Finding of hematite (specularite) at the Duškina Mala locality near Preševo, South Serbia

Хематит (спекуларит) от Душкина Мала край Прешево, Южна Сърбия

Pavle Tančić, Maja Poznanović, Simo Mojić, Veroljub Kovačević
Павле Танчич, Мая Познанович, Симо Моич, Веролюб Ковачевич

Geological Institute of Serbia, Rovinjska 12, Belgrade 11000, Serbia; E-mail: pavletan@infosky.net

Abstract. At the Duškina Mala locality near Preševo (South Serbia) at the contact of the marbles with phyllite-schists was discovered hematite variety — specularite. This gray specularite has silvery metallic luster and occurs locally with calcite, clays and quartz, as lamellar layer crystal concentrations with length up to 1.5 cm. Calculated unit cell dimensions are something smaller in comparison with the literature data.

Key words: Serbia, Duškina Mala, finding, hematite-specularite, unit cell dimensions

Introduction

The geological explorations at the Duškina Mala locality near Preševo (South Serbia) were accomplished by Mojić and Kovačević (2007). The geologic structure of its wider area consists of: Paleozoic metamorphic complex of the Kačanik-Veles series (marbles, sericite- and phyllite-schists, and metamorphic sandstones), granodiorite, and Quaternary sediments. At the south contact of the marbles with phyllite-schists was discovered sporadically concentrations of grey metallic lamellar layer mineral with silvery metallic luster and with length up to 1.5 cm in paragenesis with calcite, clays and quartz.

In this paper we report the characterization of this mineral with the X-ray and chemical analysis.

Material preparation and applied investigation methods

One representative sample was chosen, powdered and investigated with the X-ray powder diffraction analysis. It was recorded at automatically diffractometer for powder "PHILIPS", model PW-1710. There was used long-focus (LFF), Cu-anode (U=40 kV and I=30 mA), with monochromatic $K\alpha_1$ radiation (λ=1.54060Å) and Xe proportional counter. Diffraction data were collected in the angle range 2θ from 5° to 75° with keeping back with 0.5 second on every 0.02°. For measurement the angle positions of diffraction maximums and their belonging intensities

there was used base program PW-1877. Precision of the diffractometer was controlled before and after the experiment with the metallic Si powder. Identification of the present mineral phases was done with comparison of the interplanar spacings (d) and relative intensities (I) with the literature data, which is corresponding card from the ICDD PDF database. Calculation of the unit cell dimensions was accomplished with the LSUCRI program for personal computer (Garvey, 1987).

Total Fe was detected with the Perkin-Elmer FAAS (flammable atomic absorption spectrometry) after total decomposition of the sample with mixture of $HClO_4$ and HF acids, and after dissolving with small quantity of concentrated HCL and water.

Results and discussion

With the X-ray semi-quantitative analysis established that the investigated sample consists from calcite (~40%), hematite (~35%), clays (~15%) and quartz (~10%). With the chemical analysis it was obtained Fe_{total}=12.07%, i.e. Fe_2O_3=34.49%, which is in a very good agreement with the results obtained with the X-ray analysis. Hematite occurs in lamellar layer crystal concentrations with length up to 1.5 cm, with grey color and silvery metallic luster, and therefore it is classified as specularite variety. In Serbia occurrences of this variety are very rare.

With the LSUCRI program (Garvey, 1987) there were calculated unit cell dimensions of the investigat-

Table 1. Values of the calculated (d_{calc}) and observed (d_{obs}) interplanar spacing and the calculated unit cell dimensions of hematite (specularite)

ICDD-PDF 33-0664		Duškina Mala	
h k l	d	$d_{obs.}$	$d_{calc.}$
0 1 2	3.6840	3.6740	3.6748
1 0 4	2.7000	2.6979	2.6958
1 1 0	2.5190	2.5154	2.5110
0 0 6	2.2920	2.2879	2.2902
1 1 3	2.2070	2.2057	2.2019
0 2 4	1.8406	1.8408	1.8374
1 1 6	1.6941	1.6938	1.6921
0 1 8	1.5992	1.5968	1.5976
2 1 4	1.4859	1.4856	1.4828
3 0 0α_1	1.4538	1.4476	1.4497
3 0 0α_2	1.4538	1.4480	1.4497
2 0 8	1.3497	1.3459	1.3479
1 0 10	1.3115	1.3109	1.3103
a_0 (Å)	5.035	5.022(3)	
c_0 (Å)	13.74	13.74(1)	
V_0 (Å^3)	301.93	300.1(4)	

ed hematite and represented together with the literature data (Syvinski, McCarthy, 1981) at Table 1. As it could be seen, calculated and observed interplanar spacings and therefore calculated unit cell dimensions of the investigated hematite-specularite are something smaller in comparison with the literature data.

References

Garvey, R. 1987. *Least-square unit cell refinement, Version 86.2.* Dept. of Chemistry, North Dakota State University.

Mojić, S., V. Kovačević. 2007. *The Quarterly Report About the Geological Explorations of the Marbles as Carbonate Raw Material at the Duškina Mala (near Preševo) Ore Deposit.* Fund of the expert documentation of the Geological Institute of Serbia (in Serbian).

Syvinski, W., G. McCarthy. 1981. ICDD-PDF 33-0664, Hematite. National Bureau of Standards (U.S.). *Monograph 25* (18), p. 37.