O’zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi

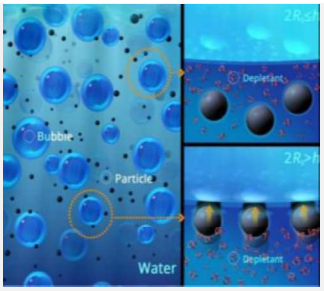
O’zbekiston Respublikasi Fanlar Akademiyasi

O’zbekiston Respublikasi Fanlar Akademiyasi Umumiy va noorganik kimyo instituti

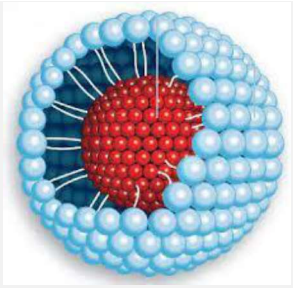
Namangan muhandislik-texnologiya instituti

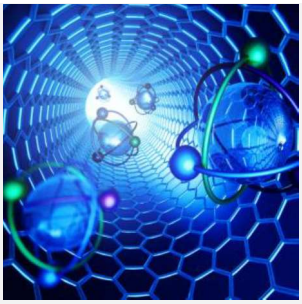
NAMANGAN MUHANDISLIK-TEXNOLOGIYA INSTITUTI

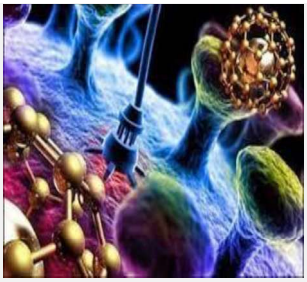
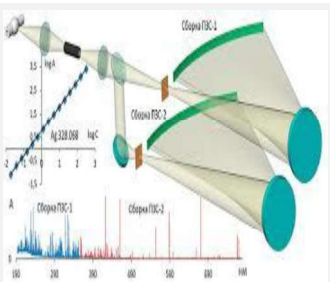
“FIZIKAVIY VA KOLLOID KIMYO FANLARINING FUNDAMENTAL VA AMALIY MUAMMOLARI HAMDA ULARNING INNOVATSION YECHIMLARI” MAVZUSIDA XALQARO ILMIY-AMALIY ANJUMAN MATERIALLARI TO’PLAMI

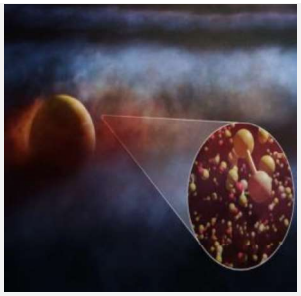












Namangan - 2024

Kimyo fanlari doktori, professor Raxmatkariyev Gayrat Ubaydullayevichning 80 yillik xotirasiga bag’ishlangan “Fizikaviy va kolloid kimyo fanlarining fundamental va amaliy muammolari hamda ularning innovatsion yechimlari” mavzusidagi xalqaro ilmiy-amaliy anjumani materiallari to‘plami. (2024-yil 9-10-fevral).

Ushbu to‘plamda “Fizikaviy va kolloid kimyo fanlarining fundamental va amaliy muammolari hamda ularning innovatsion yechimlari” mavzusidagi xalqaro ilmiy-amaliy anjumanining maqolalar matnlari o‘rin olgan. To‘plamda O’zbekiston Respublikasi Fanlar akademiyasi, oliy ta’lim muassasalari, ilmiy-tekshirish institutlari hamda Xorijiy oliy ta’lim muassasalarning professor-o’qituvchilarining ilmiy izlanish natijalari keltirilgan.

Anjuman materiallari to‘plami professor-o‘qituvchilar, katta ilmiy hodim-izlanuvchilar, doktorantlar, mustaqil tadqiqotchilar, magistrantlar hamda talabalar uchun mo‘ljallangan.

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A.A.Tursunov	NamMTI Xalqaro aloqalar bo‘limi boshlig‘i, PhD.

