FACULTY OF ENGINEERING AND TECHNOLOGY

Lecture- 7

Mineral Resources

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Mineral resources

Minerals:

Minerals or solid inorganic compound made up of one or more element. They have definite chemical composition and characteristic physical properties.

Minerals formation takes millions of years and therefore are non-renewable resources.

Minerals are found below the earth's crust.

Sources: https://images.app.goo.gl/GWSq3Dpda99wwHYbA

Types of minerals:

On the basis of their properties, minerals have been classified into two types.

Metallic and Non-metallic

Metallic minerals: Composed of metals. They are good conductors of electricity and heat. Metallic minerals are generally show lustre, malleability and ductility.

Examples: Gold, silver, nickel, copper, etc.
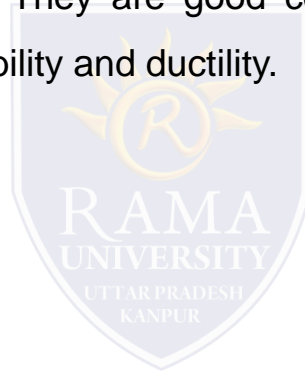
Non-metallic minerals: are not composed of metallic element. They are good insulators of heat and electricity. They are non-lustrous and neither show malleability nor ductility, hence break easily.

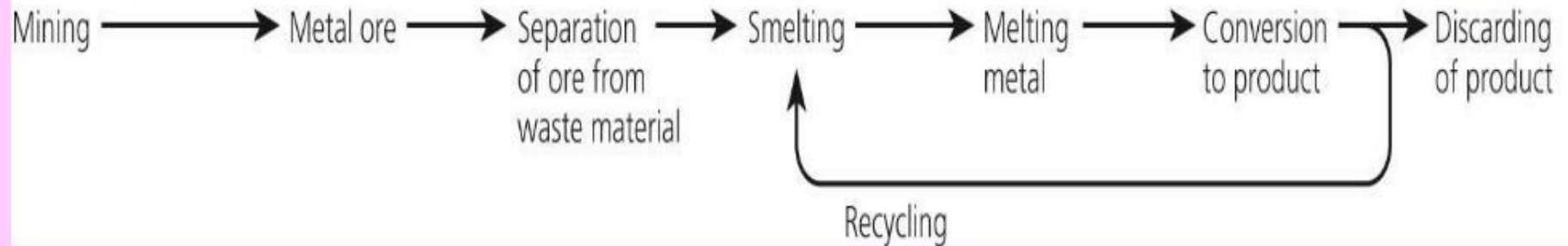Examples: Granite, quartz, sandstone, gypsum, etc.

Life cycle of minerals

Mining → Metal ore → Separation of ore from waste material → Smelting → Melting metal → Conversion to product → Discarding of product

Recycling

Mineral resources: uses and over-exploitation

Minerals are used in:

▪Industries- smelting and machinery industries are based on minerals as raw material.

▪Agriculture- minerals are used for making tools, fertilizers and pesticides

▪Energy production- e.g. uranium generate nuclear energy

▪Transportation- used for making vehicles such as airplanes, ships, cars, etc.

▪Construction- bridges, roads, homes, etc. use minerals for construction

▪Ornaments- minerals like gold silver, diamond, platinum are used for making

different jewelleries and other ornaments.

Home Decor with Minerals!
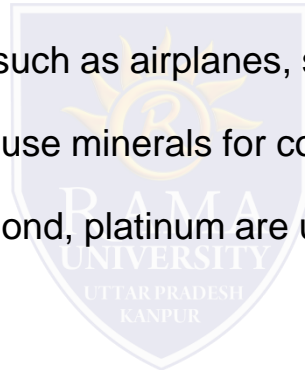
▪Weapons- defense weapons such as missiles, bullets, guns are made using mineral resources.

▪Domestic uses- minerals such as copper, aluminum, etc. are used for making utensils and other objects.

▪Communication- for making cables, telephone wires, and electronic devices.

▪Other uses- making alloy like stainless steel; amalgam for dental filling; glass, etc.

The **over-exploitation of minerals** leads to depletion of resources which affect standard of living, increase price of commodities and reduces the availability of commodities to fulfill needs of future generation.

OVER EXPLOITING THE EARTH'S RESOURCES.

Environmental effects of extracting and using mineral resources

Minerals extraction process is known as **Mining**. Mining affect environment and human health in numerous ways:

- Mining is a dangerous process which involves occupational health hazards.
- During mining dust blown cause respiratory disease among workers;

- Miners and people living in near by area get exposed to radiation during mining of radioactive minerals;

- Dynamite explosion in mining area causes air pollution and sometimes result in landslide;

- Underground mining increase the risk of occupational hazards due to accidents caused by subsidence of roof, flooding, fire in mines, and improper ventilation leading to congestion;

Mining result in loss of land area and vegetation cover;

Reduce soil fertility causing land degradation;

Displace people and animals;

Increase soil and water pollution; and

Mining require large energy consumption which indirectly contributes to global warming and climate change.

Use of minerals like coal produce toxic gases that also promote global warming and climate change.

Result in resource depletion, affecting standards of living.

Affect market price of the mineral resources and products development from them.

Environmental Effects of Extracting & Using Mineral Resources

Steps

Mining
Exploration, extraction

Processing
Transportation, purification, manufacturing

Use
Transportation or transmission to individual user, eventual use, and discarding

Environmental Effects

Disturbed land; mining accidents; health hazards; mine waste dumping; oil spills and blowouts; noise; ugliness; heat

Solid wastes; radioactive material; air, water, and soil pollution; noise; safety and health hazards; ugliness; heat

Noise; ugliness; thermal water pollution; pollution of air, water, and soil; solid and radioactive wastes; safety and health hazards; heat

Jharia coal field

Jharia coal fields are prime source of coking coal in India. Nearly 70 underground coal mines are burning from nearly a century. The burning of coal fields has created environmental and ecological damage and also affected life of local people.

Land subsidence, water contamination and increased pollution due to production of toxic fumes from coal mines fire and opencast mining are major issues that affect livelihood and environment.

Mining activity in Sariska Tiger reserve

Sariska Tiger reserve is located in Aravali hills covering areas of Gujarat, Haryana, Rajasthan and Delhi.

Sariska Tiger reserve is rich in mineral resources like granite, marble and quartzite in addition to biodiversity.

Mining activities in Sariska Tiger reserve has threatened survival of wildlife and also deteriorated fertility of the soil making area barren.

As per the order of Supreme court dated 31st December, 1991, around 400 mines have been shut down, however, illegal mining activities are still being carried out.

Sources: https://india.mongabay.com/2019/10/the-burning-coalfields-of-jharia-belch-poison-for-local-residents/