ЎЗБЕКИСТОН РЕСПУБЛИКАСИ
ОЛИЙ ВА ЎРТА МАХСУС ТАЪЛИМ ВАЗИРЛИГИ

ФАРҒОНА ДАВЛАТ УНИВЕРСИТЕТИ

FarDU. ILMIY XABARLAR-

1995 йилдан нашр этилади
Йилда 6 марта чиқади

— 5-2021 —

НАУЧНЫЙ ВЕСТНИК. ФерГУ

Издаётся с 1995 года
Выходит 6 раз в год

Муассис: Фарғона давлат университети.

«FarDU. ILMIY XABARLAR – НАУЧНЫЙ ВЕСТНИК. ФерГУ» журнали бир йилда олти марта чоп этилади.

Журнал филология, кимё ҳамда тарих фанлари бўйича Ўзбекистон Республикаси Олий аттестация комиссиясининг докторлик диссертациялари асосий илмий натижаларини чоп этиш тавсия этилган илмий нашрлар рўйхатига киритилган.

Журналдан мақола кўчириб босилганда, манба кўрсатилиши шарт.

Ўзбекистон Республикаси Президенти Администрацияси ҳузуридаги Ахборот ва оммавий коммуникациялар агентлиги томонидан 2020 йил 2 сентябрда 1109 рақами билан рўйхатга олинган.

Муқова дизайни ва оргинал макет ФарДУ таҳририят-нашриёт бўлимида тайёрланди.

Муҳаррирлар: Ташматова Т.
Жўрабоева Г.
Шералиева Ж.

Таҳририят манзили:
150100, Фарғона шаҳри, Мураббийлар кўчаси, 19-уй.
Тел.: (0373) 244-44-57. Мобил тел.: (+99891) 670-74-60
Сайт: www.fdu.uz

Босишга рухсат этилди:
Қоғоз бичими: - 60×84 1/8
Босма табоғи:
Офсет босма: Офсет қоғози.
Адади: 50 нусха
Буюртма №
ФарДУ нусха кўпайтириш бўлимида чоп этилди.
Манзил: 150100, Фарғона ш., Мураббийлар кўчаси, 19-уй.

Фарғона,
2021.

МУНДАРИЖА

Аниқ ва табиий фанлар

МАТЕМАТИКА

КИМЁ

Ижтимоий-гуманитар фанлар

ФАЛСАФА, СИЁСАТ

ТАРИХ

УДК: 612.396.175

АМИГДАЛИННИНГ КИМЁВИЙ ХОССАЛАРИ ВА ИНСОН САЛОМАТЛИГИГА ТАЪСИРИ

ХИМИЧЕСКИЕ СВОЙСТВА АМИГДАЛИНА И ЕГО ВЛИЯНИЕ НА ЗДОРОВЬЕ ЧЕЛОВЕКА

CHEMICAL PROPERTIES OF AMYGDALIN AND ITS EFFECT ON HUMAN HEALTH

Иброхим Рахмонович Асқаров[1], Фарход Султонахмадович Абдугаппаров[2], Махсадбек Муйдинович Хожиматов[3]

[1]Иброхим Рахмонович Асқаров *–АнДУ,кимё фанлари доктори, профессор.*
[2]Фарход Султонахмадович Абдугаппаров *– АнДУ,кимё фанлари бўйича фалсафа доктори (PhD)*
[3]Махсадбек Муйдинович Хожиматов *– АнДУ,кимё фанлари бўйича фалсафа доктори (PhD)*

Аннотация

Мақолада табиий цианогликозидлар синфига кирувчи амигдалин ва унинг кимёвий хоссалари тўғрисида маълумотлар келтирилган. Мақолада амигдалиннинг астма, бронхит, эмфизема, ўпка фибрози, ошқозон-ичак касалликлари, саратон, буйрак касалликлари каби турли хил касалликларни даволашдаги аҳамияти ҳақида ҳам сўз юритилган.

Аннотация

В статье представлена информация об амигдалине и его химических свойствах, который относится к классу природных цианогликозидов. В статье также упоминается важность амигдалина в лечении различных заболеваний, таких как астма, бронхит, эмфизема легких, фиброз легких, заболевания желудочно-кишечного тракта, онкологические заболевания, заболевания почек и других.

