

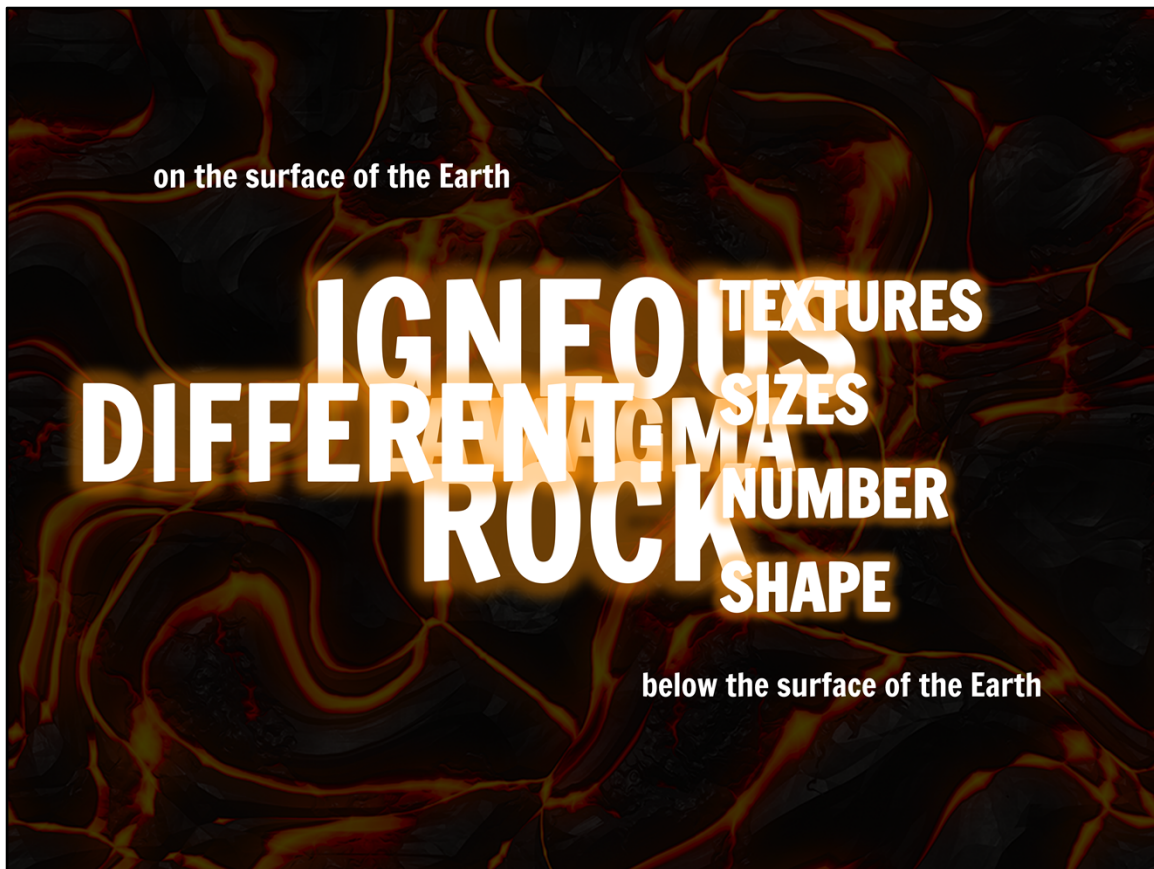
Module 6: Rocks
Topic 1 Content: Crystallization Presentation Notes



Crystallization

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Igneous rocks can form in two different ways. Magma can solidify underneath the surface of the Earth, or lava can crystallize on Earth's surface. The resulting rocks will share many characteristics, but the textures of the rocks will differ. When the texture differs, the size of the mineral crystals, number of mineral crystals, and shape of the mineral crystals are different between the two types of igneous rocks.

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Igneous rocks form when the lava or magma solidified. As existing rock is heated, it melts. Instantly, the newly-formed liquid rock will begin to cool. The elements within the liquid rock move around freely. As the rock cools, the elements recrystallize forming a new igneous rock. The speed of the cooling process will determine the properties of the igneous rock.

