



ART SCIENCE
AND SPORT



2019
IYPT



IUPAC



XXI MENDELEEV CONGRESS
on general and applied chemistry

Volume 6

**Book of abstracts
in 6 volumes**

**Saint Petersburg
9 –13 September**

XXI Mendeleev Congress on General and Applied Chemistry.

Book 6: Abstracts. – Saint Petersburg, 2019 – p. 408

ISBN - 978-5-6043248-4-4

Book 6. Satellite symposia:

From Empirical to Predictive Chemistry.

The Periodic Table through Space and Time.

F-Block Elements: Recent Advances and Challenges.

Self-Assembly and Supramolecular Organization.

Elemental Materials for Electrochemical Energy.

Book 6 consists of Plenary, Keynote, Invited lectures, Oral, Poster presentations and Correspondence reports of the symposia "From Empirical to Predictive Chemistry", "The Periodic Table through Space and Time" , "F-Block Elements: Recent Advances and Challenges", "Self-Assembly and Supramolecular Organization", "Elemental Materials for Electrochemical Energy", index, advertisements of partners and sponsors.

ISBN 978-5-6043248-4-4



9 785604 324844



Volume 6

**Book of abstracts
in 6 volumes**

**Saint Petersburg
9 –13 September**

BIOLOGICALLY ACTIVE COMPOSITIONS BASED ON CYSTEINE, SILVER NITRATE AND WATER-SOLUBLE POLYMERS

Vishnevetsky D.V., Laguseva V.S., Khizhnyak S.D., Pakhomov P.M.

Tver State University, Russia, 170100, Tver, Zhelyabova str. 33,

E-mail: rickashet@yandex.ru

In this research, we have obtained the first results on the synthesis and study of the properties of hydrogels based on cysteine-silver solution and bioactive biocompatible polymers of different molecular weight and chemical nature (polyvinyl alcohol - PVA, polyethylene glycol - PEG, polyvinylpyrrolidone - PVP).

Gels based on cysteine, silver nitrate and polymers were obtained in two stages. On the first, the cysteine-silver aqueous solution (CSS) was prepared [1]. Further, the polymer of different concentrations (0.002, 0.01, 0.02, 1 and 2 % w/w) was added to the mature (24 h) CSS solution and finally sodium sulfate (fixed concentration) as the initiator of gel formation was added to the resulting mixture.

Using UV and IR spectroscopy, it was found that the polymer macromolecules interact with CSS supramolecules without changing the structure of the latter. The study of the rheology of obtained compositions by the vibrational viscometry showed the addition of a polymer induces an increase the viscosity characteristics of hydrogels compared to the control sample (hydrogel without polymer). At the same time, PVA showed the strongest influence on the viscosity of the system. Rheological test also confirmed that gels with PVA are the most stable in time.

Methods of pH analysis, measurement of the size of the formed units and their zetta potential (DLS) confirmed the interaction of CSS and polymers through the formation of hydrogen bonds.

The study of the morphology of hydrogels (SEM) revealed a strong difference in their structure. For PVA, regardless of the molecular weight, a regular porous structure was obtained, whereas for PVP and PEG – an irregular porous structure.

References

1. Khizhnyak S.D., Komarov P.V., Ovchinnikov M.M., Zherenkova L.V. and Pakhomov P.M. *Soft Matter*. 2017. 30. № 13. P.5168-5184.

The work was carried out with the financial support of the Ministry of education and science of the Russian Federation in the framework of public works in the field of research (project №4.5508.2017/BP) on the equipment of the center for collective use of Tver State University.