Annotation

The article presents information about amygdalin and its chemical properties, which belongs to the class of natural cyanoglycosides.The article also mentions the importance of amygdalin in the treatment of various diseases, such as asthma, bronchitis, emphysema of the lungs, pulmonary fibrosis, diseases of the gastrointestinal tract, oncological diseases, kidney diseases.

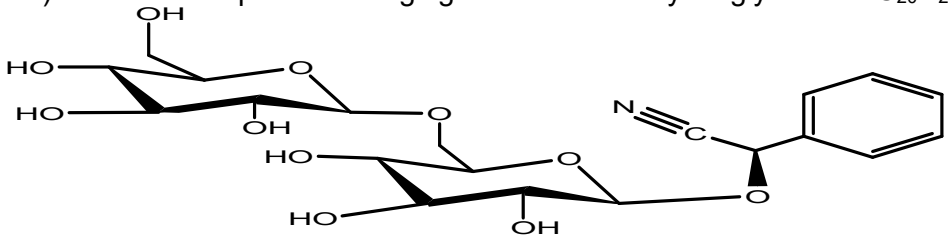
Таянч сўз ва иборалар: *цианогликозидлар, амигдалин, мураккаб эфир, сирка ангидрид, бромгексамид, альгинат-хитозан, гаптенлар.*

Ключевые слова и выражения: *цианогликозиды, амигдалин, сложный эфир, уксусный ангидрид, бромгексамид, альгинат-хитозан, гаптены.*

Key words of the expression: *cyanoglycosides, amygdalin, ester, acetic anhydride, bromhexamide, alginate-chitosan, haptens.*

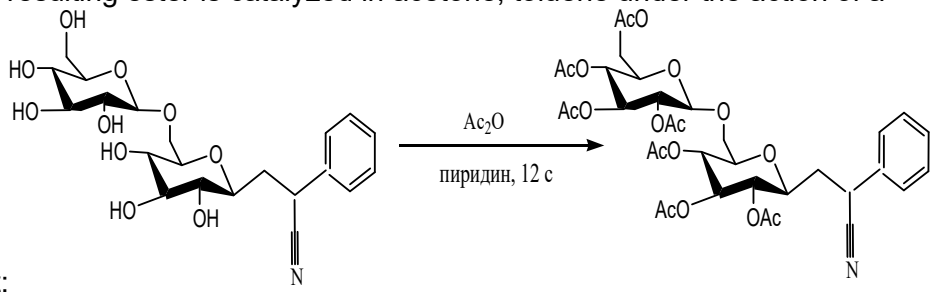
Today, cyanogenic glycosides are phytotoxins found in more than 2,000 plant species, a number of which are used as food in some parts of the world. The determining factor in the toxicity of cyanoglycosides is explained by the formation of cyanic acid when they are hydrolyzed.

One such compound is amygdalin - ([(6-O-β-D-glucopyranosyl-β-D-glucopyranosyl) oxy]] (phenyl) acetonitrile) a natural compound belonging to the class of cyanoglycosides $C_{20}H_{27}NO_{11}$.

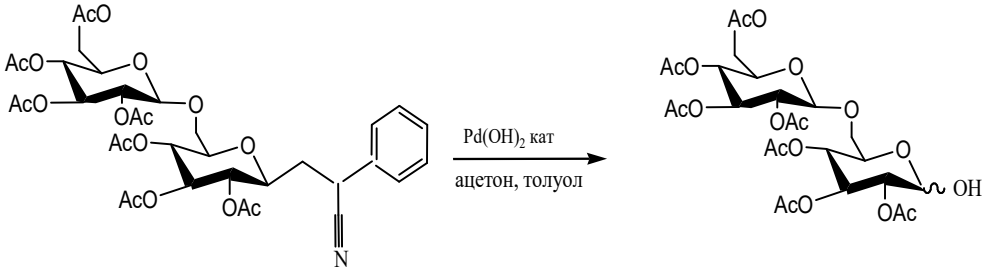


The reaction was performed in a pyridine medium and continued for 12 h.

