Full Paper _____ *Thematic Section:* Physicochemical Research.
Reference Object Identifier – ROI: jbc-02/17-50-6-112 *Subsection:* Physical Chemistry.
Publication is available for discussion in the framework of the on-line Internet conference "*Butlerov readings*".
http://butlerov.com/readings/
Submitted on June 19, 2017.

Toxic effects' analysis of water extracts of polyvinylchloride compounds

© **Darya V. Budina**, **Tamara Ya. Ashikhmina**,*+
and **Anna S. Olkova**
Vyatka State University. Institute of Chemistry and Ecology. Biomonitoring Laboratory of the Institute of Biology of Komi Scientific Center of the Ural Branch of the Russian Academy of Sciences (IB Komi SC UB RAS). Lenin St., 198. Kirov. Kirov Region. Russian.
Russia. Phone: +7 (8332) 37-02-77. E-mail: ecolab2@gmail.com; morgan-abend@mail.ru

*Supervising author; +Corresponding author
Keywords: toxicity, biotesting, polyvinylchloride compounds, plasticizers, hydrobionts.

Abstract

The article deals with the sensitivity of hydrobionts to polyvinylchloride compounds (PVC). The paper shows also the influence of water extracts of PVC on individuals' mortality and fertility, as well as on the pre-lethal test function – motor activity. PVC-extracts (1:10) of a different formulation have an acute toxic effect on *Daphnia magna* by such indications as the inhibition of motor activity and the following death of crustaceans. After making contact with PVC water affects the pre-lethal test function of *Daphnia*. So it inhibits motor activity. The most effect should be by testing of PVC-extracts without an extra dilution. The harmless multiplicity of water dilution after contact with PVC makes up 2-4 times. At the same time, a chronic toxic effect can manifest itself after dilution too. The comparison of various PVC-materials has made it possible to conclude, that water extracts of PVC linoleum have the most toxic influence on *Daphnia magna*. The degree of effects' manifestation comes down in the series: PVC linoleum → toy blanks of low-plasticized PVC → toy blanks of middle-plasticized PVC → toy blanks of high-plasticized PVC → ready-made toys of PVC, produced more than 3 months ago. One of the reasons for such effects may be the presence in water extracts of phthalates – salts of the ortho-phthalic acid, which are used as plasticizers by producing of PVC. Also, the search for safe formulations must be conducted in the direction of the optimal ratio of PVC polymer and plasticizer, as well as replacement of composition's components with safe substances.

References

[1] Methodology of determining the water toxicity and water extracts of soil, sewage sediment, waste by mortality and change in fertility of Daphnia. *Moscow: Aquaros*. **2007**. (russian) DOI:1.39.2007.03222
[2] A.S. Olkova, E.A. Sannikova, D.V. Budina, T.I. Kutyavina, N.M. Zimonina. Study of the toxicity of natural and technogenic environments on the motor activity of daphnia magna. *Modern Problems of Science and Education.* **2017**. No.3. (russian)
[3] Russian market of polymeric waste processing. Analytical review. *Moscow.* **2010**. (russian)
[4] A.B. Zezin. Polymers and the environment. *The Sorovsky Educational Journal.* **1996**. No.2. (russian)
[5] T.N. Kuvichkina, D.V. Budina, A.S. Olkova, A.N. Reshetilov, T.Ya. Ashikhmina. Detection di-(2-ethylhexyl)phthalate in polyvinylchloride compound of mass spectrometric and biosensor methods. *Theoretical and Applied Ecology.* **2015**. No.4. P.11-15. (russian)