

# Sedimentary Rocks

## Classification and Formation

December 1st, 2009

### SUMMARY

Sedimentary rocks are one of three groups of rocks. Sedimentary rocks form in a variety of ways. Therefore, sedimentary rocks are classified by how they form and what they are made of.

#### **Some rocks form from rock particles**

- Most sedimentary rocks are made from other rock particles called **sediments**. Sediments are any material that settles out of water or air to form a sedimentary rock. Examples of sediments include rocks, minerals, and the remains of plants and animals.
- This type of sedimentary rock develops in layers of sediment that build up on land, but mostly underwater.

#### **Most sedimentary rocks are formed in a five-step process**

- Step One: **Weathering**
  - Weathering is the process that breaks down rocks and minerals.
  - This creates sediments needed to form a sedimentary rock
- Step Two: **Erosion**
  - Erosion is the process that transports the sediments formed during weathering.
  - The two primary causes of erosion are water and wind. These carry the particles.
- Step Three: **Deposition**
  - Deposition is the process by which sediments settle out of water or wind carrying it.
  - When deposition occurs, more dense particles settle before less dense particles. This is because the denser particles require more energy to keep them moving in the wind or water.
  - The particles will settle into layers.
- Step Four: **Compaction**
  - Compaction is the process that presses these layers together.
  - The weight of the layers helps compact everything together, closing the gaps between the sediments. This creates a very tightly packed rock.
- Step Five: **Cementation**
  - Cementation is the process in which dissolved minerals crystallize.
  - The result is the cementing (or holding) of the particles to form the sedimentary rock. If this step doesn't occur, the result is a tightly packed group of sediments that can easily break apart.
- Not all rocks complete all five steps. For example, the sedimentary rocks silt and clay can be formed by compaction alone and do not need cementation.

### **Sedimentary rocks are classified by the type of sediment**

- With so many sedimentary rocks, scientists classify the rocks into groups based on what sediments make up the rock. There are three main groups of sedimentary rock:
  - Clastic sedimentary rock
  - Organic sedimentary rock
  - Chemical sedimentary rock

### **Sedimentary rock formed from other rocks is clastic**

- **Clastic** rock is the most common type of sedimentary rock. It is made of broken pieces of other rocks.
- Common examples:
  - Shale made of small grains of clay
  - Sandstone made of grains of sand
  - Conglomerate made of rounded rock grains
  - Breccia made of jagged rock grains

### **Sedimentary rock formed from the remains of plants and animals is organic**

- **Organic** rock contains a high amount of organic material (remains of plants and animals). It is made of things that were once living.
- The two most common organic rocks are coal and limestone.
- Coal is an organic rock made of the remains of plants: dead wood, bark, leaves, stems, roots, etc.
  - Coal forms much like clastic rocks:
    - Organic matter is layered (Deposited)
    - The matter is compacted together by the weight of the upper layers
  - The coal we use today is from organisms that were alive millions of years ago.
- Limestone is a rock made up carbonate minerals, such as calcite, that are from the shells and skeletons of animals.
  - Much as coal formed, limestone forms when the shells and skeletons layer on the ocean floor.
  - A very common use of limestone is chalk.
- Limestone formed through this process is called fossiliferous limestone.

### **Sedimentary rock formed from dissolved minerals is chemical**

- **Chemical** rock forms when minerals dissolved in a solution crystallize together.
- When water washes over rocks, it can dissolve certain minerals. Example: water with carbon dioxide dissolved in it can dissolve limestone. This forms caves and a solution rich in dissolved limestone.
- As the water evaporates (or as too much limestone is dissolved), the minerals can begin to recrystallize.
- Many rocks form through this process: limestone (oolitic and tufa are two examples), gypsum, and rock salt.