

Environmental Science Chapter 16 Notes

Section 1

- The arrangement of **atoms**, along with the **strength of the chemical bonds between them**, determines the **physical** properties of minerals
- Most minerals are **compounds**
- Certain minerals are mined because of the **valuable metals they contain**
- **Gold** is one of the most economically important metallic minerals
- Metals conduct **electricity**, have **shiny** surfaces, and are **opaque**
- **Nonmetals** tend to be good insulators, may have **shiny or dull** surfaces, and may allow **light** to pass through them
- For mining to be profitable, **the price of the final product must be greater than the costs of extraction and refining.**
- Minerals may form in a variety of ways: **below ground when magma cools and hardens, through hydrothermal solutions, and as evaporites**
- Certain minerals are of major economic and industrial importance: **aluminum, copper, gold, iron, lead, silicon, silver, sulfur, titanium, and zinc**
- **Nonmetals** are among the most widely used minerals in the world

Section 2

- **Technology** plays a huge role today in mineral **exploration** (satellites, planes, computers, etc.)
- Exploring **rock for mineralization** is the first step in finding an ore deposit
- A mineral deposit has **100 – 1,000 times** the concentration of the mineral and enough material to justify **opening a mine**
- 3 types of subsurface mining are: **Room-and-pillar, longwall, and solution**
- **Quarrying** and **open-pit mining** are both methods of surface mining
- **Solar evaporation** is a method of salt production that is used in areas that receive little rainfall and have high **evaporation rates**
- Solar evaporation has been used to produce salt for **thousands of years** – today about **30%** of the world's salt comes from this process
- The most important placer deposits are **stream placers**
- Placer gold, diamonds, and other **heavy minerals** are mined by **dredging**

- The ocean floor contains significant mineral resources
- 2 reasons undersea mining has not been successful:
cost and great water depths

Section 3

- The demand for coal has increased due to U.S. energy requirements
- Mining has become one of the most heavily regulated industries in the U.S. – regulated by federal and state laws
- Mining companies now spend large amounts of money to preserve the environment (land reclamation – is a part of every surface coal mining operation)
- There are many environmental impacts of mining: air and noise pollution, water contamination, displacement of wildlife, erosion and sedimentation, soil degradation, and subsidence
- Fires that start in underground coal seams are one of the most serious environmental consequences of coal mining
- Comprehensive Response Compensation and Liability Act – regulates the release of hazardous substances into the air, soil, and water by mining
- All mining operations must also comply with the Endangered Species Act
- The Surface Mining Control and Reclamation Act of 1977 (SMCRA) – set standards that would minimize the surface effects of coal mining on the environment and set aside funds that may be used to reclaim land and water resources that have been adversely affected by past coal mining activities
- Mining companies must obtain permits from state environmental agencies before mining a site
- Mine sites are inspected by state agencies to ensure compliance with environmental regulations