UNIT 6

MINERAL RESOURCES

A mineral is defined as being a naturally occurring element or compound that is formed by inorganic processes and contains a crystalline structure.

Geographers are primarily concerned with minerals in soil because minerals form the basic framework of soil.

Minerals originally form when ***once-heated Earth material magma*** (molten rock) cools and forms solid igneous rock. The Earth's crust formed and continues to form in this manner.

Earth's crust contains a combination of naturally occurring elements, of which following elements are predominant: silicon, aluminum, iron, calcium, Sodium, potassium, and magnesium. As you can imagine, combinations of these elements along with the other naturally occurring elements that form Earth's crust produce a wide variety of minerals.

Igneous rocks contain original minerals that form as magma cools but **sedimentary rocks** are formed by secondary minerals that grow and join sediment particles together and become cemented. **Metamorphic rocks** were once igneous rocks and sedimentary rocks that become chemically altered to form different minerals.

Key Points:

Formation of minerals:

- Over 3000 minerals are currently known and about 50 new discovered each year.
- Some minerals are originally formed from hot ***magma***, which contains the minerals. When the magna cools crystals of minerals appear.
- Most of the minerals are formed underground when ***heat and pressure*** transform one form of rock into another.
- **Decomposition** of leaves, plants and bones, flesh ultimately transform into minerals but it takes million of years.
- Mostly this process of decomposition happens in oceans where thousands of species dies every day.

Mining processes:

- Mining is a process of digging rocks and minerals from the earth.
- Minerals are found at different depths.
- There are three main methods of mining.

(a) Open cast mining:

- Some minerals like coal and iron often lie near the surface.
- Open cast mining scoops up these minerals from near the surface with the help of giant excavators and power shovels.
- Which then load the material into Lorries or railway wagons to be carried away.

(b) Under ground Mining:

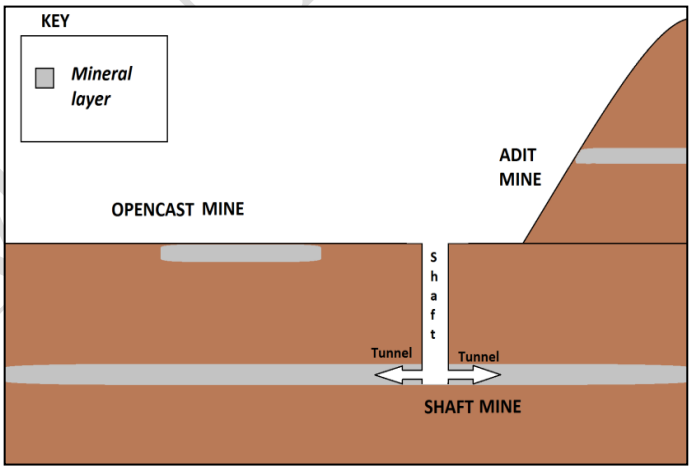
- There are two methods by which minerals are accessed underground.

(i) Adit mining:

- An adit is an opening or passage.
- Adit mining is done in hilly districts where a mineral seam is exposed on a hill side.
- Horizontal tunnels are dug into the side of a valley or hill to reach the mineral deposit.

(ii) Shaft mining:

- Vertical shafts are dug down to the minerals, especially for coal.
- This method is expensive and can be dangerous.



Metallic and Non metallic minerals:

- Metallic and non metallic are one of the mankind's most highly prized possessions.
- Many of our articles are made from metallic minerals.
- Few elements such as gold and copper occur in pure form as "metallic minerals", but most are found as "ores".
- **Ores** are compounds containing a high proportion of the metal.

- These metallic ores are cut or blasted from surrounding rock. The ore is crushed and the worthless rock removed.
- Mineral resources are non renewable although many can be recycled and used again.

