**ROCK CYCLE AND IGNEOUS ROCKS**

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ROCK CYCLE

The rock cycle is a geological concept that describes transition through geological time among the three main types of rocks: sedimentary, metamorphic and igneous. Each rock type is altered when it is forced out of its equilibrium conditions.

The rock cycle is driven by earth’s internal heat, pressure from tectonic processes, and the effects of water, wind, gravity and biological activities, temperature, heat and finally pressure.

ROCK TYPES

1. Igneous rocks

When rocks are pushed deep down enough into the earth, they can melt to form molten rock. Below the surface of the earth, molten rock is called magma but when erupted above the ground usually through volcanoes, it is called lava.

Igneous rocks formed when molten hot material cool and solidifies .when this happens, igneous rocks form crystals and are said to crystallise. When they are formed inside the earth, they are called intrusive or plutonic igneous rocks. If they are formed outside or top of the earth’s crust they are called extrusive or volcanic igneous rocks

1. Sedimentary rocks

These are rocks formed from pieces of other existing rock or organic material. Rocks on the earth’s surface are gradually broken down into smaller pieces by water, ice, wind , plants and animals(known as weathering) these broken pieces are called sediment and are transported away or eroded, by rivers, glaciers. and wind. Sediments often collect at the bottom of lakes and oceans. Over time they are squashed and compacted together to become a sedimentary rock such as sandstone, limestone or mudstone

Sedimentary rocks are laid down in layers. They can contain fossils from animals and plants that become trapped in the sediment before it becomes a rock

1. Metamorphic rocks

These are rocks that have been changed over time. When rocks are pushed down into the earth, grains and minerals can become stretched, squashed and slightly melted from the extreme pressure and heat. This is called metamorphism and it causes new metamorphic rocks with different textures and minerals to form. Metamorphic rocks are crystalline like igneous rocks however the minerals in metamorphic rocks tend to line up to form layers

DEFINITION OF TEXTURE AND COMPOSITION ACCORDING TO CLASSIFICATION IN IGNEOUS ROCKS

Igneous rocks are classified based on texture and composition

Texture: it describes the physical characteristics of the minerals such as the grain size. This relates to cooling history of the molten magma from which it came

Composition: this refers to the rocks specific mineralogy and chemical composition. Cooling history is also related to changes that can occur to the composition of igneous rocks.

DEFINITIONS OF IGNEOUS ROCK TEXTURE

1. Aphanitic-these are igneous rocks with such fine-grained textures that their mineral crystals are not visible to the naked eye. They form when lava cools rapidly in volcanic or shallow subsurface environment
2. Phaneritc –these are igneous rocks with large, visible crystals because the rock formed slowly in an underground magma chamber
3. Porphyritic –this is a texture in igneous rocks that is characterized by large crystals called phenocrysts, embedded in a finer-grained groundmass
4. Vesicular –this describes a rock with holes created by gas escaping from cooling lava. This texture is common in igneous rocks that have reached the earth surface, such as pumice and scoria
5. Glassy – a glassy texture suggests that cooling that was so extremely fast that no crystals could form.
6. Pegmatitic –this texture is a coarse grained appearance in rocks that results from the presence of very large crystals typically over 1centimeter in size. Their mineral grains are exceptionally large.

COMMON IGNEOUS ROCK FORMING MINERALS

* Quartz – SiO2
* Feldspar –KalSi3O8, NaAlSi3O8, CaAl2Si2O8
* Mica –Kal2(AlSi3O10)(F,OH)2, KAl2(AlSi3O10)(OH,F)2
* Amphibole –Ca2(Mg, Fe)4Al2Si7O22(OH)2
* Pyroxene –(Ca, Na)(Mg, Fe, Al)(Al, Si)2O6
* Olivine –(Mg, Fe)2SiO4
* Magnetite- Fe3O4
* Plagioclase –NaAlSi3O8, CaAl2Si2O8

DEFINE

1. Ultramafic- refers to the extremely mafic rocks composed of mostly olivine and some pyroxene which have even more magnesium and iron and even less silica
2. Mafic- refers to an abundance of ferromagnesium minerals plus plagioclase feldspar. It is mostly made of dark minerals like pyroxene and olivine, which are rich in iron and magnesium and relatively poor in silica.
3. Intermediate –this refers to a composition between felsic and mafic. It usually contains roughly equal amounts of light and dark minerals including light grains of plagioclase feldspar and dark minerals like amphibole.
4. Felsic –refers to predominance of the light coloured minerals feldspar and silica in the form of quartz. These light coloured minerals have more silica as a proportion of their overall chemical formula.

For each of the following igneous rocks, state if it is extrusive or intrusive and whether it is ultramafic, mafic, intermediate or felsic.

1. Peridotite –intrusive rock, ultramafic igneous rock
2. Basalt –extrusive rock, mafic igneous rock
3. Gabbro –intrusive rock, mafic igneous rock
4. Andesite-extrusive rock, intermediate rock
5. Diorite – intrusive rocks, intermediate rock
6. Rhyolite – extrusive rocks, felsic rock
7. Granite –intrusive rocks, felsic rock

TYPES OF VOLCANOES

1. Shield volcanoes

Shied volcanoes are tall and broad with flat rounded shape. They have low slope and always have large craters at the summit. The Hawaiian volcanoes exemplify the common types of shield volcano. They are built by countless outpourings of lava that advance great distances from a central summit vent or a group of vents. The outpourings of lava are typically not accompanied by pyroclastic material, which make the shield volcanoes relatively safe during eruptions. Famous shield volcanoes include Mauna Loa and Kilauea in Hawaii, Olympus mons of Mars.

1. Composite volcanoes

The most majestic of the volcanoes are composite volcanoes, also known as strato- volcanoes. Composite volcanoes are tall, symmetrically shaped with steep sides, sometimes rising 10000 feet high. They are built of alternating layers of lava flows, volcanic flows, volcanic ash and cinders. Famous composite volcanoes include Mount Fuji in Japan, Mount Shasta and Mount Lassen in California, Mount St Helens and Mount Rainier in Washington State, Mount Hood in Oregon and Mount Etna in Italy.

1. Cinder cones

Cinder cones are simple volcanoes which have a bowl- shaped crater at the summit and steep sides. They only grow to about a thousand feet, the size of a hill. They usually are created of eruptions from a single opening, unlike a strato-volcano or shield volcano which can erupt from many different openings. Cinder cones are typically are made of piles of lava not ash. During eruptions, blobs of lava are blown into the air and break into small fragments that fall around the opening of the volcano. The pile forms an oval shaped small volcano. Famous cinder cones include Paricutin in Mexico and the one in the middle of Crater Lake in Oregon

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