gangetic delta in Sunderban regions of West Bengal provide ideal conditions for utilising tidal energy.

Geo Thermal Energy

When heat and electricity are produced by using the heat from the interior of the earth, it is known as Geo-Thermal Energy. In India, geothermal energy is harnessed from Parvati valley near Manikarn in Himachal Pradesh and from Puga Valley, Ladakh.

Conservation of Energy Resources

Every sector of the national economy – agriculture, industry, transport, commercial and domestic needs inputs of energy. There is an urgent need to develop a sustainable path for energy development.

Here are some ways that each one of us can contribute to save energy resources:
- Using public transport systems instead of individual vehicles
- Switching off electricity when not in use
- Using power-saving devices.
- Using non-conventional sources of energy