

Formation of igneous rocks in Ireland | sample answer

Q. 'Explain the formation of two igneous rocks, with reference to examples from Ireland' (2011 Q3 B.)

Rocks can be categorized into three main groups. Sedimentary, metamorphic and igneous. These rocks are grouped by their formation. Compression, heat and pressure are usually what defines the group.

Igneous rocks are formed when the molten magma rock in the mantle penetrates through into the crust and cools.

The magma reaches the crust because the earth's crust is broken into plates. These plates are constantly moving due to convection currents in the mantle.

As plates move, faults occur, faults are cracks and hollows (areas of weakness) in the crust. Magma pushed through these faults and that is the beginning of how igneous rocks are formed.

In Ireland, over 400 million years ago we were directly above a plate boundary. This plate boundary was pulling apart and as two plates pull apart magma injects itself through the gaps that tensional pressure cause. Over thousands of years this magma cooled. This created what we now call, the Leinster Batholith. This is classified as an intrusive feature.

During the mountain building period fold mountains were constructed by orogeny. As two plates fold magma is injected into the crust. The magma causes the layer above to metamorphose into a different type of rock. This is called a metamorphic aureole. eg Wicklow mountains, Blackwater Valley and Mcgillicuddy reeks.

Igneous rock can cause intrusive and extrusive features. Other intrusive example could be sills, dykes, laccoliths and lopoliths, extrusive features can be volcanic plug, volcanic cone and lava plateau.

Intrusive features only become known to us when denudation occurs. The rock on the surface must be eroded and weathered away to display the igneous rock that is now underneath.

Granite is an example of an igneous rock. Granite is a hard rock with large crystals. Usually grey/ black in colour. It is a good rock for building and construction.

Granite is formed in intrusive volcanic features. It cools very slowly and as a result it can form the big crystals. Granite can be seen at the Wicklow mountains because the Granite batholith has been exposed.

Basalt is an igneous rock too. Usually a black, fine grained rock, it has small crystals and is usually found in a volcanic region.

Basalt is formed in extrusive volcanic processes. It reaches the surface as magma and rapidly cools as it hits the air. As a result it has very small crystals.

Basalt is usually in areas with active volcanoes such as Iceland and Hawaii. This is because volcanic cones have faults called vents which provide direct route for the magma to reach the surface.

However in Ireland we can see Basalt in the North and it has formed a lava plateau called the Giant's Causeway (Antrim/Derry plateau). This evidence of Basalt demonstrates to us that at one stage Ireland was at a plate boundary and a volcanic island.

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Lava plateaus are formed when lava extrudes to the surface. We can see the distinctive hexagonal shapes that make this feature such an interesting geological feature.