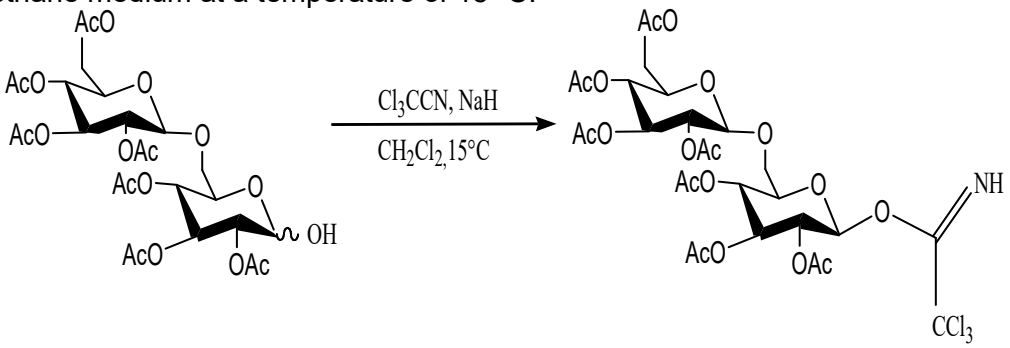
The resulting ester is catalyzed in acetone, toluene under the action of a



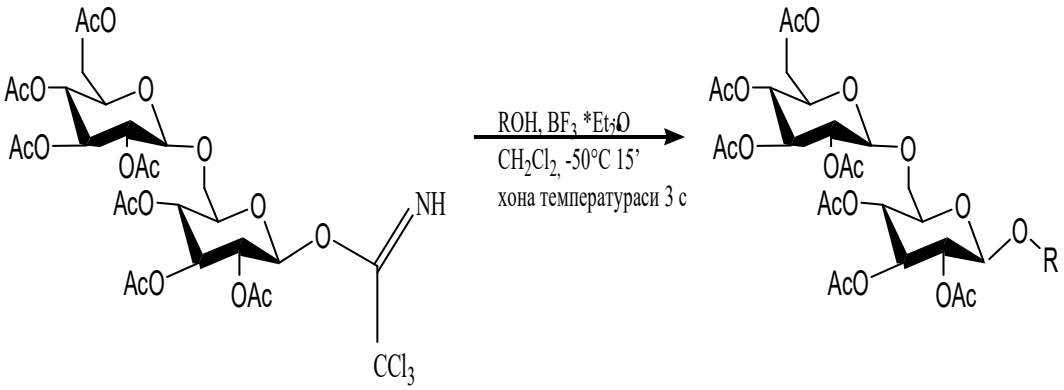
catalyst:



The resulting product was exposed to acetonitrile in the presence of sodium hydride in a dichloromethane medium at a temperature of 15 ^{0}C:



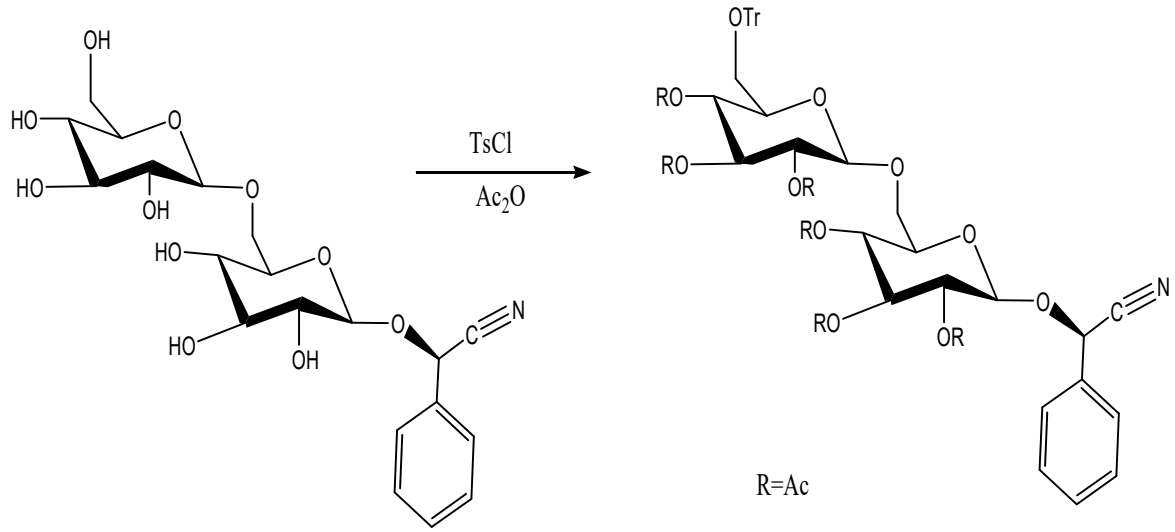
In the next step, the obtained product was first exposed to BF3, diethyl ether and alcohol at room temperature for 15 minutes at 50 0C for 15 minutes in a dichloromethane medium:



