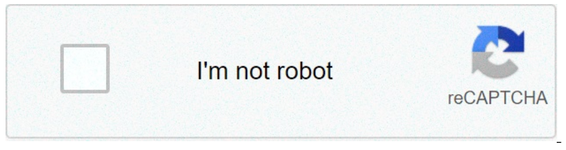

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Rock cycle pdf notes

The rock cycle is a process in which rocks are continuously transformed between the three rock types igneous, sedimentary and metamorphic. Rocks of any type can be converted into any other type, or into another rock of the same type, as this diagram illustrates: Conversion to metamorphic rocks requires conditions of increased temperature and/or increased pressure, conversion to sedimentary rocks occurs via the intermediate stage of sediments, and conversion to igneous rocks occurs via the intermediate stage of magma: Increased temperature and pressure occurs in subduction zones and in areas where two plates of continental lithosphere collide to produce a mountain range, while increased pressure without increased temperature is produced when sedimentary rocks are deeply buried under more sediments. Sediments are produced when rocks are uplifted, weathered and eroded, and the resulting detrital material deposited in marine or terrestrial basins. If the sediments are buried under further layers of sediment, they can become lithified to produce a sedimentary rock. Magma is produced when rocks are melted. This melting can occur when a lithospheric plate descends into the Earth's crust at a subduction zone, or when a mid-ocean ridge opens up and produces decompression melting in the athenosphere under the ridge. When the magma solidifies, it becomes an igneous rock. The rock cycle has many alternative pathways. The following diagram illustrates one of these and gives an indication of the plate tectonic setting where it occurs: Bill Gray The rock components of the crust are slowly but constantly being changed from one form to another and the processes involved are summarized in the rock cycle (Figure 3.2). The rock cycle is driven by two forces: (1) Earth's internal heat engine, which moves material around in the core and the mantle and leads to slow but significant changes within the crust, and (2) the hydrological cycle, which is the movement of water, ice, and air at the surface, and is powered by the sun. The rock cycle is still active on Earth because our core is hot enough to keep the mantle moving, our atmosphere is relatively thick, and we have liquid water. On some other planets or their satellites, such as the Moon, the rock cycle is virtually dead because the core is no longer hot enough to drive mantle convection and there is no atmosphere or liquid water. Figure 3.2 A schematic view of the rock cycle. [SE] In describing the rock cycle, we can start anywhere we like, although it's convenient to start with magma. As we'll see in more detail below, magma is rock that is hot to the point of being entirely molten. This happens at between about 800° and 1300°C, depending on the composition and the pressure, onto the surface and cool quickly (within seconds to years) — forming extrusive igneous rock (Figure 3.3). Figure 3.3 Magma forming pahoehoe basalt at Kilauea Volcano, Hawaii [SE] Magma can either cool slowly within the crust (over centuries to millions of years) — forming intrusive igneous rock, or erupt onto the surface and cool quickly (within seconds to years) — forming extrusive igneous rock. Intrusive igneous rock typically crystallizes at depths of hundreds of metres to tens of kilometres below the surface. To change its position in the rock cycle, intrusive igneous rock has to be uplifted and exposed by the erosion of the overlying rocks. Through the various plate-tectonics-related processes of mountain building, all types of rocks are uplifted and exposed at the surface. Once exposed, they are weathered, both physically (by mechanical breaking of the rock) and chemically (by weathering of the minerals), and the weathering products — mostly small rock and mineral fragments — are eroded, transported, and then deposited as sediments. Transportation and deposition occur through the action of glaciers, streams, waves, wind, and other agents, and sediments are deposited in rivers, lakes, deserts, and the ocean. Exercise 3.1 Rock around the Rock-Cycle clock Referring to the rock cycle (Figure 3.2), list the steps that are necessary to cycle some geological material starting with a sedimentary rock, which then gets converted into a metamorphic rock, and eventually a new sedimentary rock. A conservative estimate is that each of these steps would take approximately 20 million years (some may be less, others would be more, and some could be much more). How long might it take for this entire process to be completed? Figure 3.4 Cretaceous-aged marine sandstone overlying mudstone, Gabriola Island, B.C. [SE] Unless they are re-eroded and moved along, sediments will eventually be buried by more sediments. At depths of hundreds of metres or more, they become compressed and cemented into sedimentary rock. Again through various means, largely resulting from plate-tectonic forces, different kinds of rocks are either uplifted, to be re-eroded, or buried deeper within the crust where they are heated up, squeezed, and changed into metamorphic rock. Figure 3.5 Metamorphosed and folded Triassic-aged limestone, Quadra Island, B.C. [SE] The rock cycle Magma fountain sprays liquid rock from deep underground The rock cycle is the process by which rocks of one kind change into rocks of another kind.[1] There are three main kinds of rocks: igneous rock, metamorphic rock, and sedimentary rock. Each of these rocks can change into the other kinds by physical processes: cooling, melting, heat, weathering/erosion, compacting (squeezing tightly together), cementing, and pressure.[2] When heated deep under ground, rocks become magma (liquid rock). Above ground, it is called lava. Sediment, the particles from rock erosion and weathering, is the basis for sedimentary rock of the future.[3] Igneous rock is hardened magma, which can happen above or below ground.[1] It can melt into magma, erode into sediment, or be pressed tightly together to become metamorphic. Metamorphic rock is igneous or sedimentary rock that has been heated and squeezed.[1] It can erode into sediment or melt into magma. It is formed under extreme pressure and temperature deep inside mountain chains. Sedimentary rock is compacted sediments which can come from any of the other rocks,[1] plus remains of living things. It can erode back into sediment, or be pressurized into metamorphic rock and can be melted to magma , which forms igneous rocks . These processes can occur in different orders, and the cycle goes on forever. Earth has several processes for changing rocks. Wind and water can create sediment from rocks, and movement of one tectonic plate against another creates enormous heat and pressure which affects rocks greatly.[4] Subduction converts all kinds into magma, which eventually rejoins the cycle as igneous rocks. References ↑ 1.0 1.1 1.2 1.3 "Rock Cycle (2010)". The Hutchinson unabridged encyclopedia with atlas and weather guide. 2011 [last update]. Retrieved 25 May 2011. Check date values in: |year= (help) ↑ "Earth Floor: Cycles". www.cotf.edu. Retrieved 2021-02-17. ↑ Blatt, Harvey and Robert J. Tracy 1996. Petrology; igneous, sedimentary, and metamorphic. 2nd ed, Freeman. ISBN 0-7167-2438-3 ↑ Fichter, Lynn S. 2000. The Wilson cycle and a plate tectonic rock cycle. James Madison University, Department of Geology and Environmental Science. [1] Retrieved from " Loading... Found a content error? Tell us ROCKS come in cool colors, shapes, textures, and sizes and are found all around you, but how much do you REALLY know about them? Discover rock secrets through these activities. Create a rock collection as you learn about the three main types of rock, find out how to tell the different rock types apart, and see how rocks change from one type into another! Begin with Types of Rocks