

The International Scientific Conference “Natural and Synthetic Polymers for Medical and Technical Purposes”

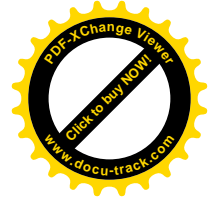
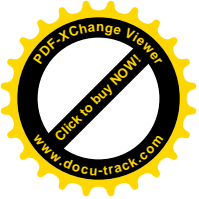
Book of abstracts

Minsk, Belarus, April 27 – 29, 2022



The conference is dedicated to the memory of the outstanding Belarusian scientist and teacher, academician of the NAS of Belarus

Kaputsky Fyodor Nikolaevich (1930 - 2017)



BELARUSIAN STATE UNIVERSITY
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НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК БЕЛАРУСИ»

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**Международная научная конференция
«Природные и синтетические полимеры
медицинского и технического назначения»**

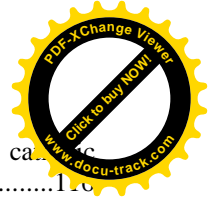
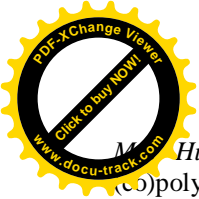
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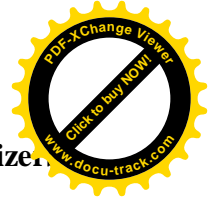
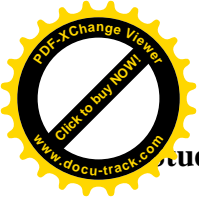
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<i>M.I. Hulnik, I.V. Vasilenko, S.V. Kostjuk, F. Ganachaud.</i> Aqueous catalyzed (C5)polymerization of β -myrcene	116
<i>G.A. Ixtiyarova, D. Xazratova, A.S. Mengliev, N. Muyinova.</i> Potential raw sources of chitosan and approaches to its production.....	118
<i>I.L. Krasnou, E.V. Tarasova, V.V. Gudkova, A. Krumme.</i> Development of thermoplastic cellulose esters.....	121
<i>E.A. Ksendzov, P.A. Nikishau, S.V. Kostjuk.</i> Copolymers of N-isopropylacrylamide with (meth)acrylate-terminated oligo(D,L-lactide) and oligo(ϵ -caprolactone): the influence of composition of copolymers on their lower critical solution temperature	122
<i>O.V. Kuharenko, M.I. Hulnik, I.V. Vasilenko, S.V. Kosjuk.</i> Cationic polymerization of β -pinene in the presence of alkylaluminum chlorides.....	124
<i>M.I. Makarevich, I.A. Bereziianko, P.A. Nikishau, S.V. Kostjuk.</i> Controlled cationic polymerization of isobutylene catalyzed by alkylaluminum chlorides	125
<i>N.I. Nazarov, H.S. Beknazarov.</i> Study of photo stabilization of PVC by new photo stabilizers	127
<i>E. Ovodok, H. Maltanova, S. Poznyak, M. Ivanovskaya, T. Gaevskaya, V. Kurilo, G. Monastyreckis, D. Zeleniakiene, M. Micusik, A. Aniskevich.</i> Epoxy composites loaded with carbon based nanofillers: electrical and mechanical properties	128
<i>Yu.A. Piskun, E.A. Ksendzov, P.A. Nikishau, S.V. Kostjuk.</i> Controlled synthesis of star-shaped homo- and copolymers of cyclic esters in the presence of organic catalysts	131
<i>E.M. Togaev, H.S. Beknazarov.</i> Stabilization of polyvinyl chloride with phthalaminic acid salts.....	133
<i>K. Trosheva, A. Efimova, S. Sorokina, Z. Shifrina, A. Yaroslavov.</i> Features of the interaction of cationic pyridylphenylene dendrimer with oppositely charged liposomes	134
<i>F.T. Turaev, H.S. Beknazarov.</i> Research by IR-spectroscopic method of modified road bitumen with element sulfur	135
<i>A.A. Vaitusionak, G.K. Belousov, I.V. Vasilenko, G. Sych, J.V. Grazulevicius, S.V. Kostjuk.</i> Synthesis of linear and star-shaped copolymers based on carbazole containing styrene derivatives by controlled radical polymerization.....	137
<i>M.A. Yesayeu, D.I. Shiman, L.V. Gaponik.</i> Influence of stirring rate during emulsion polymerization on monodispersity of polystyrene nanolatexes	138
<i>P.A. Yudaev, V.V. Maslennikova, E.M. Chistyakov.</i> Sorbents based on polyvinyl alcohol and phosphazene-containing extractant	142



Study of photo stabilization of PVC by new photo stabilizer

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Thermal destruction of polyvinyl chloride occurs by sequential removal of hydrogen chloride (HCl), which is called dehydrochlorination, with the formation of long polyenes, which as a result cause color change, deterioration of mechanical properties and a decrease in chemical resistance.

We have synthesized photostabilizers based on derivatives of crotonic aldehyde and the corresponding d-metals, which are used as PVC photostabilizer. The stabilization of stabilized PVC samples was studied with UV radiation over time.

The change in the properties of samples from time to time was studied by the IR spectroscopic method. In the IR spectrum of the presented samples, a noticeable change in the region of 3435 cm^{-1} occurs during aging; in this connection, the band grows to 1730 cm^{-1} and the intensity of the bands decreases in the region of 1632, 1125, 1077, 967 cm^{-1} , and a number of others. A wide band of stretching vibrations in the region of $3000\text{--}4000\text{ cm}^{-1}$ proves the appearance of hydroxyl-OH groups, and also corresponds to various bonded types of hydrogen bond, and a peak in the region of 1735 cm^{-1} corresponds to deformation vibrations of carbonyl C = O groups, which forms in the process various functional groups, which are usually also associated with a hydrogen bond.

Thus, the studied data confirmed that within 3000 hours during the aging process, structural changes are observed (a decrease in the concentration of C–O–C groups, an increase in the content of CO and OH groups, as well as the formation and opening of C = C bonds with the formation of cross-links) leads to a slight increase in strength characteristics, proves the crosslinking process during radiation (tensile strength and elastic modulus) and the stiffness of the material, a decrease in its elasticity (relative elongation at break), and deterioration of decorative characteristisk (reduced - contact angle, transmittance increases discoloration and gloss).

The kinetics of the mass loss of PVC from the heating temperature in the temperature range $290\text{--}770\text{ }^{\circ}\text{C}$ under consideration is associated with various processes: the removal of hydrogen chloride, decomposition with the participation of oxygen, the release of volatile substances, etc. The mass loss in the TGA curve with increasing temperature is due to the continuation of the destruction of PVC. This part of the process is accompanied by an exothermic effect.

Thus, on the basis of the obtained experimental data, it can be concluded from the kinetics of thermooxidative degradation of PVC in the temperature range $290\text{--}770\text{ }^{\circ}\text{C}$ that, firstly, the removal of hydrogen chloride in the initial sample occurs in the range $300\text{--}600\text{ }^{\circ}\text{C}$, and for stabilized samples - in the range of $500\text{--}800\text{ }^{\circ}\text{C}$.