Mazkur to‘plamga kiritilgan materiallarning mazmuni, undagi statistik ma’lumotlar va me’yoriy hujjatlar sanasining to‘g‘riligi hamda tanqidiy fikr-mulohazalarga mualliflarning o‘zlari mas’uldirlar.

Technological Interventions:

Delve into the various technologies contributing to the enrichment of flour products, such as fortification processes, micronutrient encapsulation, and smart ingredient incorporation. Discuss how these technologies enhance the nutritional profile of flour and contribute to the development of functional bread.

Nutritional Enhancements: Examine the specific nutritional elements that can be integrated into flour products, emphasizing their positive impact on consumer health. From vitamins and minerals to functional additives, explore how these enrichments not only meet dietary needs but also address health concerns.

Innovative Bread Formulations: Highlight case studies and examples of innovative bread formulations that showcase the successful implementation of modern technologies. Discuss the balance between taste, texture, and nutritional value in the development of functional bread, appealing to the evolving preferences of health-conscious consumers.

Health Benefits and Considerations: Evaluate the potential health benefits associated with consuming enriched flour products and functional bread. Consider addressing concerns or misconceptions related to these technological advancements, fostering a comprehensive understanding among consumers.

Consumer Trends and Market Impact: Explore the current trends in consumer preferences for enriched flour products and functional bread. Discuss the market impact of these advancements, considering factors such as sustainability, transparency, and the growing demand for health-centric food options.

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5. "Bread Revolution: World-Class Baking with Sprouted and Whole Grains, Heirloom Flours, and Fresh Techniques" by Peter Reinhart
6. "The New Artisan Bread in Five Minutes a Day: The Discovery That Revolutionizes Home Baking" by Jeff Hertzberg and Zoë François
7. "Healthy Bread in Five Minutes a Day: 100 New Recipes Featuring Whole Grains, Fruits, Vegetables, and Gluten-Free Ingredients" by Jeff Hertzberg and Zoë François
8. "The Bread Bible" by Rose Levy Beranbaum
9. "Tartine Bread" by Chad Robertson
10. "Flour Water Salt Yeast: The Fundamentals of Artisan Bread and Pizza" by Ken Forkish
11. "Whole Grain Breads: New Techniques, Extraordinary Flavor" by Peter Reinhart

XITIN VA XITOZANNI BIOFAOL GIDROFIL HOSILALARINI SINTEZI VA BIOTIBBIYOTDA ISHLATISH XUSUSIYATLARI

A.S.Boymirzayev[1], I.J.Erniyazova[2]
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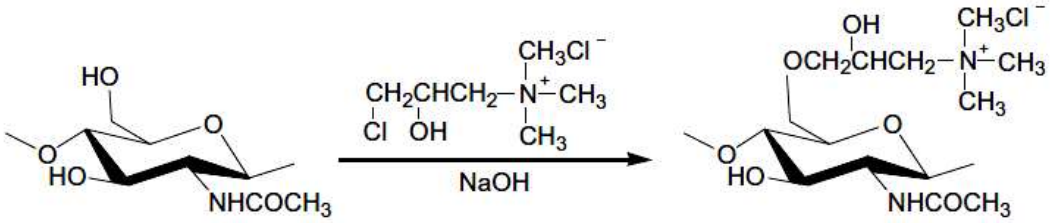
Annotatsiya. *Maqolada xitin va xitozanning suvda eruvchan to’rtlamchi ammoniy, karboksimetil va sulfat guruhlari bilan modifikatsiyalash, olingan biofaol hosilalarni antibakterial va antikoagulyant xossalari muhokama qilingan.*

Kalit so’zlar. *xitin, xitozan, to’rtlamchi ammoniy, modifikatsiya, antibakterial, polielektrolit.*

