Thematic Section: Research into New Technologies. **Full Paper**
Subsection: Technology of the Non-metallic Materials. *Reference Object Identifier* – ROI: jbc-02/18-53-3-105
Publication is available for discussion in the framework of the on-line Internet conference "*Butlerov readings*".
http://butlerov.com/readings/
The article is published based on the materials of the 2nd stage of *the Mini-Symposium "Butlerov's Heritage –17-18"*
(Kazan).Submitted on January 15, 2018.

X-ray protective ceramic material on the basis of wastes of lead-containing initiating explosives

© **Alexander M. Pyzhov**,*+ **Elena V. Kochkina**, **Victoria V. Pirogova**, **Mikhail A. Eshakov**, and **Akmaral Zh. Dzhakhyanova**
Chair of Chemistry and Technology of Organic Nitrogen Compounds. Samara State Technical University. Molodogvardeyskaya St., 244. Samara, 443100. Samara Region. Russia
Phone: +7 (846) 337-08-89. E-mail: argel33@mail.ru

*Supervising author; +Corresponding author

Keywords: production of initiating explosives, lead-containing waste, processing, ceramic material, X-ray protective capacity.

Abstract

Results of the researches devoted to a problem of utilization and processing of lead-bearing waste of productions of the initiating explosives (IniE) are presented in this article.

In work the possibility of production of the skilled ceramic material having the increased X-ray protective ability with use of waste of productions of lead-bearing IniE was estimated.

For the first time all making components of ceramic material – filler and binding, had high X-ray protective ability, unlike the modern construction materials used for decrease in x-ray radiation in which only filler – barytic sand is effective X-ray protective material.

For the first time carbonate production wastes of lead-bearing IniE have been used as initial raw materials for introduction of the ceramic material, binding in structure, containing filler – barium sulfate. Influence of composition of furnace charge and conditions of formation and agglomeration of samples in the muffle furnace in the range of temperatures from 950 to 1000 °C on such properties of skilled material as, density, extent of shrinkage and strength was investigated at compression. It has been shown that the most effective binding for production of X-ray protective ceramic material from among used, is silicate of lead which content can be 10-20 mass. %. And, in this case, as initial substance for receiving silicate of lead both "jet" oxide of lead, and the lead oxide received from carbonate withdrawal of productions of IniE can be used. This greatly expands the range of used original components.

Besides, for giving to building constructions of X-ray protective properties use of skilled ceramic material in the form of a facing tile was offered. It not only will simplify and will accelerate process of drawing a protective layer of material, but also will allow to utilize toxic waste of productions of the initiating explosives.

As a result of researches it is shown that lead-bearing waste can be used for receiving ceramic material which settlement X-ray protective ability exceeds similar ability of the used construction materials twice.

References

[1] L.D. Lindenbraten, L.B. Naumov. Medical radiology. *Moscow: "Medicine"*. **1984**. 322p. (russian)
[2] Electronic resource: https://ru.wikipedia.org/wiki/Radiatsionnaya_zashchita
[3] E.V. Korolev, A.N. Grishina. Basic principles of creation of radiation protective material. Determination of efficiency of the chemical composition. News of the Kazan state architectural and construction university. *Kazan*. **2009**. No.1(11). P.261-265. (russian)
[4] A.N. Grishin, E.V. Queens. The choice of technology of radiation protective materials on the basis of silicates or hydrosilicates of heavy metals (ISSN 2223-8565). *Nauka stroitelstvo, obrazovanie.* **2011**. No.2 (hhtp://www.nso-jounal.ru)
[5] LLC Ashamed Group. [Electronic resource] / http://ashamedspb.ru/o-kompanii.html.
[6] Methods of definition of harmful substances in air. M.S. Bykhovskaya, S.L. Ginzburg, O.D. Halizova. Part 1. *Moscow: Medgiz*. **1960**. 312p. (russian)
[7] L.I. Bagal. Chemistry and technology of the initiating explosives. *Moscow: Mechanical engineering*. **1975**. 456p. (russian)

[8] Pharmaceutical chemistry: The textbook for student. Prof. Studies. Institutions. N.N. Glushchenko, T.V. Pletneva, V.A. Popkov. *Moscow: Prod. Akademiya center*. **2004**. 384p. (russian)
[9] N.G. Polyansky. Lead. *Moscow: Science*. **1986.** 357p. (russian)
[10] A.M. Pyzhov, I.K. Kukushkin, E.E. Romashin and P.P. Purygin. Assessment of opportunities waste of TNT different retention periods. *Butlerov Communications.* **2015**. Vol.41. No.1. P.117-121. ROI: jbc-02/15-41-1-117.
[11] General technology of silicates: Sulimenko L.M Textbook. *Moscow: INFRA*. **2004.** 336p. (russian)
[12] X-ray protective material from waste of productions of the initiating explosives. Ya.A. Yakovlev, V.V. Pirogova, E.A. [et al.]. The collection of materials V of the All-Russian scientific conference for young scientists, school and university students "Topical issues of biomedical engineering" on October 26 – on December 15, 2015 *Moscow: Prondo*. **2015**. P.34-38. (russian)
[13] Chemical encyclopedic dictionary. Hl. edition I.L. Knunyants. *Moscow: Sov. Encyclopedia*. **1983**. 792p. (russian)
[14] Reference book by the master builder. V.A. Anzigitov, A.P. Kotov, A.P. Novak, etc. *Moscow: Stroyizdat.* **1989**. 544p. (russian)
[15] Electronic resource: https://www.knauf.ru/catalog/find-products-and-systems/knauf-sejfbord.html.