

On the mineralogy of the O Casteliño spodumene pegmatite near Lalin, Galicia, Spain

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ABSTRACT

The mineralogy of a spodumene-bearing pegmatite from northwestern Spain is briefly described. Analyses of spodumene, tantalite and wodjonite are given.

INTRODUCTION

The lithium pegmatites southwest of Lalin in the Pontevedra province of Galicia were first described in detail by Parga-Pondal and Cardoso in 1948. They discovered in this general area of mica schists and gneisses a number of spodumene-bearing pegmatites of which one particular dyke was traced for some 7 kms. This steeply inclined, arcuate dyke, in places up to 8 m wide is trending NNE-NE from O Casteliño in the parish of Vilatuxe in the south, to the village of Gresande in the northeast. The apparently continuous dyke is exposed at different levels in the hilly terrain and from their observations Parga-Pondal and Cardoso concluded that the spodumene dyke contained a sizable tonnage of lithium minerals.

In view of the economic importance of lithium and certain accessory minerals associated with lithium deposits, the pegmatites of Vilatuxe were briefly examined in October, 1979.

O Casteliño spodumene pegmatite

This pegmatite is situated some 2 km west of Vilatuxe. Here, a well exposed dyke is outcropping on a slope - the dyke is at this point some 8 m wide but narrows considerably in the strike direction northwards to about 2 - 3 m where it disappears under soil cover. The southern extension of the dyke is traversed by a small stream. The pegmatite has been mined in the past for a total length of some 20 m and to a depth of some 2 - 4 m, it is almost vertical, and is emplaced in a mica schist which commonly carries garnet and staurolite. The pegmatite is on the whole rather fine-grained for a pegmatite, and apart from a few larger lenses and veins of quartz, it is poorly zoned and consists primarily of spodumene, microcline, albite, muscovite and quartz.

The spodumene is of two kinds - a more abundant greenish-yellow, platy to fibrous variety with crystals up to 10 cm long and 1 cm. wide is mainly confined to the central part of the vein. This spodumene is fresh and glassy in appearance and has a tendency to form parallel, streaky concentrations up to 10 cm. in width in the fine-grained matrix of quartz, albite and some microcline and muscovite. The other variety of spodumene is considerably coarser, forming light grey aggregates of crystal laths up to 25 cm. long and 5 cm. wide, cemented together by quartz, albite, microcline and muscovite - these clusters are of less common occurrence and are not confined to any particular zone of the pegmatite. This variety of spodumene appears to be somewhat altered and replaced by minute mica flakes, in

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addition, the spodumene laths are transversed by numerous fractures filled by quartz and albite.

Parga-Pondal and Cardoso (loc. cit.) calculated the spodumene content of the pegmatite and obtained an average value of some 21 percent. The central part of the vein at O Casteliño may indeed contain some 20 percent of spodumene or even more in places, but towards the margins the amount is much lower and therefore the average content of the mineral in the vein may not be more than about 10 percent.

The grey spodumene was analysed and compared with the analyses of a spodumene and a spodumene-bearing pegmatite given by Parga-Pondal and Cardoso (Table 1).

TABLE 1. Chemical composition of spodumene and a spodumene-bearing pegmatite from the Lalin area, Spain.

	1.	2.	3.
SiO ₂	62.81 %	62.65 %	72.16 %
TiO ₂	tr.	0.00	0.00
Al ₂ O ₃	28.21	28.20	17.68
Fe ₂ O ₃	0.48	0.20	0.30
FeO	--	0.14	0.21
MnO	0.12	0.11	0.04
MgO	tr.	0.00	0.00
CaO	0.20	0.00	0.09
Li ₂ O	7.03	5.55	1.20
Na ₂ O	0.40	1.22	6.56
K ₂ O	0.25	1.21	0.92
H ₂ O +	0.67	0.75	0.69
H ₂ O-	0.13	0.00	0.17
	100.30 %	100.03 %	100.02 %

1. Grey spodumene from O Casteliño, Vilatuxe, Lalin. anal. O. von Knorring
2. Spodumene from Lalin. Anal. I. Parga-Pondal.
3. Spodumene-bearing pegmatite from Lalin. anal. I. Parga-Pondal.

Microcline occurs in large scattered crystals measuring some 15 × 8 cm. in size and in smaller grains within the fine-grained matrix of the main pegmatite.

Albite forms the bulk of the pegmatite, it is mostly of finer grain size and often saccharoidal in habit, frequently replacing other minerals.

Muscovite is, on the whole, of minor importance and is seen in smaller flakes in the pegmatite matrix, also at the contacts and occasionally in larger aggregates together with the coarse spodumene.

Quartz is present throughout, generally in smaller grains, but may also form veinlets and larger lenses within the pegmatite. Among accessory minerals the following have been identified in the present occurrence: beryl, columbite-tantalite, apatite, some heterosite and ferrisicklerite derived from lithiophilite-triphyllite, zircon, arsenopyrite and manganiferous

garnet mainly in the contact zones. The identification of these minerals has been confirmed by x-ray diffraction analysis.

Beryl is seen in white to grey, translucent glassy crystals up to 2 cm across frequently associated with the large spodumene aggregates.

Columbite-tantalite has been observed in two associations-black, platy prismatic crystals up to 2 cm. long, embedded in cleavelandite and associated with coarse spodumene aggregates - microscopic crystals of columbite-tantalite dispersed in the fine-grained albite-rich matrix of the main pegmatite. Specific gravity determinations of the larger crystals gave a value of 6.80, which corresponds to a tantalite with some 55-60 percent Ta₂O₅. This tantalite was subsequently analysed by a microprobe and the examination showed some inclusions of a tin-bearing phase with a composition corresponding closely to the tin-bearing tantalum mineral wodginite but with a somewhat lower Ta/Nb ratio than in Wodginites from other localities. In comparison with the host tantalite the inclusions contain lower amounts of niobium, iron and manganese, whereas the concentration of tantalum is almost identical (Table 2).

TABLE 2. Chemical composition of tantalite and wodginite from O Casteliño pegmatite (Lalin).

	1.	2.
Nb ₂ O ₅	21.24	15.13
Ta ₂ O ₅	60.30	60.48
WO ₃	--	--
TiO ₂	0.14	0.09
SnO ₂	1.42	10.09
MnO	9.01	7.64
FeO	7.08	6.45
	99.19	99.88

1. Tantalite from O Casteliño pegmatite, Vilatuxe, Lalin. Anal. E. Condliffe.
2. Wodginite inclusion in tantalite from O Casteliño. Anal. E. Condliffe.

Apatite of a yellowish-brown to orange colour is rather abundant in the fine-grained pegmatite. This type of apatite is rare, as a bluish, manganiferous variety is the more common form in most spodumene pegmatites. Since the garnets and phosphates in lithium pegmatites are commonly rich in manganese, these minerals are mostly responsible for the widespread black staining by secondary manganese oxides, particularly observed along cleavage planes of muscovite, feldspars and spodumene.

On the whole, the mineral assemblage observed in the O Casteliño pegmatite is similar to that described by Hensen (1967) from the tin-bearing pegmatites farther southwest of the present area near the village of Doade.

Acknowledgements. The writers are grateful to Professor Parga-Pondal at the Laboratorio Xeolóxico de Laxe who suggested the investigation and to Dr. Eric Condliffe for the electron probe analyses of tantalite and wodginite.

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