

# Mineral Exploration & Mining

## I. Mineral Exploration

### 1. When are conditions right to open a mine?

- mineral deposit has 100-1000x the concentration of the mineral than ordinary rock

### 2. List the steps for locating ore deposits.

- p. 415
1. Exploring rock for mineralization
  2. Rock samples taken from exploration area
  3. Samples analyzed to determine ore grade ← metal content of ore
  4. If ore grade is ↑, then test holes drilled
  5. If deposit is extensive, then mine is opened
- 3-D extent of ore →

## II. Subsurface Mining

### 1. Define the term subsurface mining.

Subsurface Mining - mining of ore deposits that are usually 50 m or more beneath Earth's surface

### 2. List three types of subsurface mining.

- p. 416 Bottom
1. Room + Pillar
  2. Longwall
  3. Solution

### 3. Match the subsurface mining techniques to the correct definitions.

- p. 416 Top
1. B. - shearer machine moves back and forth transporting coal on a conveyor (Digging out a snow hole)
  2. C. - hot water is injected to dissolve an ore and is removed with compressed air (Dentist office - 1. Rinse 2. Air)
  3. A. - rooms are cut into a seam and pillars of coal support the roof

a. room-and-pillar mining

b. longwall mining

c. solution mining

## III. Surface Mining

### 1. Define the term surface mining.

Surface Mining - methods used when ore deposits are located close to Earth's surface

Potash - mined salts containing potassium in a water-soluble form

### 2. List four types of surface mining.

- p. 417 Top
1. Open-Pit
  2. Surface Coal
  3. Quarrying
  4. Solar Evaporation
- p. 417 Bottom
- p. 418

3. Match the surface mining techniques to the correct definitions.

1. C. - aggregates such as sand, gravel, and crushed rock are extracted
  2. A. - ore is mined downward, layer by layer
  3. D. - sea water placed in shallow ponds evaporate and form salt crystals
  4. B. - soil & overburden removed; exposed coal extracted; soil & overburden refilled
- a. open-pit mining      b. surface coal mining      c. quarrying      d. solar evaporation

**IV. Placer Mining**

1. Define the term placer deposits.

Most important are stream placers.

Placer Deposits - minerals concentrated by wind and water into surface deposits

2. Where do placer deposits tend to accumulate?

- Where currents are weak and the dense mineral grains can no longer be carried in the water.

3. What type of equipment is used to extract placer deposits?

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Dredge - (floating barge on which buckets fixed on a conveyor are used to extract sediments in front of the dredge)

**V. Smelting**

1. List the steps of how molten metal is extracted using smelting?

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1. Crushed ore melted at high temps. (Separates impurities)
2. Flux bonds with impurities (Separates from molten metal)
3. Molten metal settles to bottom + is recovered
4. Less dense slag (flux impurities) is removed

Coke - fuel with few impurities + high carbon content - reduces iron oxide to collect iron

**VI. Undersea Mining**

1. List four mineral resources located on the ocean floor.

1. Gold      2. Silver      3. Diamonds      4. Gravel

2. What are two reasons that undersea mining is not successful?

1. Land-based companies can mine cheaper.
2. Great water depths to mineral deposits