Metallic minerals are:

- Iron ore
- Copper antimony
- Chromites
- Celestite
- Manganese
- Gold
- Silver
- Tin
- Bauxite

Non Metallic minerals are:

- Coal
- Sulphur
- Rock salt
- Gypsum
- Soapstone
- Limestone
- Marble
- Clays

Organizations for mining in Pakistan:

- ***Geological Survey of Pakistan***, started working in 1947.its main function was to investigate the minerals deposits.
- *Pakistan Mineral Corporation* started working in 1974.its main function was to explore and market all the minerals. The **Pakistan Mineral Development Corporation** (PMDC) is an autonomous corporation attached to the Ministry of Petroleum and Natural Resources, of the Government of Pakistan.
- ***Resource Development Corporation*** started working in 1974.it used to investigate and develop copper mines at Saindak, Balochistan.
- ***Gemstone Corporation of Pakistan*** established in 1979.its main aim was to develop gemstone resources.

Description and uses of metallic and non metallic minerals:

(i) Rock salt:

- Seams of rock salt vary in thickness from between 20 to 100 meters.
- The rocks are whit and pink in color.
- The salt is overlain by gypsum and clay.

- Rock salt is used for cooking and preservation purposes and for the manufacture of soda ash, caustic soda and other sodas for laundries, textiles and tanning.

(ii) Brine:

- Used in chemical and fertilizer industry.

(iii) Limestone

- Limestone is a major sedimentary deposit and is widespread in Pakistan.
- It is the main raw material for cement.
- It is also used in the manufacture of bleaching powder, glass, soap, paper, paints and lime.
- It is used to treat sugarcane waste to produce alcohol fuel.
- It is painted on barks of trees to counter pests and termite attacks.

(iv) Coal

- Pakistan has low quality coal is mainly used in brick kilns.
- Some is use to make coal.
- A small percentage is used for power generation.
- Thermal power stations are also being run by coal.

(v) Natural gas;

- Gas is being used in Domestic and industrial uses.

(vi) Gypsum:

- Found is grey, white and pink color.
- It is used in the manufacture of paints, fertilizers and pre – fabricated construction boards.
- White gypsum is used for making cement and plaster of Paris.
- Spread on saline soil to help land reclamation for farming.

(vii) Marble:

- Found in bands of white, grey, yellow and brown.
- It is used in buildings and for making chips for flooring and decorative pieces.

(viii) Clays

- China clay is used in the ceramic industry, for a special type of cement and has other industrial uses.
- Fire clays fine clay capable of enduring high temperature to make fire bricks; it is also used to make pottery and chemicals.

(ix) Magnetite

- It is used in the manufacture of cement, fertilizer, rayon, paper pulp, chemicals and pharmaceuticals.

(x) Sulphur

- Sulphur is used in chemical industries to manufacture sulpheric acid, paints, explosive materials, rayon and fertilizers.

(i) Chromite

- Chromite gives hardness and electrical resistance to steel.
- It is used for bridges and railways carriages.
- It is also used in metallurgical furnaces and for making engineering tools and stainless steel etc.

(ii) Iron ore

- Steel making, construction and the transport industry.