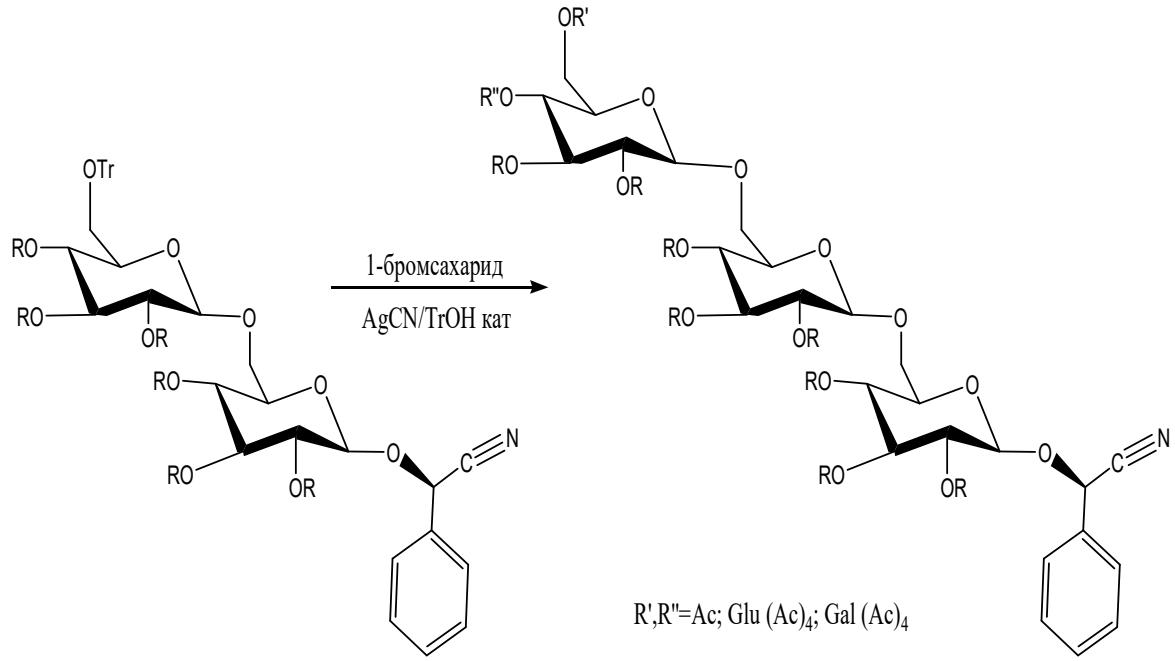
The final product obtained at the end of the reaction was treated with alkali.

In addition, the synthesis of its esters based on amygdalin has been performed [2].

In this case, the amygdala was first synthesized by the action of pure chloride and acetic anhydride:

