MAGNESTIE OF THE NIKOL’SK DEPOSIT

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Nikol’sk Deposit is a part of the Satka group of deposits of crystalline magnesite.

In a structural sense the deposit is confined to the northwestern side of the Satka syncline and is controlled by the Volch’egorsk and Nikol’sk upthrusts.

In the area of the deposit deposits of lower and upper Satka members of the Satka formation of the upper Proterozoic era have been uncovered. The upper Satka member is represented by rocks of the Kamenogorsk (light-gray dolomites interstratified with marlaceous dolomites of dark gray and black color) and Karagai (light gray and gray dolomites of fine and medium crystalline structure) layers.

The intrusive rocks are steeply dipping dikes of diabases of dark green color up to 6 m thick.

The dolomites of the Karagai layer and also the diabases and magnesite lying in the area of the deposit are piecemeal subjected to intense weathering all the way to formation of karst of pocket and slit-like types. The karst zones are made of clay of brown and yellow-brown color with detritus of bedrock.

The magnesite of Nikol’sk deposit forms lens- and plate-shaped bodies occurring concordantly with the dolomites of the Karagai layer holding them.

Five deposits from 3 to 42 m thick with a length of strike from 50 to 950 m have been identified. The form of the ore bodies is complex and elongated preferentially from the southwest to the northeast. The dip to the southeast is at an angle of 25-30°.

The magnesite is a polynuclear rock with tints of white, grayish white, and gray colors. The basic rock-forming mineral is magnesite MgCO₃ with insignificant impurities of dolomite, calcite, talc, quartz, pyrite, serpentine, and a carbon-clay substance, that is, minerals characteristic of all deposits of the Satka group [1, 2].

In crystal size magnesite is divided into coarse-, medium-, and fine-crystalline with crystal sizes of larger than 10, 5-10, and finer than 5 mm. The rules in the distribution of the structures have not been established. The texture of the magnesite is caused by the distribution of the carbon-clay substance in the intergranular space. Banded, massive, radial, and comb-banded textures of magnesite are known in the deposit.

A chemical and mineralogical investigation of samples taken both during prospecting of the deposit and in the initial period of mining make it possible to divide the magnesites into two groups, unaltered of normal composition and chlorite-containing and altered including dolomitized, talced, quartzed, and calcited [3].

The magnesite of normal composition is made of magnesite crystals (Fig. 1) with an insignificant quantity of carbon-clay substance in the intergranular space. Its structure is normally coarse- or very coarse-crystalline. The texture is massive, brecciated, or more rarely banded. The most common impurity is pyrite. The chemical composition of the magnesite of normal composition is characterized by a high magnesium oxide content, as high as 46.5% (in individual samples 47.4%) and it is grade I in accordance with Technical Specification 14-8-64-73. The behavior in heating of magnesite containing 0.5% SiO₂, 0.1% Al₂O₃, 0.6% Fe₂O₃, 0.4% CaO, 46.5% MgO, and about 52% Δmcalc is shown in the derivatogram (Fig. 2). The endothermic effect at 680°C is related to decomposition of magnesite.

The chlorite-containing magnesite includes the variety with a carbon-chlorite substance content of more than 3%. This magnesite in the form of layers up to 2 m thick is inter-

*Here and subsequently weight % is given.


Fig. 1. The microstructure of coarse- (a), medium- (b), and fine-crystalline (c) magnesite. 60X. Reflected light.

Fig. 2. Derivatogram of Nikol'sk magnesite.