

Sedimentary rocks



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To begin with, it is important to point out that there are three types of rocks found on the earth's surface namely; igneous rocks; metamorphic rocks, and sedimentary rocks which cover about 75% of the of the earth's surface area. In reference to Stille and Fichter (2010), the weathering process, this can be chemical or physical, which takes places at the high places of the earth such as the mountains, grinding down hard rock that makes up the mountains (p. 6). Erosion processes from wind and water and the force of gravity carry the sediments formed downhill and are deposited on the lowest parts of the earth (p. 6). Following the above description, it is evident that plate tectonics affects in two different but related ways: subsidence of the crust and uplift of the land. The creation of high and low point of the earth through plate tectonic processes enables the forces of erosion to affect sedimentation.

With continued deposition, these sediments form huge piles which are subject to compression forces. According to Levin (2008), these rocks are formed when loose sediments such as sand and clay are compressed or cemented to form solid rock by a process called lithification, which may involve only compaction or may also include cementation (p. 67).

Sedimentary rocks are characterized by formation of horizontal layers called strata, which result from changes in deposition that cause materials of different composition or particle size to be deposited for a period of time (p. 67). From the xplanation above it can therefore be concluded that sedimentary rocks have their origin in igneous rocks. They come from disintegrated older rocks which are commonly igneous (p. 67).

There are three categories of sedimentary rocks, classified based on their texture and their composition. According to Levin (2009), Clastic

sedimentary rocks have grains and broken fragments of minerals, rock and fossils; and include conglomerates, sandstones, siltstones and shales when classified according to the size of the grains that they are composed of.

Conglomerates consist of water-worn rounded particles that are larger than 2mm in diameter; while sandstones are composed of grains that range from 2mm to 1/16mm in diameter (p. 69). Furthermore, sandstones are subdivided according to their composition; for example siltstones have finer particles than sandstones, and shales are abundant in clay minerals and characteristically split into thin slabs parallel to bedding planes (p. 69).

Carbonate sedimentary rocks form from the process of precipitation of sea water or from accumulation of the Shelly skeletal parts of sea creatures.

Levin (2010) indicates that with the warming of the sea water, carbon dioxide is lost, favoring the precipitation of calcium carbonate, forming carbonate sedimentary rocks especially along continental coastlines. These rocks are basically composed of the mineral calcite and dolomite.

Additionally, carbonate rocks contain highly variable amounts of impurities, which may include iron oxide, clay, and particles of silt and sand swept into the environment by currents. Like clastic rocks, carbonate rocks form strata that range in texture from coarsely granulate to very fine grained. Based on the texture the resultant types are: micrite, carbonate clasts, and oolites (p. 70). Other types of limestone are chalk and dolomite. Interestingly, dolomite is neither secreted from organisms nor precipitated from sea water.

Besides clastic and carbonate sedimentary rocks, chemical sedimentary rocks formed through evaporation processes. Levin (2009) indicates that

when water passes over rocks, it dissolves and carries away some of the minerals in those rocks. When the water dries up, the minerals are left behind and when this process repeats itself over a long period of time, minerals build up, subsequently forming chemical sedimentary rocks, also called evaporites (p. 71). Evaporates can occur in thick layers that extend over hundreds of square kilometers the examples of which are halite and gypsum (p. 57).

In conclusion, plate tectonics influences the formation of sedimentary rocks by developing the appropriate landscape on which the forces of erosion can bring about deposition. It is evident that sedimentary rocks originate from older igneous rocks that are broken down by various weathering processes and subsequent deposition. The varied methods of deposition and other chemical and physical processes will determine the type of sedimentary rock formed.