(iii) Copper

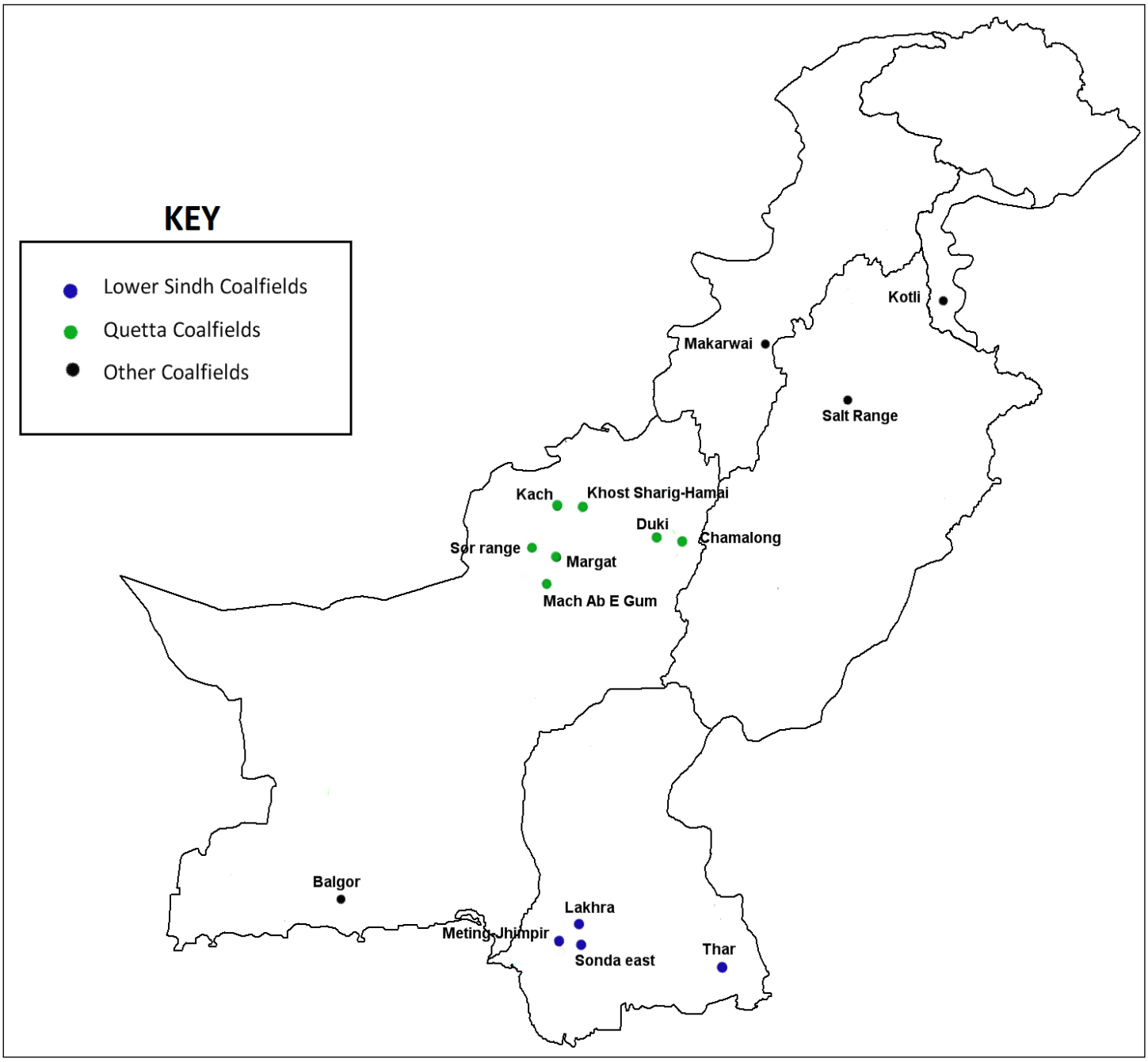
- Making electrical wires and other electrical appliances especially switches that carry current.
- It is also used in making alloys, water pipes and tanks.

