

SEDIMENTARY ROCKS

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- Sedimentary rocks are formed **near or at the surface of the earth**.
- They are derived from **preexisting source rocks**.
- They are composed by **sediments**, this is material that has been **weathered, transported and deposited** by processes such as running water (**rivers**) glaciation (**glaciers**), etc., or formed by **chemical precipitation from solutions**.
- They cover **75%** of the Earth's surface and are the sites of important resources such as **COAL, OIL** and **GROUNDWATER**.
- Sedimentary rocks frequently contain fossils that can be used to interpret earth's history
- They are **composed** only by **few mineral species**.

Their physical appearance is due to different factors

- **SOURCE AREA** (rock type present, relief, climate, degree of weathering)
- **TRANSPORTING MEDIUM** (running water, glacier, wind, gravity)
- **DISTANCE OF TRANSPORTATION**
- **TYPE OF ENVIRONMENT OF DEPOSITION** (water depth, climate, current strength)

SEDIMENTARY ROCK FORMATION

DEPOSITION	COMPACTATION	RECRYSTALLIZATION + COMPACTATION	SEDIMENTARY ROCKS
LITHIFICATION			

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Sedimentary rocks are classified based on their **TEXTURE** and **COMPOSITION**

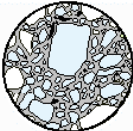
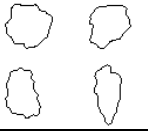

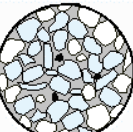
TEXTURE. Is the geometrical arrangement of the constituents of a rock (**SIZE, SHAPE** and **MUTUAL RELATIONSHIPS OF PARTICLES**).

Based on their composition there are three main groups of sedimentary rocks:


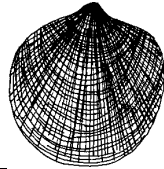
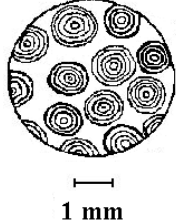
<u>CLASTIC or DETRITAL</u>	Formed by fragments of mineral or rocks
BIOCHEMICAL	Formed by remains of organisms.
CHEMICAL	Formed by chemical processes. Crystals that have precipitated from solutions

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CLASTIC TEXTURES / ROCKS -TEXTURAL FEATURES / COMPOSITION

SEDIMENT	SIZE	DEGREE OF SORTING	ROUNDING	MINERALS	ROCK NAME
GRAVEL- (boulder- cobble- pebble-) SIZED	> 2mm in Ø	POORLY SORTED 	ANGULAR 	Source dependent	BRECCIA
			WELL- ROUNDED 		CONGLOMERATE
SAND- SIZED	1/16 - 2 mm Ø (0.062 mm)	WELL SORTED 	WELL- ROUNDED	QUARTZ ORTHOCLASE	QUARTZ SANDSTONE ARKOSE
SILT-SIZED	0.005 - 1/16 mm Ø Feels gritty when rubbed	Grains to small to be seen without the aid of a microscope	Grains to small to be seen without the aid of a microscope	Grains to small to be seen without the aid of a microscope	SILTSTONE
CLAY- SIZED	<0.005 mm Ø Feels smooth	Grains to small to be seen without the aid of a microscope	Grains to small to be seen without the aid of a microscope	Grains to small to be seen without the aid of a microscope	SHALE

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BIOCHEMICAL –CARBONATES					
Composition	Fragment size	Name of the fragment	Origin	Textural Characteristics	Rock name
<p>CaCO₃ (calcium carbonate) CALCITE</p> <p>Fizz strongly with dilute HCl</p>	<p>Microscopic 1 - 5 μ</p>	<p>MICRITE</p>	<p>Results from the lithification of <i>lime mud</i>, most of which originates from the breakdown of the hard "skeletons" secreted by calcareous algae which live in warm, shallow seas</p>	<p>The color is variable, ranging from gray to tan, or other colors.</p> 	<p>MICRITIC LIMESTONE or MICRITE</p>
<p>CARBONATES</p> <p><u>LIMESTONES</u> are generally <u>gray</u> (but may be tan, pink, white, black, or other colors).</p>	<p>Microscopic (larger than above)</p>		<p>Probably formed by the accumulation of the remains of planktonic marine algae called coccolithophores or shells of Foraminifera and/or by chemical precipitation.</p>	<p>White, but it may be stained with iron oxide or other impurities. It is a soft porous rock that crumbles easily. Less dense, and less compact than micrite.</p>	<p>CHALK</p>
	<p>Macroscopic</p>	<p>ALLOCHEMS</p>	<p>The remains of ancient plants or animals</p> <p>Many organisms have calcareous shells or skeletons, and their remains may accumulate in lime mud</p>	<p>Whole fossils, broken shell fragments with a calcareous skeleton or body parts.</p> 	<p>FOSSILIFEROUS LIMESTONE</p>
		<p>OOLITES are small (1/4 - 2mm; sand-sized)), concentrically layered, spherical grains, so named because they look like fish eggs. On a cut or broken surface they look circular, and internal concentric laminations may be seen with a hand lens or microscope.</p>	<p>Commonly are formed by layers of material (usually calcite), that have been deposited around some tiny particle such as a sand grain or fossil fragment and are rolled back and forth in quiet waters</p>	<p>Composed almost entirely by broken shell fragments</p> 	<p>COQUINA</p> <p>OOLITIC LIMESTONE</p>

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BIOCHEMICAL -OTHER COMPOSITIONS				
Composition	Fragment size	Origin	Textural Characteristics	Rock name
SiO₂ SILICEOUS	Microscopic to very fine grained silica sediment	Chemical or biochemical origin. Some chert contains siliceous skeletons of micro-organisms known as <i>radiolarians</i> and diatoms.	Chert can be recognized by its extremely fine grain size, smooth feel, and hardness (scratches glass) Breaks with a conchoidal fracture	CHERT Two main varieties: Nodular Bedded
C CARBON		The plant fossils in coal generally indicate deposition in <u>fresh-water swamps</u>	Black, light weight smudgy or shiny	COAL

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CHEMICAL			
	Mineralogy	Texture / Properties	Rock name
EVAPORITES Chemical precipitates, which form by precipitation of dissolved minerals from water during evaporation.	Halite NaCl	Cubic crystals and cubic cleavage; usually transparent; softer than glass; salty taste	Rock salt
	Gypsum $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	Very finely sugary, usually white nor pink; silky luster Softer than nail	Gypsum Gypsum rock
	Anhydrite CaSO_4		Anhydrite
	Calcite CaCO_3	Reacts to HCl	Crystalline limestone
	Calcite CaCO_3	Coarsely crystalline; can be recognized by their cylindrical shape and internal "tree-ring-like" appearance. Reacts to HCl	Travertine
Forms by evaporation of cave, spring, or river waters. stalactites and stalagmites			