Chapter 10: Minerals and Energy Resources

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Exercise 10.1 — Multiple Choice Questions

Q1 Which one of the following minerals is formed by decomposition of rocks, leaving a residual mass of weathered material? (a) coal (b) bauxite (c) gold (d) zinc

SOLUTION

One mode of mineral formation involves the decomposition of surface rocks and the removal of soluble constituents, leaving a residual mass of weathered material containing ores.

The chapter states that bauxite is formed this way.

Answer: (b) bauxite

Q2 Koderma, in Jharkhand is the leading producer of which one of the following minerals? (a) bauxite (b) mica (c) iron ore (d) copper

SOLUTION

Mica deposits are found in the northern edge of the Chota Nagpur plateau.

The Koderma–Gaya–Hazaribagh belt of Jharkhand is the leading producer of mica.

Answer: (b) mica

Q3 Minerals are deposited and accumulated in the stratas of which of the following rocks? (a) sedimentary rocks (b) metamorphic rocks (c) igneous rocks (d) none of the above

SOLUTION

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 strata.

Answer: (a) sedimentary rocks

Q4 Which one of the following minerals is contained in the Monazite sand? (a) oil (b) uranium (c) thorium (d) coal

SOLUTION

Monazite sand is a source of thorium, used in the generation of nuclear (atomic) energy.

Hence, of the given options, thorium is the mineral contained in Monazite sand.

Answer: (c) thorium

Exercise 10.2 — Answer the following questions in about 30 words

Q1 Distinguish between the following in not more than 30 words: ferrous and non-ferrous minerals.

SOLUTION

Ferrous minerals contain iron. They account for about three-fourths of the total value of the production of metallic minerals and provide a strong base for metallurgical industries — e.g. iron ore and manganese.

Non-ferrous minerals do not contain iron. India's reserves and production of them are not very satisfactory, yet they play a vital role in metallurgical, engineering and electrical industries — e.g. copper, bauxite, lead, zinc and gold.

Answer: Ferrous minerals contain iron (iron ore, manganese); non-ferrous minerals do not (copper, bauxite, lead, zinc, gold).

Q2 Distinguish between the following in not more than 30 words: conventional and non-conventional sources of energy.

SOLUTION

Conventional sources of energy include firewood, cattle dung cake, coal, petroleum, natural gas and electricity (both hydel and thermal).

Non-conventional sources include solar, wind, tidal, geothermal, biogas and atomic energy.

Answer: Conventional: firewood, dung cake, coal, petroleum, natural gas, electricity. Non-conventional: solar, wind, tidal, geothermal, biogas, atomic energy.

Q3 What is a mineral?

SOLUTION

Geologists define a mineral as a "homogenous, naturally occurring substance with a definable internal structure."

Minerals are found in varied forms in nature, ranging from the hardest diamond to the softest talc. Rocks are combinations of these homogenous substances called minerals.

Answer: A homogenous, naturally occurring substance with a definable internal structure.

Q4 How are minerals formed in igneous and metamorphic rocks?

SOLUTION

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.

In most cases they are formed when minerals in liquid, molten and gaseous forms are forced upward through cavities towards the earth's surface, where they cool and solidify as they rise. Major metallic minerals like tin, copper, zinc and lead are obtained from veins and lodes.

Answer: They occur in cracks, faults or joints as veins and lodes, formed when molten/gaseous minerals are forced up through cavities and then cool and solidify.

Q5 Why do we need to conserve mineral resources?

SOLUTION

The total volume of workable mineral deposits is an insignificant fraction — about one per cent of the earth's crust. We are rapidly consuming resources that required millions of years to be created and concentrated.

The geological processes of mineral formation are so slow that the rates of replenishment are infinitely small compared to present rates of consumption. Minerals are therefore finite and non-renewable, and continued extraction raises costs and lowers quality.

Hence a concerted, planned and sustainable effort — including improved technologies for low grade ores, recycling of metals, and using scrap metals and substitutes — is needed to conserve them for the future.

Answer: Minerals are finite and non-renewable; they take millions of years to form but are being consumed rapidly, so they must be conserved for the future.

Exercise 10.3 — Answer the following questions in about 120 words

Q1 Describe the distribution of coal in India.

SOLUTION

In India coal occurs in rock series of two main geological ages — Gondwana, a little over 200 million years in age, and tertiary deposits which are only about 55 million years old.

The major resources of Gondwana coal, which are metallurgical coal, are located in the Damodar valley (West Bengal–Jharkhand). Jharia, Raniganj and Bokaro are important coalfields. The Godavari, Mahanadi, Son and Wardha valleys also contain coal deposits.

Tertiary coals occur in the north eastern states of Meghalaya, Assam, Arunachal Pradesh and Nagaland.

Because coal is a bulky material that loses weight on use as it is reduced to ash, heavy industries and thermal power stations are located on or near the coalfields.

Answer: Gondwana (metallurgical) coal lies in the Damodar valley (Jharia, Raniganj, Bokaro) and the Godavari, Mahanadi, Son and Wardha valleys; tertiary coal occurs in Meghalaya, Assam, Arunachal Pradesh and Nagaland.

Q2 Why do you think that solar energy has a bright future in India?

SOLUTION

India is a tropical country and therefore has enormous possibilities of tapping solar energy.

Photovoltaic technology converts sunlight directly into electricity, and solar energy is fast becoming popular in rural and remote areas.

Big solar power plants being established in different parts of India will minimise the dependence of rural households on firewood and dung cakes. This in turn will contribute to environmental conservation and to an adequate supply of manure in agriculture. For these reasons solar energy has a bright future in India.

Answer: As a tropical country, India can tap abundant sunlight; photovoltaic solar power is spreading in rural/remote areas and reduces reliance on firewood and dung cakes, aiding the environment and agriculture.