75. *Osumilite, a New Mineral, and Cordierite in Volcanic Rocks*

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Introduction

In the course of his study on cordierites at Tôkyô University in 1951, the writer's attention was directed to the fact that nearly or completely uniaxial positive "cordierite" occurs characteristically in volcanic rocks. He thought that such "cordierite" might represent a high temperature form of the mineral. In the winter of 1952–53, he had an opportunity to make a detailed study at Harvard University on one of such uniaxial "cordierites". The sample examined is from biotite-bearing hypersthene-plagioliparite (rhyodacite) in Sakkabira, Tarumizu-mati, Kagosima prefecture, southern Kyûsyû, Japan. From this study it was found that the mineral is a new one, hexagonal, distinct from cordierite. The writer named it *osumilite* after the name of the province Ôsumi to which Sakkabira belongs. The details of this study will be published in another paper in the near future (in American Mineralogist). In the present paper, the writer intends to give a brief account of the new mineral with special reference to the contrast to cordierite in modes of occurrence in volcanic rocks.

Osumilite

Osumilite is dihexagonal-dipyramidal with axial ratio $c/a=1.410$. The chemical formula is:

$$(K,Na,Ca)(Mg,Fe^{+2})_2(Al,Fe^{+3},Fe^{+2})_3(Si,Al)_{12}O_{30}\cdot H_2O$$

Table I. Comparison of osumilite with cordierite

	Cordierite	Osumilite from Sakkabira
a_0	9.7 Å	10.17 Å
b_0	17.0 Å	
c_0	9.3 Å	14.34 Å
α or ω	1.52–1.56	1.545–1.547
γ or ε	1.53–1.57	1.549–1.551
Birefringence	0.008–0.016	0.004
2Ω ($2V$ over Z)	Usually 75°–140°	Usually 0°—70°, rarely larger
Colour in thin sections	Usually colourless	O=light blue E=colourless

The space group is C 6/mcc(D^2_{6h}). Structurally osumilite is composed of hexagonal double rings $(Si,Al)_{12}O_{30}$, each of which is composed of 12 (Si,Al)-O tetrahedra. (Cordierite is composed of pseudo-hexagonal single rings $(Si_5Al)O_{18}$.)

Osumilite and cordierite are so resembling to each other in optical properties and in chemical compositions that the osumilite was identified as cordierite by Morimoto (1948) and Morimoto and Minato (1949).

Osumilite and Cordierite in Volcanic Rocks

In the literature there are several descriptions on minerals which were identified as "cordierite", but the writer thinks to be probably osumilite, judging from their optical and chemical properties. They all occur in volcanic rocks. For example, Taneda (1950) described such "cordierite" in the groundmass of hypersthene rhyodacite from Hamanoiti, Kagosima prefecture. "Cordierite" from ejecta in the Laacher See district (Brauns, 1911; Gossner and Reindl, 1932) and "cordierite" from ejecta in the Celebes (Bücking, 1900) are also probably osumilite.

On the other hand we know many examples of the occurrence of what appears to be true cordierite in volcanic rocks and inclusions in them. Cordierite from Cabo de Gata in Spain (Osann, 1888) is a classic example. Ichimura (1936) described cordierite occurring as porphyritic crystals in biotite-hornblende-andesite in Kasyôtô near Formosa. Di Franco (1942) described cordierite from inclusions of clay in basaltic tuff in Motta S. Anastasia in Sicily.

So far as the writer is aware at present, cordierite in volcanic rocks occurs as porphyritic crystals or as a constituent of inclusions, while osumilite occurs only in volcanic rocks as a constituent of the groundmass, or in cavities, or as a constituent of inclusions, but not as porphyritic crystals. (In Sakkabira, the osumilite occurs in the groundmass and in cavities in the host-rock.) In this respect the modes of occurrence of osumilite are somewhat similar to those of tridymite and cristobalite. It may suggest that osumilite is a mineral formed at high temperatures and low pressures, though the accumulation of data of osumilite in future may modify this provisional view.

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