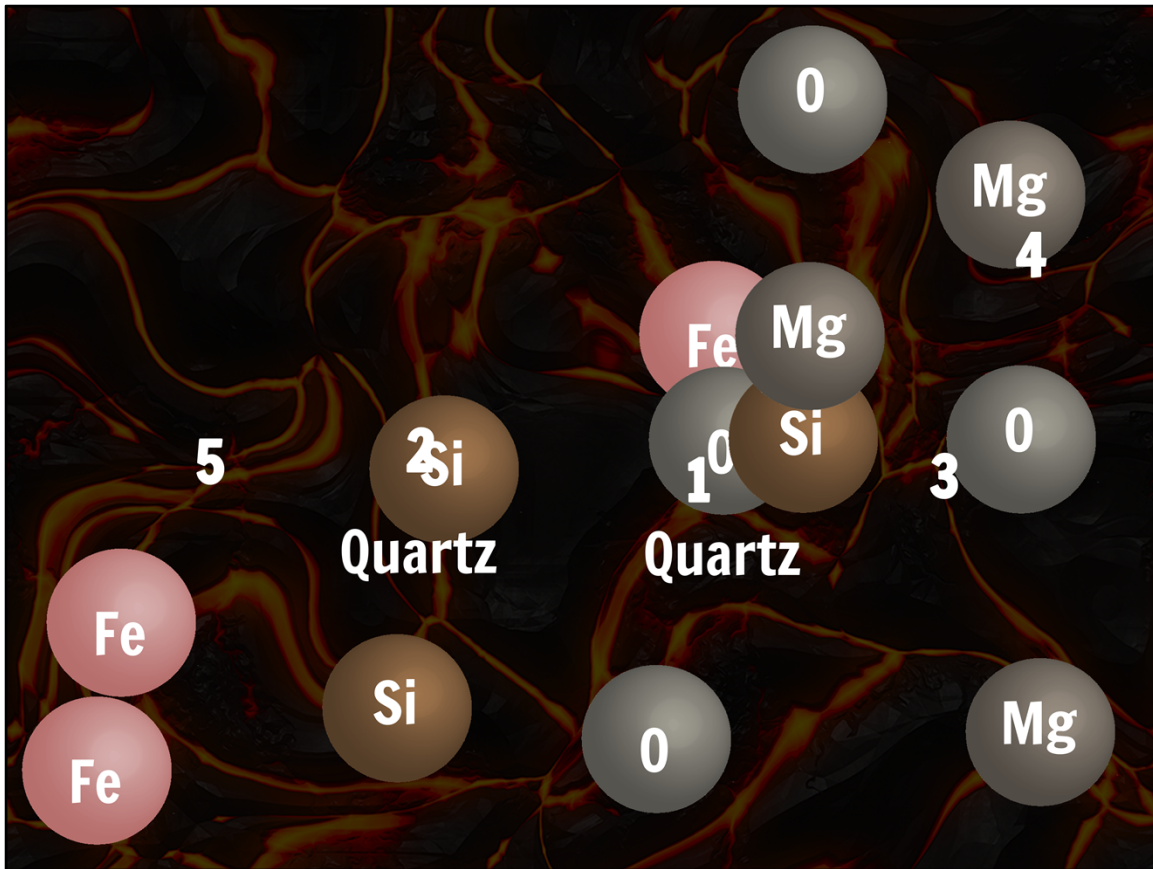
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Igneous rocks are divided into two groups based on where they form. Rocks that cool from magma inside the Earth are called intrusive, while the rocks that cool from lava outside the Earth on Earth's surface are called extrusive. The location of cooling is important because it affects the rate at which the melted rock cools. Since magma is located inside the Earth, temperatures are higher and the resulting intrusive rocks cool very slowly. Lava erupts onto the Earth's surface where the temperatures are significantly cooler. This enables the melted rock to cool and harden into rock at a much faster rate. The rate of cooling, or how fast or slow it cools and crystallizes, will determine the size of mineral crystals in the resulting rock. When magma cools slowly, large mineral crystals typically form. High rates of cooling produce very small mineral crystals or sometimes no minerals at all. Take a moment to view the differences in the size, number, and shape of the resulting crystals between an extrusive and intrusive igneous rock.

