The rock cycle refers to the continuous process in which rocks are formed, broken down and re-formed over time. It begins with the formation of igneous rocks through the cooling and solidification of molten magma or lava. These rocks can then be weathered and eroded into sedimentary rocks through the action of wind, water or ice. Over time, the sedimentary rocks can be buried and subjected to heat and pressure, transforming them into metamorphic rocks. Finally, all types of rocks can be melted and recycled back into magma through the process of melting and solidification, starting the cycle anew. The rock cycle is an ongoing process that takes millions of years and plays a crucial role in shaping the Earth's surface and geology.

The process that leads to the formation igneous rock is when molten rock material (magma) cools and solidifies either underneath the Earth's surface or on top of it as lava. This transformation from a liquid state to a solid state is known as crystallization. As magma cools down, its crystals start growing and bonding together until they form an entirely new structure –the igneous rocks. The type of igneous rock formed depends on factors such as the composition and temperature of the magma, how quickly or slowly it cools, and whether it contains gas bubbles or not. Some examples include granite (a common type found in mountains), basalt (found in volcanic islands), pumice (known for its light texture due to trapped gas bubbles), etc

Sedimentary rock is formed in a few steps. First, weathering and erosion break down rocks and minerals into fragments called sediment. These sediments can be carried away by wind or water, eventually settling to the bottom of a body of water like a lake or ocean. Over time, these layers (known as strata) become compacted and cemented together through a process known as lithification. Lithification involves pressure pushing down on the sediment, squeezing out any trapped air spaces or fluids until it forms hardened rock material that we call sedimentary rock. The exact composition of the rock will depend on many factors such as what types of materials were eroded into the sediment, where they came from geographically, how long ago they originated etc.

the process that leads to the formation of metamorphic rocks is it involves a pre-existing rock being subjected to conditions such as high pressure, high temperature or chemical exposure which cause it to transform into another type of rock altogether. This occurs without melting the rock entirely but rather recrystallizing and changing its original structure. For example, shale (a sedimentary rock) may undergo processes such as tectonic activity or deep burial which can turn it into slate (a foliated metamorphic rock) due to pressure and temperature changes over extended periods of time. The resulting new type of metamorphic rock will vary depending on factors like its original composition and what kind of external forces acted upon it during transformation.

Sure! Texture in regards to igneous rocks refers to the size and arrangement of the crystals within it. For example, if the magma cooled slowly over a long period of time, larger crystal formations would have more time to grow and form within the rock resulting in a coarse or phaneritic texture. On the other hand, if magma cools rapidly some minerals may not have enough time to fully crystallize leading to small or microscopic crystal formation known as fine-grained texture.

Composition on the other hand refers to what materials are present within an igneous rock such as different types of minerals that make up its structure.

Aphanitic texture in igneous rocks refers to the fine-grained crystal formation within the rock. This type of texture is formed when magma cools very fast,as a result, there is not enough time for large crystals to grow and form, leading to an appearance of small and uniform mineral grains throughout the rock. Aphanitic igneous rocks often have a smooth texture and are commonly found as volcanic ash or lava flows on Earth's surface.

Phaneritic texture in igneous rocks refers to the coarse-grained crystal formation within the rock. This type of texture is usually formed when magma cools slowly over a long period of time deep underground. The slow cooling allows enough time for large crystals to grow and form, leading to an appearance of large mineral grains throughout the rock. Phaneritic igneous rocks often have a rough or grainy texture and are commonly found as intrusive formations like plutons and batholiths.

Porphyritic texture in igneous rocks refers to a combination of coarse-grained and fine-grained crystal formation within the rock. This type of texture is typically formed when magma cools slowly deep underground, allowing large mineral grains to form first, and then later on it rapidly cools at a shallow depth surface level leading to small crystals formations as well. As a result, there are distinct big crystals surrounded by smaller ones throughout the rock. Porphyritic igneous rocks can have both rough and smooth textures depending on their composition, and they are commonly found in volcanic areas such as lava domes or stocks.

Vesicular texture refers to the presence of gas bubbles or vesicles within the rock. These bubbles are formed by the release of gas from magma during volcanic eruptions or as it rises up through cooler material underground. When the magma solidifies, the gas bubbles become trapped and form small cavities throughout the rock. Vesicular igneous rocks often have a spongy texture and are commonly found in lava flows or pyroclastic deposits such as pumice.

Glassy texture refers to the lack of mineral crystals within the rock, giving it a smooth and non-grainy appearance. This type of texture is typically formed when magma cools quickly at the surface level or during explosive volcanic eruptions that cool rapidly upon contact with air or water. Glassy igneous rocks are often shiny and translucent, resembling glass, and are commonly found in areas that have experienced high levels of volcanic activity such as obsidian flows or tuff rings.