Xitin, xitosan va ularni suvda eruvchan hosilalari farmatsevtika, biotibbiyot, qishloq xo'jaligi, toqimachilik sanoati va boshqa sohalarda keng qo’llanilmoqda. Xitin va xitozanni suvda erimasligi bu polisaxaridlarni biotibbiyotda ishlatilishini ma’lum darajada cheklab qo’yadi. Shu sababli hozirgi paytda xitin va xitozanni gidrofil hosilalarini sintez qilish va ularni antimikrob, antibakterial, antivirus hamda zamburug’larga qarshi biofaol moddalar sifatida ishlatishga katta e’tibor qaratilmoqda. Masalan, Qunying Chen [1] hamkasblari bilan3-xlor-2-gidroksipropiltrimetilammoniy xlorid (GTX) yordamida 2`-O-gydroksipropyltrimetilammoniy chitin xlorid olishga erishdilar. Modifikatsiya jarayoni 35–40 % NaOH muhitida, 40^0C haroratda 6 soat va GTX ni β-xitinga molyar nisbati 4 ga teng bo’lgan reaktsiya sharoitida o’tkazilgan (1-rasm).

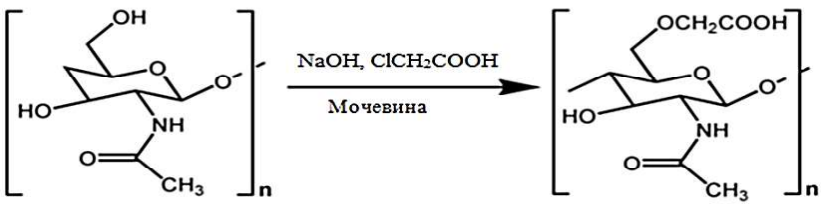


1-rasm. 2’-O gydroksipropyltrimetilammoniy xitin chlorid olish sxemasi

β-xitinning to’rtlamchi ammoniyli sivda eruvchan hosilasi tuzilishi Infraqizil (FT-IR) va yadro magnit rezonans (YaMR) spektroskopiya usullari bilan tahlil qilingan. To’rtlamchi ammoniy guruhlarida C-H bog’larning 1479 cm^{-1} dagi chastota tebranishi $-N^+(CH_3)_3$ bog’larni mavjudligini tasdiqlagan.

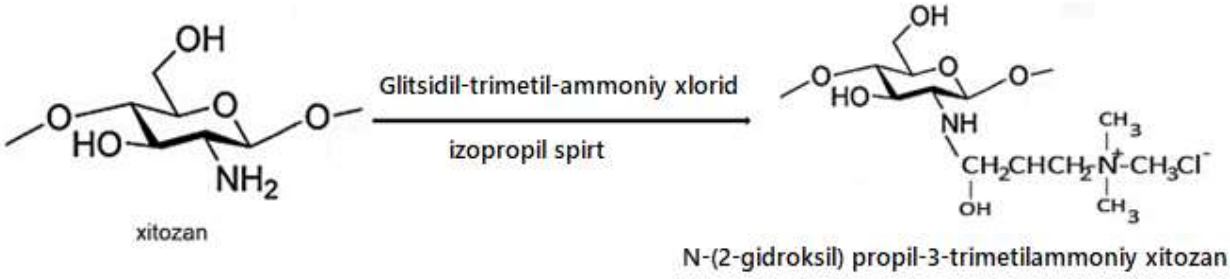
F.Ding va uning hamkasblari tomonidan 8 % NaOH + 4 % karbamid + 2,3- epoksipropyl-trimetilammoniyxlorid (EPTX) ning suvli aralashmasida molyar massasi 500 kDa va acetillanish darajasi 98% bo’lgan 2% kontsentratsiyali xitinni 10^0C haroratda 24 soat davomida gomogen sintez jarayoni olib borilgan [2]. Natijada xitinning gidrofil bo’lgan to’rtlamchi ammoniy hosilasi olingan va FT-IR spektroskopiya, rentgen tahlili, YaMR, Gel-xromatografiya, elementlar tahlili va elektr o’tkazuvchanlik (ζ-potentsial) usullari bilan kimyoviy tuzilishi va molyar massalari aniqlangan. Kuchli kation zaryadga ega bo’lgan kvaterlangan xitinni grammusbat va grammanfiy bakteriyalarga qarshi ingibitorlik xossasi tekshirilganda modifikatsiyalanmagan xitozanga nisbatan kvaterlangan ammoniy tuzli xitin *E. coli* va *S. aureus* bakteriyalariga kuchli ta’sir etganligi kuzatildi.

