

# Pyroclastic rock

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**Pyroclastic rocks** or **pyroclastics** (derived from the Greek: *πῦρ*, meaning fire; and *κλαστός*, meaning broken) are clastic rocks composed solely or primarily of volcanic materials. Where the volcanic material has been transported and reworked through mechanical action, such as by wind or water, these rocks are termed *volcaniclastic*. Commonly associated with unsieved volcanic activity—such as Plinian or krakatoan eruption styles, or phreatomagmatic eruptions—pyroclastic deposits are commonly formed from airborne ash, lapilli and bombs or blocks ejected from the volcano itself, mixed in with shattered country rock.

Pyroclastic rocks may be a range of clast sizes, from the largest agglomerates, to very fine ashes and tuffs. Pyroclasts of different sizes are classified as volcanic bombs, lapilli, and volcanic ash. Ash is considered to be pyroclastic because it is a fine dust made up of volcanic rock. One of the most spectacular forms of pyroclastic deposit are the ignimbrites, deposits formed by the high-temperature gas-and-ash mix of a pyroclastic flow event.

## Classification

Clast size	Pyroclast	Mainly unconsolidated: Tephra	Mainly consolidated: Pyroclastic rock
> 64 mm	Block, bomb	Agglomerate	Agglomerate, pyroclastic breccia
< 64 mm	Lapillus	Layer, lapilli tephra	Lapilli tuff, lapillistone
< 2 mm	Coarse ash	Coarse ash	Coarse (ash) tuff
< 0.063 mm	Fine ash	Fine ash	Fine (ash) tuff



USGS scientist examines pumice blocks at the edge of a pyroclastic flow from Mount St. Helens



Rocks from the Bishop Tuff, uncompressed with pumice on left; compressed with fiamme on right.

[1]

Three modes of transport can be distinguished: pyroclastic flow, pyroclastic surge, and pyroclastic fall. During Plinian eruptions, pumice and ash are formed when silicic magma is fragmented in the volcanic conduit,

because of decompression and the growth of bubbles. Pyroclasts are then entrained in a buoyant eruption plume which can rise several kilometers into the air and cause aviation hazards. Particles falling from the eruption clouds form layers on the ground (this is pyroclastic fall or tephra). Pyroclastic density currents, which are referred to as "flows" or "surges" depending on particle concentration and the level turbulence, are sometimes called *glowing avalanches*. The deposits of pumice-rich pyroclastic flows can be called ignimbrites.

A pyroclastic eruption entails spitting or "fountaining" lava, where the lava will be thrown into the air along with ash, pyroclastic materials, and other volcanic byproducts. Hawaiian eruptions such as those at Kīlauea can eject clots of magma suspended into gas; this is called a "fire fountain". The magma clots, if hot enough may coalesce upon landing to form a lava flow.

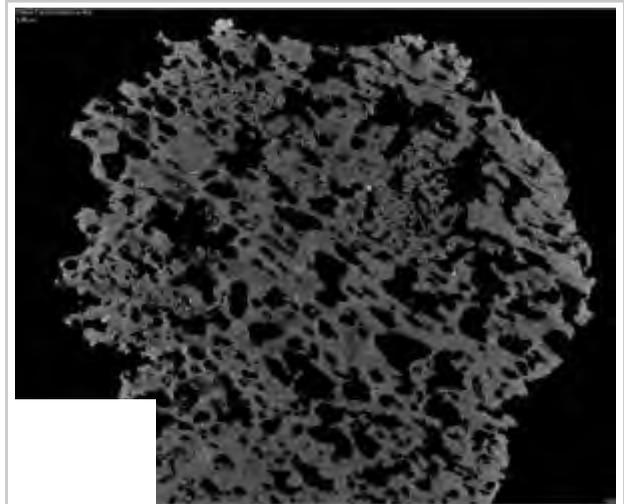
Pyroclastic deposits consist of pyroclasts which are not cemented together. Pyroclastic rocks (tuff) are pyroclastic deposits which have been lithified.

## References

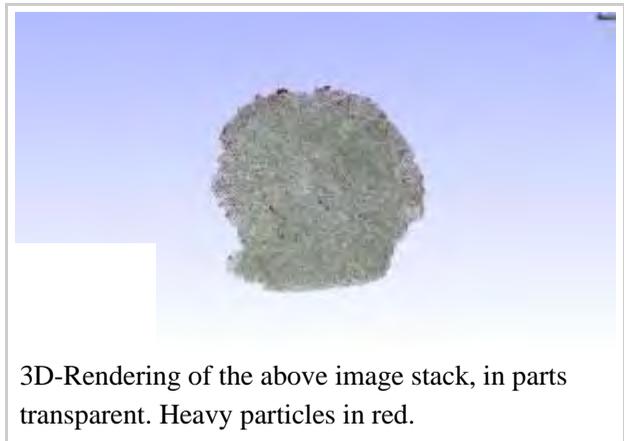
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Flight through a  $\mu$ CT-image stack of a Lapilli of the volcano Katla in Iceland. Find spot: Beach near Vik at the end of road 215. Acquisition done using "CT Alpha" by "Procon X-Ray GmbH", Garbsen, Germany. Resolution 11,2 $\mu$ m/Voxel, width approx. 24 mm.



3D-Rendering of the above image stack, in parts transparent. Heavy particles in red.

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