

## ***Chapter 6 Outline***

- I. What is a sedimentary rock?
  - A. Products of mechanical and chemical weathering
  - B. Account for about 5 percent (by volume) of Earth's outer 16 km (10 miles)
  - C. Contain evidence of past environments
    1. Provide information about sediment transport
    2. Often contain fossil
  - D. Economic importance
    1. Coal
    2. Petroleum and natural gas
    3. Sources of iron, aluminum, and manganese
  
- II. Turning sediment into sedimentary rock
  - A. A great deal of change can occur to sediment after it is deposited
  - B. Diagenesis - all chemical, physical, and biological changes that take place after sediments are deposited
    1. Occurs within the upper few kilometers of Earth's crust
    2. Includes:
      - a. Recrystallization – development of more stable minerals from less stable ones
      - b. Lithification - unconsolidated sediments are transformed into solid sedimentary rocks by
        1. Compaction
        2. Cementation by the materials
          - a. Calcite and/or
          - b. Silica
      - c. Iron oxide
  
- III. Types of sedimentary rocks
  - A. Material originates from mechanical and/or chemical weathering
  - B. Rock types are based on the source of the material
    1. Detrital rocks - material is solid particles
    2. Chemical rocks - material that was once in solution
  
- IV. Detrital sedimentary rocks
  - A. Chief constituents
    1. Clay minerals
    2. Quartz
    3. Others
      - a. Feldspars
      - b. Micas
  - B. Particle size is used to distinguish among the various types of detrital rocks
  - C. Common detrital sedimentary rocks (in order of increasing particle size)
    1. Shale
      - a. Thin layers (lamina)
      - b. Most common sedimentary rock
    2. Sandstone
      - a. Form in a variety of environments
      - b. Sorting, shape, and composition of the grains can be used to interpret the rock's history
      - c. Quartz is the most predominant mineral
    3. Conglomerate and breccia
      - a. Conglomerate consists largely of rounded gravels
      - b. Breccia composed mainly of large angular particles

## V. Chemical sedimentary rocks

- A. Consist of precipitated material that was once in solution
- B. Precipitation of material occurs in two ways
  - 1. Inorganic processes
  - 2. Organic processes (biochemical origin)
- C. Common chemical sedimentary rocks
  - 1. Limestone
    - a. Most abundant chemical rock
    - b. Composed chiefly of the mineral calcite
    - c. Marine biochemical limestones
      - 1. Coral reefs
      - 2. Coquina
      - 3. Chalk
    - d. Inorganic limestones
      - 1. Travertine
      - 2. Oolitic limestone
  - 2. Dolostone
  - 3. Chert
    - a. Made of microcrystalline quartz
    - b. Forms
      - 1. Flint
      - 2. Jasper (banded form called agate)
  - 4. Evaporites
    - a. Evaporation triggers deposition of chemical precipitates
    - b. Examples
      - 1. Rock salt
      - 2. Rock gypsum
  - 5. Coal
    - a. Different from other rocks – made of organic material
    - b. Stages in coal formation
      - 1. Plant material
      - 2. Peat
      - 3. Lignite
      - 4. Bituminous

## VI. Classification of sedimentary rocks

- A. Classified according to the type of material
- B. Two major groups
  - 1. Detrital
  - 2. Chemical
- C. Two major textures used in the classification of sedimentary rocks
  - 1. Clastic
    - a. Discrete fragments and particles
    - b. All detrital rocks have a clastic texture
  - 1. Nonclastic
    - a. Pattern of interlocking crystals
    - b. May resemble igneous rocks

## VII. Sedimentary environments

- A. A geographic setting where sediment is accumulating
- B. Determines the nature of the sediments that accumulate

- C. Types of sedimentary environments
  - 1. Continental
  - 2. Marine
  - 3. Transitional (shoreline)

#### VIII. Sedimentary structures

- A. Provide information useful in the interpretation of Earth history
- B. Types
  - 1. Strata, or beds (most characteristic feature of sedimentary rocks)
  - 2. Bedding planes that separate strata
  - 3. Cross-bedding
  - 4. Graded beds
  - 5. Ripple marks
  - 6. Mud cracks
  - 7. Fossils

#### IX. Nonmetallic mineral resources from sedimentary rocks

- A. Use of the word “mineral” is very broad
- B. Two common groups
  - 1. Building materials
    - a. Natural aggregate (crushed stone, sand, and gravel)
    - b. Gypsum (plaster and wallboard)
    - c. Clay (tile, bricks, and cement)
  - 2. Industrial minerals
    - a. Corundum
    - b. Garnet

#### X. Energy resources from sedimentary rocks

- A. Coal
  - 1. Formed mostly from plant material
  - 2. Along with oil and natural gas, coal is commonly called a fossil fuel
  - 3. The major fuel used in power plants to generate electricity
  - 4. Problems with coal use

- a. Environmental damage from mining
  - b. Air pollution
- C. Oil and natural gas
  - 1. Oil and natural gas, consisting of various hydrocarbon compounds, are found in similar environments
  - 2. Derived from the remains of marine plants and animals
  - 3. Formation is complex and not completely understood
  - 4. A geologic environment that allows for economically significant amounts of oil and gas to accumulate underground is termed an oil trap
    - a. Two basic conditions for an oil trap
      - 1. Porous, permeable reservoir rock
      - 2. Impermeable cap rock, such as shale
    - b. Cap rock keeps the mobile oil and gas from escaping at the surface