Na Peng va boshq.[3] 8 % NaOH/4 % karbamidli eritmada suvda eruvchan kvaterlangan ammoniy guruhli xitin olishgan va olingan biofaol moddadan gen tashuvchilar sifatida foydalanishga tavsiya etdilar. Suvda eruvchan xitinni sintez jarayoni (2-rasm) NaOH/ karbamid/monosirka kislota/HCl eritmasida olib borilgan va gidrofil 6-O-karboksimetilxitin olingan [4]. Olingan chitin hosilasining tuzilishi infraqizil spektroskopiya, YaMR yordamida, molekulyar massasi esa Gel-xromatografiya usuli bilan aniqlangan. Karboksimetilxitin tibbiyotda termosezgichli dori vositalarini tashuvchi biofaol modda sifatida ishlatilish imkoniyatiga ega.



Hozirgi paytda suvda eruvchan xitozan hosilalarini sintez qilish, farmatsevtika va tibbiyotda tabiiy biofaol modda sifatida ishlatish juda muhim ahamiyat kasb etmoqda. Ko’p tadqiqotchilar xitozanni to’rtlamcni ammoniy guruhli hosilalarini sintezi bo’yicha tadqiqotlar

olib bormoqdalar. Xususan, A.R.Egorov va boshq.[5] tomonidan xitozanni suvda eruvchan kation zaryadiga ega bo’lgan tarkibida selen saqlagan hosilasini sintez qilish uchun 3-xlormetil-[1,2,4]selendiazol[4,5-a]-piridinbromidda reaktsiya 7 soat davomida 60^0C da (pH 3) olib borilgan. Reaktsiyada xitozannig C-2 (aminoguruh) va C-6 (gidroksil) bog’larida funktsional guruhlarni 0,15; 0,45 va 0,65 almashinish darajasi spektroskopik usullar bilan qayd etilgan.Almashinish darajasi 0,65 ga teng bo’lgan biofaol xitozan hosilasining antibakterial xossasi eng yuqori bo’lib, xitozanga nisbatan 2,4 marta, ampitsillinga nisbatan 1,1 marta, gentamitsinga nisbatan 1,18 marta kuchli ekanligi tajribada aniqlangan. T.Xu va boshq.[6] xitozanni to’rtlamchi ammoniy hosilasini olish uchun glitsidil-trimetil-ammoniy xloridni izopropil spirtida C2 aminoguruh bilan o’rin almashinish reaktsiyasini o’tkazdilar (3-rasm).



3-rasm. Xitozanni trimetilammoniyli hosilasini olish sxemasi

Polikation xossasiga ega bo’lgan yuqori molyar massaga ega kvaterlangan ammoniy tuzli xitozan molekulalari anion guruhlari joylashgan bakteriya hujayrasi sirtiga elektrostatik (ion) ta’sirlashuv natijasida ion kompleks hosil qiladi va hujayarni tashqi muhit bilan modda almashinuvini qiyinlashtiradi. Kichik molekulyar massali xitozan hosilasi esa bakteriya yuzasidagi hujayra devori membranasidan o’tib DNK molekulasi bilan ham ion kompleks hosil qiladi va oqsil sinteziga qarshilik qiladi.Bu esa bakteriyani o’limiga olib keladi.

Tabiiy antikoagulyant geparinning kimyoviy tuzilishiga eng yaqin bo’lgan xitozanning sulfatlangan gidrofil hosilalarini antikoagulyant sifatida ishlatilishi ushbu sohada ilmiy tadqiqotlarni jadal sur’atlar bilan rivojlanishi uchun keng yo’l ochib bermoqda. Oxirgi 2-3 yil davomida B.P.Karlybaeva va hamkasblari [7] tomonidan Orol dengizi qisqichbaqasi *Artemia Parthenogenetica* tsistasidan ajratib olingan xitindan xitozan sintez qilindi va xitozanni sulfatlangan hosilasi olindi.Ushbu biofaol moddani kimyoviy tuzilishi, biofaolligi va fizik-kimyoviy parametrlari YaMR, IQ spektroskopiya, Gel-xromatografiya usullari bilan tadqiq qilindi.