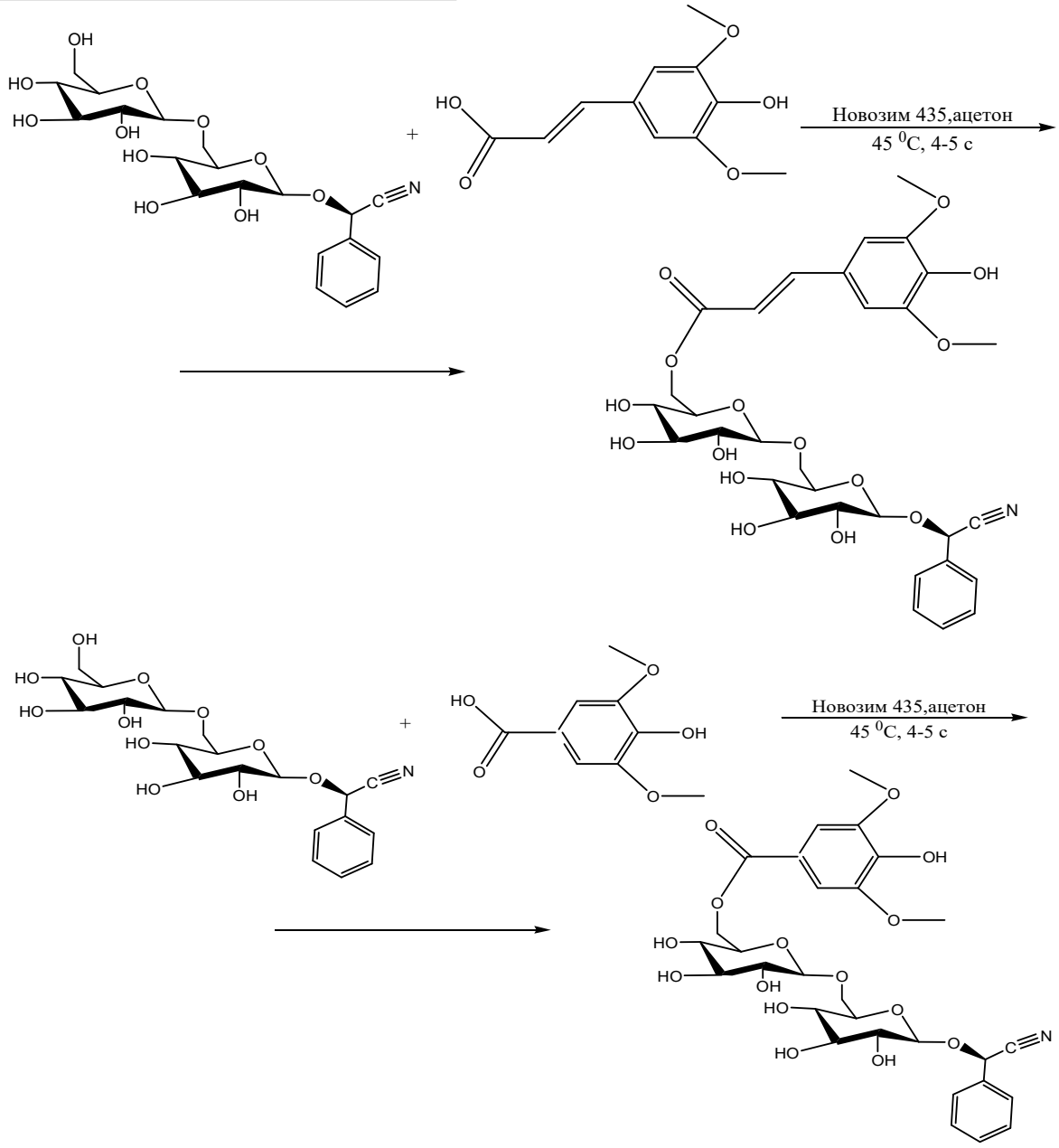


A new trisaccharide was obtained by bromsaccharide in the presence of a catalyst:



Indian scientists have synthesized complex esters of amygdalin with 3,5-dimethyl esters of synaptic acid and gal acid in the presence of biocatalyst-immobilized lipase (novozyme 435) [3].