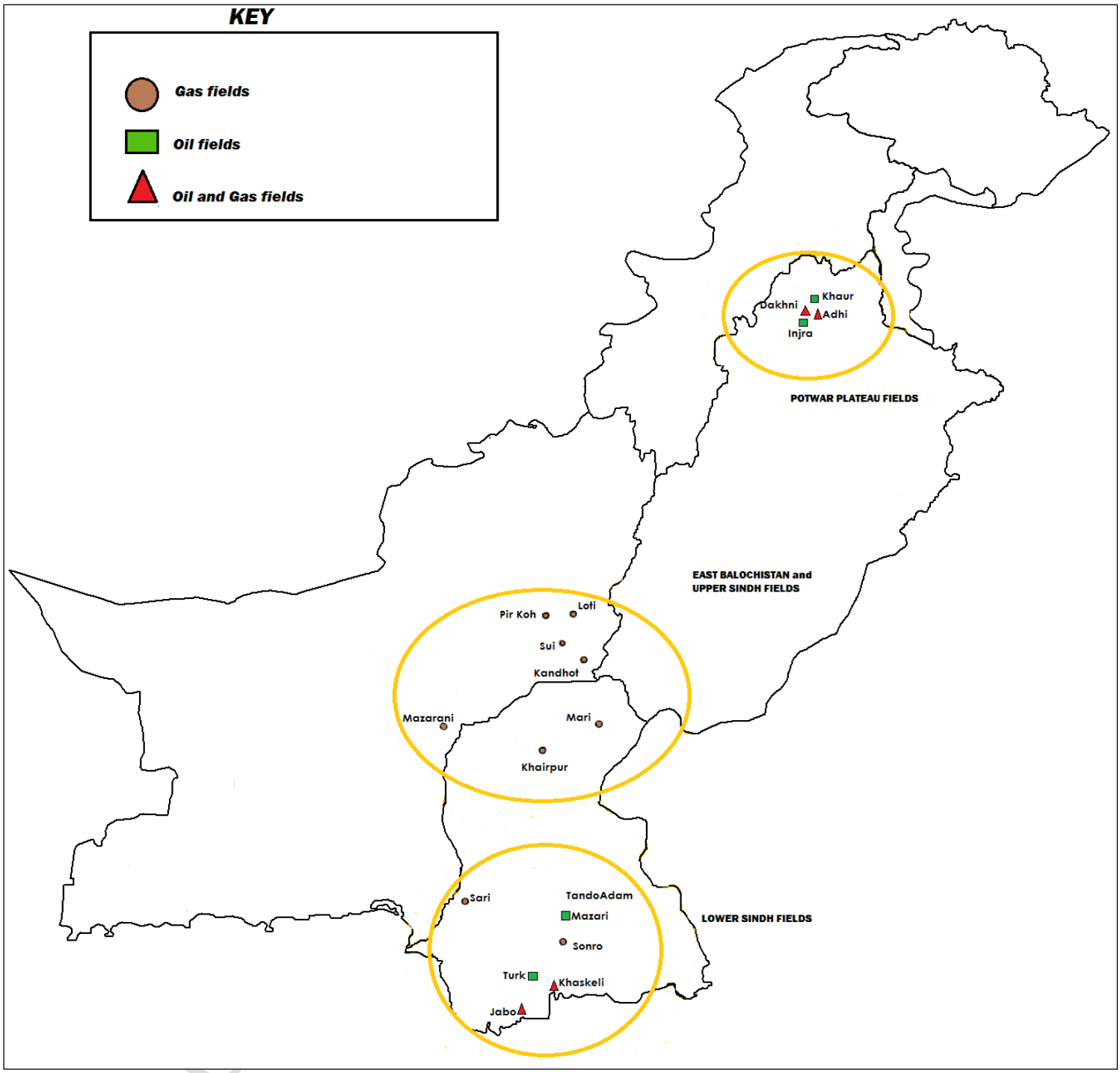
(iv) Maganese

- Used in making dry batteries and paints.
- It is vital alloy in steel making.

(v) Bauxite:

- It is used in utensils, tins, cans etc.


KEY
Lower Sindh Coalfields
Quetta Coalfields
Other Coalfields
Kotli
Makarwai
Salt Range
Kach
Khost Sharig-Hamai
Duki
Chamalong
Ser range
Margat
Mach Ab E Gum
Balgor
Lakhra
Meting-Jhimpir
Sonda east
Thar


KEY
Gas fields
Oil fields
Oil and Gas fields
Dakhni
Khaur
Adhi
Injra
POTWAR PLATEAU FIELDS
EAST BALOCHISTAN and
UPPER SINDH FIELDS
Pir Koh
Loti
Sui
Kandhot
Mazarani
Mari
Khairpur
Sari
TandoAdam
Mazari
Sonro
Turk
Khaskeli
Jabo
LOWER SINDH FIELDS