Karboksimetilxitozan (KMX) o’sma kasalliklarini davolashda dori tashuvchi vosita, grammusbat va grammanfiy bakteriyalarga qarshi gel sifatida ishatilmoqda [8]. Berdimbetova ilmiy jamoasi tomonidan xitozanning suvda eruvchan hosilalaridan KMX sintez qilinib uning bir qator fizik-kimyoviy hossalari o’rganib chiqildi [9]. Olingan moddaning molyar massasi Gel-xromatografiya usuli bilan 3 kDa ga teng ekanligi aniqlandi.

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WATER-SOLIBLE CHITOSAN DERIVATIVES FOR BIOMEDICAL APPLICATION

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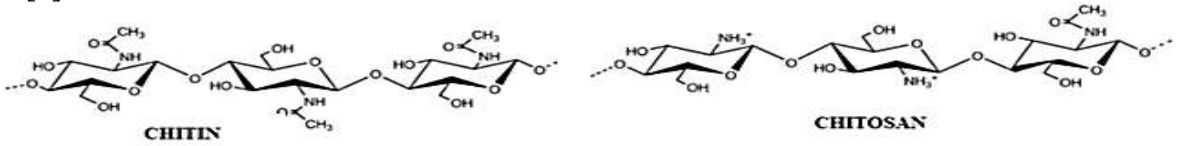
Annotation. *This review summarizes the modification of chitosan by acylation, carboxylation, alkylation, and quaternization in order to improve the water solubility, pH sensitivity, and the targeting of chitosan derivatives. Chitosan derivatives will have a large impact and show potential in biomedicine for the development of drugs in future.*

Keywords: *Chitosan derivative, antibacterial species, biodegradability, biocompatibility, antioxidant*

Chitosan is a linear polysaccharide composed of β-(1-4)-linked 2-amino-2-deoxy-D-glucose and 2-acetamido-2-deoxy-D-glucose units. Chitosan is obtained from chitin, which is the second most common natural polysaccharide after cellulose, by acetylation of 2-amino-2-deoxy-D-glucose unit of chitin in alkali media [1]. Figure 1 shows the structure of chitin and chitosan.

Chitosan has been commonly used in many applications through its biodegradability, biocompa-tibility and non-toxicity [2]. These unique properties enable to produce various chitosan based materials which are used in drug delivery [3], adsorption [4], food packaging [5], food additive [6], and in agriculture [7]. Chitosan is soluble in acidic media. The polymer chains are charged positively when it is dissolved in an aqueous solution of pH<6.5. Commonly used acidic solutions for dissolving chitosan are acetic acid, lactic acid, formic acid, and hydrochloric acid [8].



However, this cationic charged polymer usage is limited in some aspects due to it cannot be dissolved easily in aqueous media [9]. Water soluble chitosan is produced generally by substituting hydrophilic groups onto chitosan. Water soluble chitosan derivatives have been synthesized in a variety of structures.

Adding water soluble functional groups on chitosan's backbone, converts the polymer in an expedient form for many biological applications such as being antioxidant [10], antimicrobial , and anticancer agent . Due to such properties, water soluble chitosan attracts many researchers' attention under the favour of its being highly soluble in aqueous solutions. . There has been a significant difference in publication number in comparison to last twenty years articles since from as known first article reported in 1983. In this review, synthesis routes of several water soluble chitosan derivatives are discussed. This review aims to collect a wide range of published articles on water soluble chitosan as concentrating on its biological applications of antioxidant, antimicrobial, and anticancer, respectively. Furthermore, water soluble chitosan or WSC based material’s usage is compared to exhibit their possible app lications in different scientific fields.

Antibacterial materials refer to a new class of functional materials that have the function of killing or inhibiting microbes. There are many substances in nature that have good bactericidal or microbicidal activities : however, antibacterial materials are a kind of new functional material that have the ability to inhibit or kill bacteria through the addition of certain antibacterial