Full Paper _____ *Thematic Section:* Research into New Technologies.
Reference Object Identifier – ROI: jbc-02/18-55-8-156 *Subsection:* Technology of Inorganic Substances.
Publication is available for discussion in the framework of the on-line Internet conference "*Chemical basis for the rational use of renewable natural resources*".
http://butlerov.com/natural_resources/
Submitted on Jule 17, 2018.

Chemical and phase composition of oxidized nickel ores of the Kulikovsky deposit – raw materials for the production of magnesium compounds, Fe-Ni-containing concentrates, SiO_2

© **Alfred N.Gabdullin**,[1]*+ **Evgenia A. Nikonenko**,[1]
Timofey M. Klyuev,[2] and **Vyacheslav F. Markov**[2,3]
[1] *Department of General Chemistry;* [2] *Department of Physical and Colloid Chemistry. Ural Federal University named after the first President of Russia B.N. Yeltsin. Mira St., 19. Ekaterinburg, 620002. Sverdlovsk Region. Russia. Phone:* [1)] *+7 (343) 375-93-18;* [2)] *+7 (343) 375-45-68.*
[3] *Ural institute State Fire Service of EMERCOM of Russia. Mira St., 22. Ekaterinburg, 620002. Russia. Phone: +7 (343) 360-81-68. E-mail: gan1105@mail.ru*

*Supervising author; +Corresponding author
Keywords: oxidized nickel ores, IR, Raman spectroscopy, X-ray phase, thermographic analysis.

Abstract

The subject of the study are oxidized nickel ores of the Kulikovsky deposit (South Ural) – substandard iron and nickel-containing raw materials. The work is devoted to the study of the chemical and phase composition to substantiate the choice of the method of processing this material in order to obtain valuable inorganic substances, in demand in the chemical and metallurgical industry: magnesium oxide and (or) nitrate, iron and nickel concentrates, silicon dioxide. The chemical composition of ore is shown, demonstrating the advisability of developing technology for its integrated processing. X-ray powder diffraction showed the presence in the oxidized nickel ores of the Kulikovsky deposit of silicates of the serpentine group (lizardite-1M and lizardite-1T) and the group of spinels (magnesioferrite). Literary analysis suggested the presence of other hydrosilicates (antigorite, chrysotile, nimit, talc, revdinskite, clinochlor, etc.). In addition, IR spectroscopic analysis was performed to confirm the phase composition. Thermogravimetric analysis was performed, which will allow further to determine the conditions for preliminary preparation of the crushed feedstock. Based on the described properties of minerals and previous work on the hydrometallurgical technology for processing oxidized nickel ores and metal-containing silicate raw materials for the production of inorganic substances, nitric acid is offered as a leaching agent.

References

[1] I.D. Reznik, G.P. Ermakov, Ya.M. Shneerson. Nickel. In 3 vols. T.2. *Moscow: Science and Technology Ltd*. **2004**. 468p. (russian)
[2] B.D. Khalezov, O.V. Zayakin, A.S. Gavrilov, and V.I. Zhuchkov. Hydro-, pyrometallurgical method of obtaining alloys system Fe-Ni-Cr-Mn-Si. *Butlerov Communications.* **2017**. Vol.52. No.10. P.111-117. ROI: jbc-02/17-52-10-111
[3] A.S. Molodykh, V.V. Vaitner, E.A. Nikonenko, A.N. Gabdullin, and S.F. Katyshev. A method of producing nickel concentrate from Serov's nickel ore deposit. *Butlerov Communications*. **2016**. Vol.47. No.9. P.67-72. ROI: jbc-02/16-47-9-67
[4] *Pat*. 2532871 RF IPC C22B 23/00. Method of processing oxidized nickel ores: I.I. Kalinichenko, V.V. Whitner, A.S. Molodykh, V.N. Shubin; the applicant and the patentee I.I. Kalinichenko; No. 2013118820/02; claimed. 04/23/2013; publ. 11/10/2014. Bul. No.31. 10p.
[5] A.S. Molodykh. Complex processing of nickel ore of the Serov deposit into inorganic products. *Diss. Cand. tech. sciences. Kazan*. **2017**. 118p. (russian)
[6] S.V. Sergeyeva. Development of electrothermal technology for the production of ferronickel from the Urals serpentinite ores. *Diss. Cand. tech. sciences. Kazan*. **2017**. 126p. (russian)
[7] A.G. Betekhtin. The course of mineralogy. *Moscow: KDU*. **2010**. 736p. (russian)
[8] G.N. Vertushkov, V.N. Avdonin. Tables for the determination of minerals by physical and chemical properties: Handbook. *Moscow: Nedra*. **1992**. 489p. (russian)
[9] K. Nakamoto. IR spectra and Raman spectra of inorganic and coordination compounds. *Moscow: Mir*. **1991**. 536p. (russian)