КИМЁ



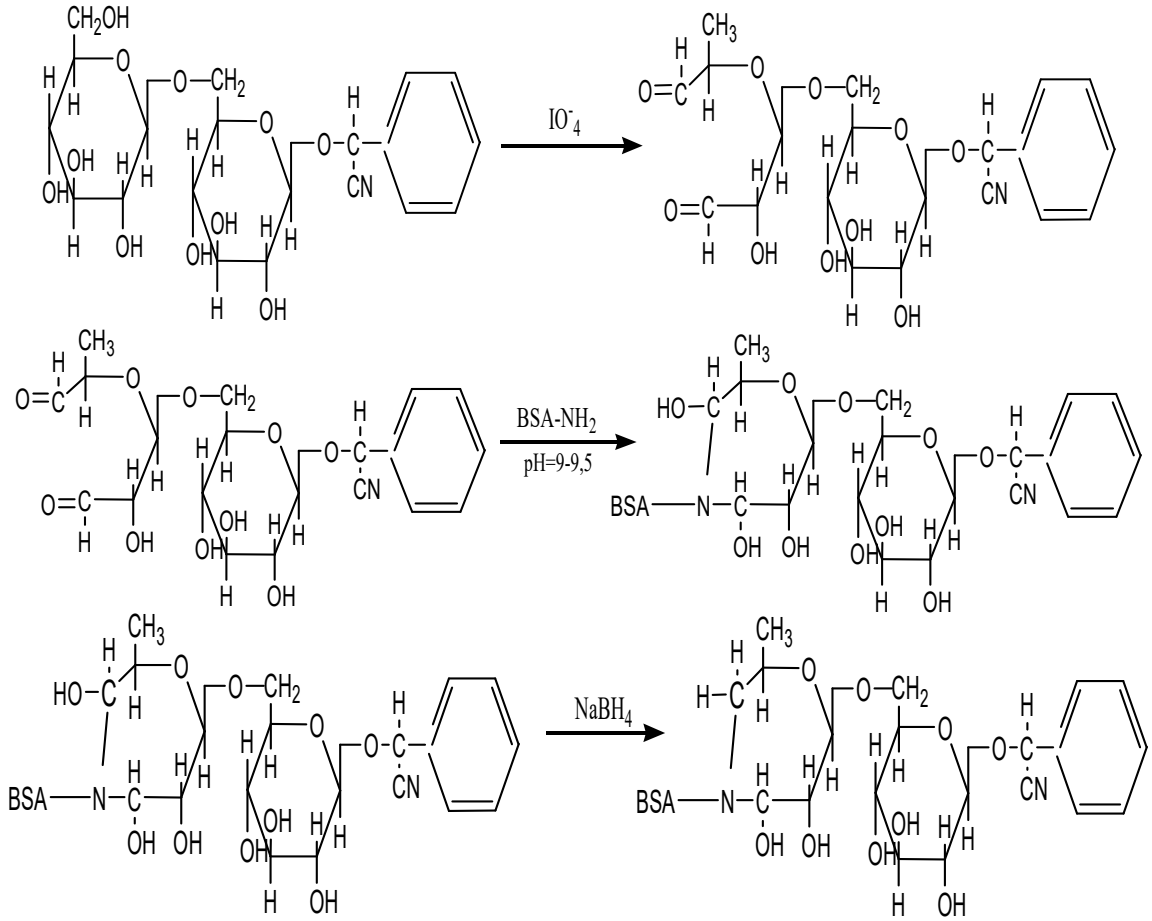
The biological activity of the synthesized compounds has been tested against S. aureus, P. aeruginosa, E. coli, P. mirabilis bacteria and against the pathogenic fungi C. albicans and A. niger.

Cyanogenic plant species are abundant in the flora. Because of the different cyanide ions in these plants, many studies have shown that they are different in humans and animals. Among these, the role of both cyanogenic glycosides is of some importance.

Consumption of cyanogenic plants can cause serious problems related to human health. Finding ways to detect and quantify cyanogenic glycosides that form cyanides can help prevent cases of poisoning from improperly processed cyanogenic plants. The hapten-protein conjugates with amygdalin and linamarin have been synthesized by the authors based on a new approach [4].

Compounds with a molecular mass of less than 1000–10000 typically do not have immunogenic properties unless they are bound to another larger, immunogenic property by a covalent bond in the form of haptens, a molecule (in most cases a protein). Conjugated with bovine serum albumin (BSA), hemocyanin (KLH), ovalbumin, ovomucoid, thyroglobumin, or fibrinogen, which are typically hapten-carrying proteins, allow stimulation of the antibody response to T-cell-helper epitomies.

BSA is a protein-carrier for haptens (amygdalin and linamarin) in the production of immunogens in the production of antibodies.

