Project 2

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1. The rock cycle

The rock cycle is a continuous process that describes how rock transforms from one type to another over a period of time. There are three types of rocks that is the indigenous rock, metamorphic rocks and sedimentary rocks. The following are how the various types of rocks are formed:

1. Indigenous rock: These form from the cooling and solidification of magma or lava. Examples include granite, basalt, and obsidian.
2. Sedimentary Rocks: These form from the accumulation and compression of sediments, often in layers, over long periods. Examples include limestone, sandstone, and shale.
3. Metamorphic Rocks: These form from the alteration of existing rocks due to heat, pressure, or chemical processes, typically deep within the Earth’s crust. Examples include marble, slate, and schist.
4. Texture and composition

Texture refers to the size, shape and arrangement of mineral grain or crystals within the rock. Indigenous rocks can have various textures, including fine-grained (small crystals), coarse-grained (large crystals), glassy (no visible crystals), vesicular (contains gas bubbles or vesicles), and porphyritic (contains both large and small crystals).

Composition refers to the chemical makeup of the rock, specifically the minerals present and their relative proportions. Indigenous rocks can be classified into two main composition categories: felsic (rich in silica and lighter-coloured minerals like quartz and feldspar) and mafic (lower in silica and richer in darker-coloured minerals like pyroxene and olivine). Intermediate compositions fall between these two extremes. The composition of an indigenous rock influences its colour, density, and overall chemical properties.

1. Indigenous rock texture

Aphanitic texture refers to indigenous rocks with fine-grained or microscopic crystals that are too small to be seen with the naked eye. This texture typically forms when molten rock cools quickly at the Earth’s surface, such as in volcanic eruptions. Examples include basalt and rhyolite.

Phaneritic texture describes indigenous rocks with coarse-grained crystals that are large enough to be visible to the naked eye. This texture usually forms when molten rock cools slowly beneath the Earth’s surface, allowing crystals to grow over time. Examples include granite and diorite.

Porphyritic texture is characterized by the presence of both large crystals (phenocrysts) embedded in a fine-grained matrix (groundmass). This texture indicates two stages of cooling: initial slow cooling deep within the Earth to form large crystals, followed by rapid cooling near the surface to create the finer matrix. Examples include porphyritic basalt and andesite.

Vesicular texture refers to indigenous rocks with a spongy appearance due to the presence of numerous small cavities or vesicles formed by gas bubbles trapped during solidification. This texture commonly occurs in volcanic rocks that rapidly cool at or near the Earth’s surface. Examples include vesicular basalt and pumice

Glassy texture describes indigenous rocks that lack any crystalline structure and appear similar to glass. This texture forms when molten rock cools extremely rapidly, preventing the formation of crystals. Examples include obsidian and fulgurite.

Pegmatitic texture refers to indigenous rocks with very coarse-grained crystals, typically larger than a centimetre in size. This texture forms in the late stages of magma crystallization, often in veins or dikes, where there is abundant water and slow cooling, allowing for the growth of large crystals. Examples include pegmatite and aplite.

1. Indigenous rock forming mineral

The following are some of the indigenous rock forming minerals:

* 1. Quartz: SiO2
  2. Feldspar (includes orthoclase, albite, and plagioclase):
  3. Orthoclase: KAlSi3O8
  4. Albite: NaAlSi3O8
  5. Plagioclase (varies depending on composition):
  6. Albite (Na-rich): NaAlSi3O8
  7. Anorthite (Ca-rich): CaAl2Si2O8
  8. Mica (includes muscovite and biotite):
  9. Muscovite: KAl2(AlSi3O10)(OH)2
  10. Biotite: K(Fe,Mg)3AlSi3O10(OH)2
  11. Amphibole (includes hornblende):
  12. Hornblende: (Ca,Na)2-3(Mg,Fe,Al)5(Al,Si)8O22(OH)2
  13. Pyroxene (includes augite):
  14. Augite: (Ca,Na)(Mg,Fe,Al)(Al,Si)2O6
  15. Olivine: (Mg,Fe)2SiO4
  16. Biotite: K(Fe,Mg)3AlSi3O10(OH)2
  17. Magnetite: Fe3O4

1. Definition

Ultramafic rocks are composed primarily of mafic minerals like olivine and pyroxene, with very low silica content (less than 45%). They typically have high magnesium and iron content and are often associated with mantle-derived rocks. Examples include peridotite and dunite.

Mafic rocks have a moderate silica content (45-52%) and are rich in magnesium and iron. They are typically dark-coloured and composed mainly of mafic minerals like pyroxene and plagioclase feldspar. Basalt is a common example of a mafic rock.

Intermediate rocks have a silica content between that of mafic and felsic rocks (52-65%). They contain minerals from both the mafic and felsic groups and often exhibit a mix of characteristics from both. Diorite and andesite are examples of intermediate rocks.

Felsic rocks have the highest silica content (65% or more) and are typically light-coloured. They are rich in minerals like quartz, orthoclase feldspar, and plagioclase feldspar, and low in magnesium and iron. Granite is a common example of a felsic rock

1. Classification of indigenous rock
2. Peridotite: Intrusive; Ultramafic
3. Basalt: Extrusive; Mafic
4. Gabbro: Intrusive; Mafic
5. Andesite: Extrusive; Intermediate
6. Diorite: Intrusive; Intermediate
7. Rhyolite: Extrusive; Felsic
8. Granite: Intrusive; Felsic
9. Types of volcanoes
10. Shield volcanoes are broad, gently sloping volcanoes characterized by low viscosity lava flows. They are typically formed by the eruption of basaltic lava, which spreads out in thin layers, creating a shield-like shape. These volcanoes are relatively non-explosive and are commonly found at divergent plate boundaries and hot spots.
11. Stratovolcanoes are tall, conical volcanoes composed of alternating layers of lava flows, volcanic ash, and other volcanic debris. They are formed by explosive eruptions of intermediate to felsic lava, which tends to be more viscous and traps gases, leading to more explosive eruptions. Stratovolcanoes are associated with convergent plate boundaries, where subduction zones create conditions for magma generation and explosive eruptions.
12. Cinder cone volcanoes are small, steep-sided volcanoes formed from explosive eruptions of volcanic ash, cinders, and other pyroclastic materials. They typically have a bowl-shaped crater at the summit and are composed mostly of loose, fragmented volcanic material. Cinder cone volcanoes are often found along the flanks of larger volcanoes or as standalone features within volcanic fields.

**REFERENCE**

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