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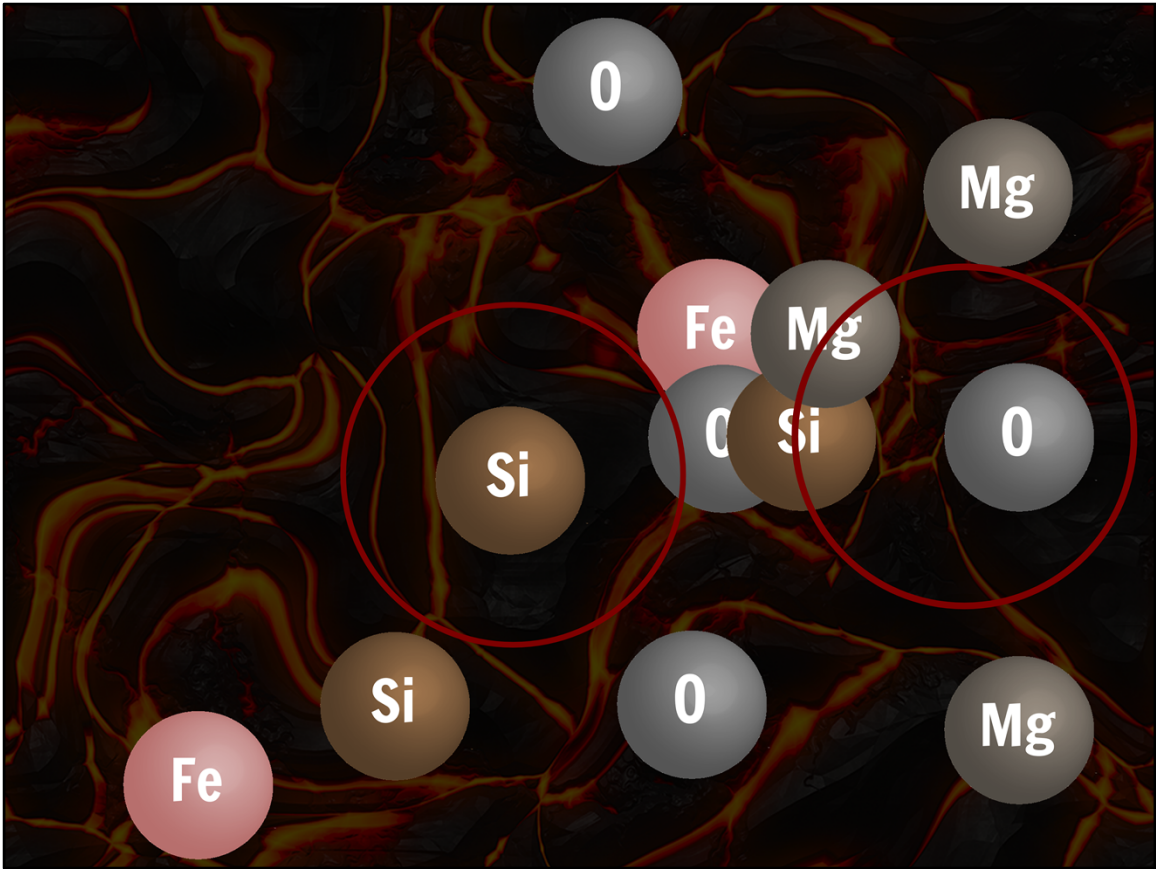
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The time that it takes the newly melted material to cool determines the mineral and crystal shapes as it allows more elements to combine. This also allows the minerals to form larger crystalline structures. The overall rock texture will be coarse-grained. Here, you can see that five possible minerals may have formed as the magma cooled during this slow time frame. Did you notice that two minerals are quartz (SiO_2)?

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When lava cools quickly, the elements do not have time to arrange. This means that the minerals will remain smaller and the rock texture will be fine-grained or glassy. You can see that only two possible minerals may form when lava cools this quickly.