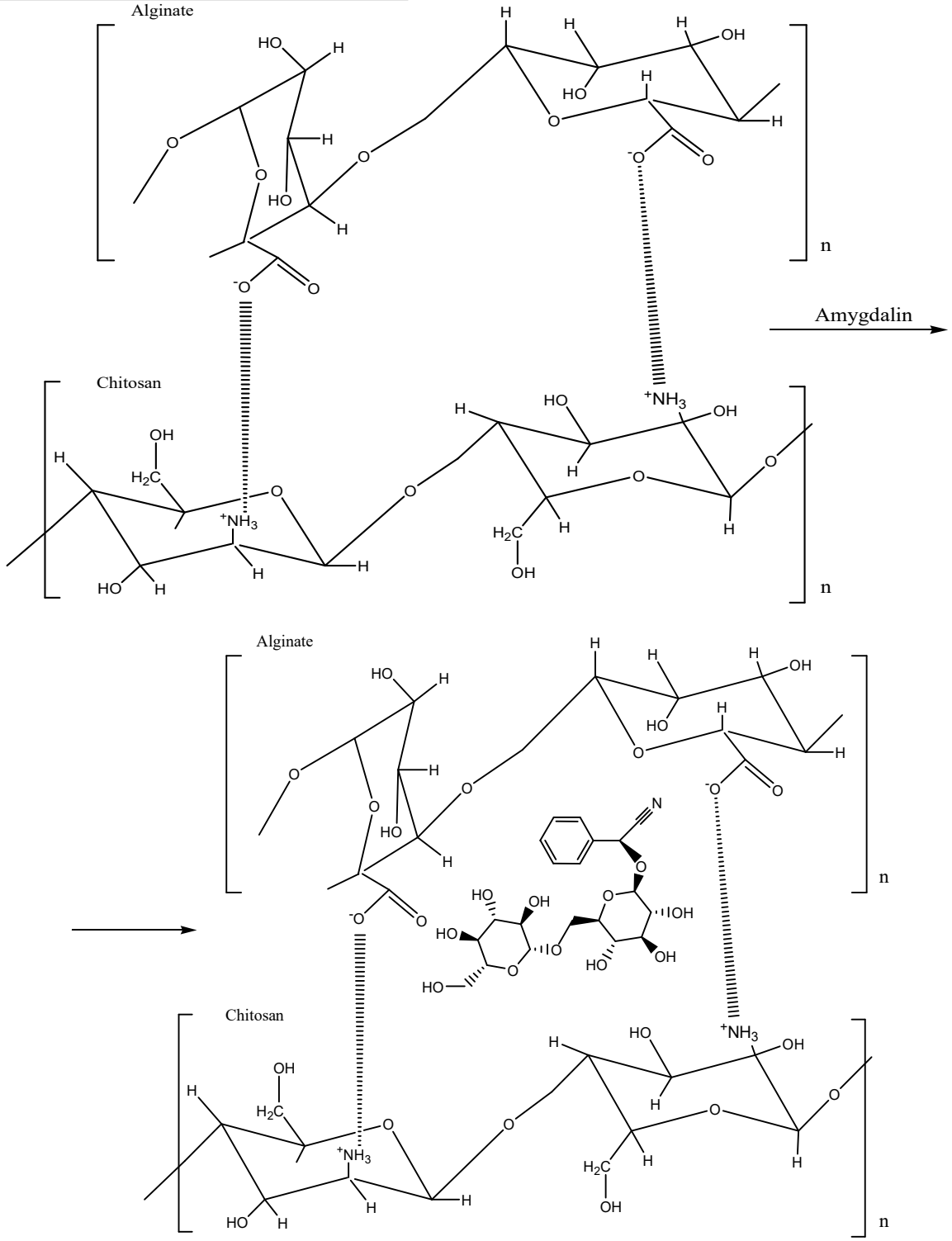


It is known that many drugs are produced in capsule form to ensure that they do not break down into organs or damage the gastric mucosa.

Given the use of amygdalin in the treatment of cancer, scientists have worked to encapsulate amygdalin through alginate-chitosan nanoparticles to ensure that it reaches cancer cells completely without hydrolysis [5].

Studies have shown that encapsulated amygdalin, based on biomassable and biodegradable alginate-chitosan nanoparticles, is harmless to healthy cells with a slight increase in cytotoxic effects on cancer cells. These types of encapsulated nanoparticles have proven their effectiveness in medical practice.

КИМЁ



Amygdalin-based drugs have been manufactured and used in the United States, Germany, Italy, Japan, the Philippines, and more than 20 other countries. Numerous studies have found a positive effect of amygdalin on expectorant and antiastatic effects, as well as on the digestive organs. In addition, the pharmacological action may include antiaretogenic, inhibitory renal interstitial fibrosis, treatment of pyelonephritis, pulmonary fibrosis, increased resistance to pneumonia, immune suppression, immune system management, anti-tumor therapy, anti-inflammatory and anti-ulcer effects [6]. It has also been used to treat asthma, bronchitis, pulmonary emphysema, procrastination, colorectal cancer, and vitiligo [7]. As a result of hydrolysis of amygdalin, benzaldehyde and cyanide are broken down into acid. The resulting benzaldehyde has an analgesic effect and analgesic effect in tumors [8]. Its anti-tumor effect is manifested in

inhibiting the growth of cancer cells in the body, reducing the incidence of lung, colon and rectal cancers [9].

Amygdalin increases the activity of collagenase, which produces renal fibroblasts of type I [10]. It also strengthens the body's immune system, ensuring the production of large amounts of polyhydroxyanoates. [11].