Pegmatitic texture refers to a type of coarse-grained formation characterized by unusually large crystals which can range from several centimeters up to meters in size. These rocks are typically found near the edges or margins of intrusive igneous formations and often contain mineral-rich zones or veins with smoky quartz, feldspar, tourmaline, and other minerals. Pegmatitic igneous rocks have a variety of textures ranging from glassy or fine-grained to coarsely porphyritic depending on their composition and cooling history.

The following are the common igneous rock forming minerals and their formulas are:

1. Quartz (SiO2)
2. Feldspar - potassium feldspar (KAlSi3O8), plagioclase feldspar ((Na,Ca)(Al,Si)4O8)
3. Amphibole - hornblende ((Ca,Na)2-3(Mg,Fe,Al)5(Si,Al)8O22(OH,F)2)
4. Pyroxene - augite ((Ca,Mg,Fe,Ti)(Si,Al)2O6), enstatite (MgSiO3), hypersthene((Mg,Fe,Ca)(Si,Al)2O6)
5. Mica - biotite (K(MgFe)3(Al/Fe Si3 O10 )(OH ) 2 ), muscovite(KA12( Alsi 3 O10 )(Oh ) symmetric ), phlogopite((Mg,KNa)(Cr,Mn,Ti)(Atiecal)sio20(Oh,F))
6. Olivine - forsterite(Mg₂SiOl₆⁻ or Mg₂[ᴼ₄│ᴼ]) , fayalité(recognized as Iron-rich olivine)
7. Hornblende(pyroxenoidend members)- diopside CaMgc(Sil₁₀))o²²(OH\*FCl)

These minerals make up the majority of igneous rocks that are formed by cooling magma and lava on or beneath the earth's surface and they contribute to their unique properties and characteristics such as texture and color.

Ultramafic refers to a type of igneous rock that is composed primarily of dark-colored, magnesium-rich minerals such as olivine and pyroxene. These rocks have high melting points and are typically formed in the earth's mantle but can also be found in plutonic or volcanic settings. Ultramafic rocks have low silica content and are often associated with areas of tectonic activity such as mid-ocean ridges or subduction zones.

Mafic refers to a type of igneous rock that is composed primarily of dark-colored, magnesium and iron-rich minerals such as pyroxene and olivine. These rocks have intermediate silica content and are typically formed at higher temperatures than felsic rocks. Mafic rocks can be found in both plutonic (intrusive) and volcanic (extrusive) settings, often associated with areas of tectonic activity such as mid-ocean ridges or hotspots.

Intermediate refers to a composition of igneous rock with a moderate amount of silica content between mafic and felsic rocks. These rocks typically have a balanced mix of dark and light minerals, and are formed at intermediate temperatures. Intermediate rocks can be found in both plutonic (intrusive) and volcanic (extrusive) settings, often associated with areas of tectonic activity such as island arcs or subduction zones.

Felsic is a igneous rocks that are relatively rich in elements that form feldspar and quartz.It is contrasted with mafic rocks, which are relatively richer in magnesium and iron. Felsic refers to silicate minerals, magma, and rocks which are enriched in the lighter elements such as silicon, oxygen, aluminium, sodium, and potassium. Felsic magma or lava is higher in viscosity than mafic magma/lava.

Felsic rocks are usually light in color and have specific gravities less than 3. The most common felsic rock is granite. Common felsic minerals include quartz, muscovite, orthoclase, and the sodium-rich plagioclase feldspars (albite-rich).

Igneous rock can either be extrusive or intrusive. Extrusive igneous rocks are those rocks that cooled rapidly or faster while intrusive igneous rocks cooled slowly.

The following igneous rocks can be described as extrusive rocks

Basalt

Andesite

Rhyolite

Intrusive igneous rocks include

Periodotite

Gabbro

Diorite

Granite

Igneous rocks can also be classified as ultamafic, mafic, intermediateor felsic. The silica content is the one that determines the group into which a certain rock falls into.

Ultramafic- contains less than 45 percentage of silica content, they include PERIODOTITE

Mafic- have 48 percentage of silica content, they include BASALT and GABBRO

Intermediate- they include ANDESITE and DIORITE

Felsic- contains 72 percentage of silica content, they include RHYOLITE and GRANITE

Volcanoes can be classified as following

Cinder cone volcanoes: they are built from particles and blobs of congealed lava ejected from single vent. As the gas-charged lava is blown violently into the air, itbreaks into small fragments that solidify and fall as cinders around the vent to form a circular or oval cone

Composite volcanoes: they are tall, symmetrically steep shaped cones that produce explosive eruptions. They are built of alternating layers of lava flows, volcanic ash and cinders.

Shield volcanoe: they are usually constructed almost entirely of basaltic and/or andesitic lava flows which were very fluid when erupted. They are built by repeated eruptions that occured over vast periods of time- upto a million years or longer. They are much wider than they are tall