

Onneto Yunotaki Falls

Onneto Yunotaki Falls is a thermal waterfall that springs from gaps in the lava on Mt. Meakan's western slope. The lava here flowed from an eruption of Mt. Meakan 7,000 years ago. There are many waterfalls in Japan heated by geothermal energy, but this one stands out for its rare deposits of manganese oxide. Manganese oxide is an important metal compound used in steel and dry-cell battery manufacture.

Onneto Yunotaki is the only place known on Earth where the natural production of manganese oxide can be observed on land, as it normally occurs in the ocean or deep underground.

How is manganese oxide produced here?

Manganese is a metallic element known by the chemical symbol Mn, with an atomic weight of 25. It constitutes roughly 0.1 percent of the Earth's crust, and readily combines with oxygen, carbon, and silicon to form manganese ores. When manganese combines with oxygen, it becomes manganese oxide.

Approximately one ton of manganese oxide is produced at Onneto Yunotaki Falls per year due to a rare set of circumstances. Geothermally heated groundwater carries manganese ions from the lava on Mt. Meakan's slopes to the hot spring at the top of the falls. Cyanobacteria (blue-green algae) grows in the warm water of the falls and produces oxygen through photosynthesis. The water also contains manganese-oxidizing bacteria, which act as a catalyst for the reaction of oxygen and manganese ions, turning these elements into manganese oxide.