The role of amygdalin in T-cell expression is important, as it prevents the formation of aortic occlusions, dilates blood vessels, and is used in the treatment of atherosclerosis. The positive effect of amygdalin in the treatment of peptic ulcer disease has been determined experimentally. It has been shown to slow angiogenesis in endothelial cells of diabetic rats [12]. Studies have shown that amygdalin has a positive effect on many organs, including sedative and protective properties in digestion, improves urinary function, normalizes the process of apoptosis, improves renal fibroplast function, has a positive effect in the treatment of asthma, bronchitis, emphysema, cough. owns [13].

We have synthesized esters of amygdalin in acetic anhydride and p-ferrocenylbenzoic acids, studied the structure and some physicochemical properties of these compounds. The effect of the biological activity of the newly synthesized compounds on seed germination has also been studied. The synthesis of new compounds of amygdalin and their biological activity is the main goal of our research to develop drugs not only for plant growth, but also for the treatment of diseases in the human body.

References

1. Araya E, Rodriguez A, Rubio J **et al**. Synthesisand evaluation of diverse analogs of amygdalin as potential peptidomimetics of peptide T. **Bioorg**. **Med**. **Chem**. **Lett**. 15,1493–1496 (2005).

2. ChristopheBliard*GeorgesMassiotSergeNazabadioko Amygdalin as building block in oligosaccharide synthesis Tetrahedron Letters Volume 34, Issue 32, 6 August 1993, Pages 5083-5084 https://doi.org/10.1016/S0040-4039(00)60681-0

3. Amit Lather, Sunil Sharma , Anurag Khatkar. Amygdalin based G-6-P synthase inhibitors as novel preservatives for food and harmaceutical products. Scientific RepoRtS | (2020) 10:1390-1393. https://doi.org/10.1038/s41598-020-70895-1

4. Islamiyat Folashade Bolarinwa. Synthesis and Characterization of Hapten-Protein Conjugates for Antibody Production against Cyanogenic Glycosides. Journal of Food Protection, Vol. 78, No. 7, 2015, Pages 1408–1413. doi:10.4315/0362-028X.JFP-15-033

5. Rabia Sohail, Shah Rukh Abbas. Evaluation of amygdalin-loaded alginate-chitosan nanoparticles as biocompatible drug delivery carriers for anticancerous efficacy. International Journal of Biological Macromolecules 153 (2020) 36–45.

6. Chan TY. A probable case of amygdalin-induced peripheral neuropathy in a vegetarian with vitamin B12 deficiency. Ther Drug Monit 2006;28:140.

7. Chang HK, Yang HY, Lee TH, Shin MC, Lee MH, Shin MS, et al.Armeniacae semen extract suppresses lipopolysaccharide-induced expressions of cyclooxygenase [correction of cycloosygenase]-2 and inducible nitric oxide synthase in mouse BV2 microglial cells. Biol Pharm Bull 2005;28:449-454.

8. Chang HK, Shin MS, Yang HY, Lee JW, Kim YS, Lee MH, et al. Amygdalin induces apoptosis through regulation of Bax and Bcl-2 expressions in human DU145 and LNCaP prostate cancer cells. Biol Pharm Bull 2006;29:1597-602.

9. Park HJ, Yoon SH, Han LS, Zheng LT, Jung KH, Uhm YK, et al. Amygdalin inhibits genes related to cell cycle in SNU-C4 human colon cancer cells. World J Gastroenterol 2005;11:5156-5161.

10. Guo J, Wu W, Sheng M, Yang S, Tan J. Amygdalin inhibits renal fibrosis in chronic kidney disease. Mol Med Rep 2013;7:1453-1457.

11. Baroni A, Paoletti I, Greco R, Satriano RA, Ruocco E, Tufano MA, et al. Immunomodulatory effects of a set of amygdalin analogues on human keratinocyte cells. Exp Dermatol 2005;14:854-859.

12. Mirmiranpour H, Khaghani S, Zandieh A, Khalilzadeh OO,Gerayesh-Nejad S, Morteza A, et al. Amygdalin inhibits angiogenesisin the cultured endothelial cells of diabetic rats. Indian J PatholMicrobiol 2012;55:211-214.

13. Liu C, Li X, Yang H, Mao X, Wang J, Gao W. Effect of Natural beta-Glucosidase Inhibitors in Reducing Toxicity of Amygdalin in Persicae Semen. Phytother Res. 2017; 31(5): 771–777. doi: 10.1002/ptr.5798.