Clastic Sedimentary Rocks - A Closer Look

- Consist of solid particles which results when physical weathering breaks down rocks. The weathered products include pebbles, sand, silt and clay.
- Clay minerals and Quartz fragments are the most common type of sediment produced.
- These rocks usually form in water environments such as: rivers, lakes and oceans, but can also form in deserts.
- Remember the table:

Particle Name	Sediment Name	Rock Name
Boulder Pebble	Gravel	Conglomerate or Breccia
Sand	Sand	Sandstone
Silt Clay	Mud	Shale

Examples of Clastic Sedimentary Rocks

1) Conglomerate

Consist of poorly sorted *rounded* gravel size particles.

Form in shoreline and river environments where mixtures of sediments are deposited.

The *rounded* rock fragments suggest that the sediment was transported great distances. This allowed angular edges to be eroded to produce rounded fragments.

Round sediment clast

2) Breccia

Consist of poorly sorted, *angular* gravel size particles.

Form in shoreline and river environments where mixtures of sediments are deposited.

The *angular* rock particles suggest that the sediment was not transported far from the place where it originated. Thus angular fragments.

Angular sediment clast

3) Sandstone

Consist of well sorted sand size particles.

Form in shoreline environments (deltas) where sand is deposited.

Sand size sediment is a result of erosion due to wind, water, and ice acting on rock fragments over a long period of time.

4) Shale

Consist of fine clay sized particles compacted to form thin layers.

Form in deeper water environments where clay is transported and deposited.

Commonly contain organic material within the original clay or mud which form fossils.

Sample Question 3.26 (b)

Explain how particle size is used to classify clastic (detrital) sedimentary rocks.

Answer:

Sediment can be classified according to sediment size. The smallest being clay, then silt, then sand, and finally pebbles. Clastic sedimentary rocks are named depending on what size sediments predominant in the rock. Refer to the chart below.

Particle Size	Sediment Name	Rock Name
Boulder & Pebble	Gravel	Conglomerate or Breccia
Sand	Sand	Sandstone
Silt & Clay	Mud	Shale

Chemical Sedimentary Rocks - A closer look

- These rocks form as a result of chemical weathering dissolving chemicals and transporting it in solution. When conditions are right, these dissolved chemicals change back into a solid through the processes of:

1) **Precipitation**
2) **Evaporation**

- These rocks usually form in water environments such as lakes and shallow seas or oceans.
- These rocks can also form where ground water dissolves chemicals and precipitates the material in certain environments. An example of this process would be the formation of stalactites and stalagmites.

1) Precipitation:

Process where chemicals dissolved on solution, falls out of solution and forms a solid material. Most common in shallow water environments.

2) Evaporation:

Process where there is a change in state from a liquid to a gas. Chemicals dissolved in the liquid (water) are left behind as a solid material.

FYI: Evaporation and Precipitation often work together. As water evaporates, chemicals in solution will precipitate.

Example: Rock Salt (Halite)

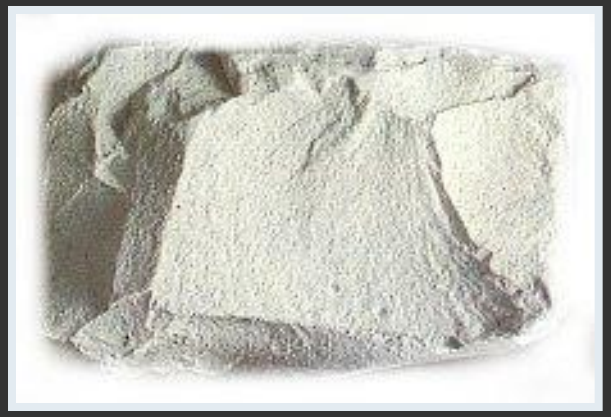
Examples of chemical sedimentary rocks include:

1) **Limestone**

Consist of calcium carbonate ($CaCO_3$), the mineral Calcite.

Forms by chemical precipitation in shallow water environments.

Most abundant chemical precipitate rock which forms in shallow marine waters. Often contain shell fossils.



2) Rock Gypsum

Consist of the mineral Gypsum.

Forms by evaporation of shallow seas and lagoons that have high concentrations of gypsum in solution. The mineral precipitates out of solution as the water evaporates.

Common use is plaster and gyproc (wall board).

3) Rock Salt

Consists of the mineral Halite.

Forms by evaporation of shallow seas and lagoons that have high concentrations of halite in solution. The mineral precipitates out of solution as the water evaporates.

Common use is table salt and road salt.

Sample Problem 3.26 (c)

Describe two conditions necessary for chemical sedimentary rocks to form.

Answer:

One of two processes must occur, that being chemical precipitation or evaporation of water. Their must also be an accumulation of chemicals within the water so it can fall out of solution and form solid chemical sedimentary rock.

Example: Salt water has an accumulation of salt dissolved in the oceans. In shallow marine environments, where water evaporates, the salt (halite) precipitates and forms rock salt.