FURFUROL ASOSIDAGI POLIMERLARNING TADQIQI

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Annotatsiya. Maqolada ionitlarni sintez qilishda asosiy monomer sifatida gidroliz sanoati mahsuloti bo‘lgan furfurolni qo‘llash usullari muhim ahamiyatga ega ekani ta'kidlanadi. Yuqoridagilarga asoslanib, furfurol – ikkilamchi xom ashyo asosida yangi ionoalmashinuv polimerlarini sintez qilish, ularning sorbsion va ekspluatatsion xususiyatlarini o‘rganish, shuningdek, olingan ionitning molekulyar massasi aniqlangan, hamda metodikasi keltirilgan. Statik va dinamik sorbsion yutish o‘rganilgan, natijasi xromatamass va IQ spektrda tekshirilgan. Turli kimyo sanoati ishlab chiqarishlari, shu jumladan gidrometallurgiya sohasidagi chiqindi va toza suvlarni tozalash uchun samarali va amaliy foydalanish obyektlarini aniqlash katta ilmiy-texnik va amaliy ahamiyatga ega.

Kalit so‘zlar: furfurol, 1-(furanil-2)penten-4-in-2-ol, akril kislota, DAK, KOH, kreoskopik usul, oligo(polimer), molekulyar massa, vinilatsetilen, potensiametrik titrlash, xromato-mass spektri, IQ spektr.

Annotation. The paper argues that the use of furfurol, a product of the hydrolysis industry, as a key monomer in ionite synthesis is important. Based on the above, the synthesis of new ionoalmashinuv polymers based on furfurol – secondary raw materials, the study of their sorbic and operational properties, as well as the molecular mass of the ionite obtained, as well as the methodology are presented.nnotation. The paper argues that the use of furfurol, a product of the hydrolysis industry, as a key monomer in ionite synthesis is important. Based on the above, the synthesis of new ionoalmashinuv polymers based on furfurol – secondary raw materials, the study of their sorbic and operational properties, as well as the molecular mass of the ionite obtained, as well as the methodology are presented. Static and dynamic sorption studies were performed, and the results were verified by chromatogram and IR spectra. The identification of objects of effective and practical use for the treatment of waste and fresh water in various chemical industry productions, including hydrometallurgy, is of great scientific and technical and practical importance.

Keywords: furfurol, 1-(furanyl-2)pentene-4-in-2-ol, acrylic acid, DAK, KOH, creoscopic method, oligo(polymer), molecular mass, vinylacetylene, potentiametric titration, chromato-mass Spectrum, IQ spectrum.

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Аннотация. В статье подчеркивается важность методов использования фурфурола, продукта гидролизной промышленности, в качестве основного мономера при синтезе ионитов. На основании вышеизложенного проводится синтез новых ионообменных полимеров на основе фурфурола-вторичного сырья, изучение их сорбционных и эксплуатационных свойств, а также определяется молекулярная масса полученного ионита, а также приводится методика.татье подчеркивается важность методов использования фурфурола, продукта гидролизной промышленности, в качестве основного мономера при синтезе ионитов. На основании вышеизложенного проводится синтез новых ионообменных полимеров на основе фурфурола-вторичного сырья, изучение их сорбционных и эксплуатационных свойств, а также определяется молекулярная масса полученного ионита, а также приводится методика. Были изучены статическое и динамическое сорбционное поглощение, результат был исследован в хроматамассе и ИК-спектре. Большое научно-техническое и практическое значение имеет выявление объектов эффективного и практического использования для очистки сточных и пресных вод различных производств химической промышленности, в том числе в области гидрометаллургии.

Ключевые слова: фурфурол, 1-(фуранил-2)пентен-4-в-2-ол, акриловая кислота, DAK, кон, креоскопический метод, олиго(полимер), молекулярная масса, винилацетилен, потенциометрическое титрование, хромато-масс-спектр, ИК-спектр.

1. Introduction

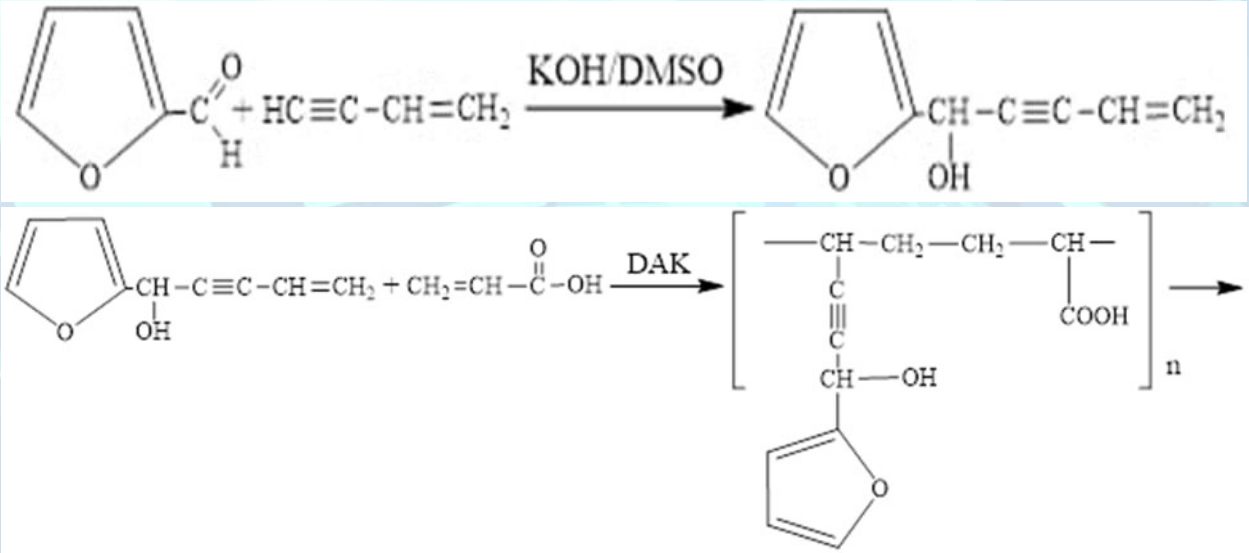
O‘zbekistonda furan birikmalari bilan bir qator tadqiqotlar olib borilgan bo‘lib unda bu spirtlarni tanlab modifikatsiya qilish ularning sintetik va amaliy imkoniyatlarini sezilarli darajada kengaytirishi mumkin. Shu nuqtai nazardan, ularni atsetilen bilan vinillash reaksiyasi qulay, tejamli, “yashil” kimyo usuli talablariga javob beradigan furan fragmentini saqlagan vinil efirlarini sintez qilish usuli istiqbolli bo‘lib hisoblanadi, chunki ular polifunksional furan strukturalarining dizayni uchun qimmatli asosiy matritsa hisoblanadigan birikmalardir. Hozirgi vaqtda sanoat organik sintezining ko‘lami shunchalik kattaki, uning ehtiyojlarini qondirish uchun zarur bo‘lgan neft va gazning cheklangan tabiiy resurslari muammosi dolzarb bo‘lib qolmoqda. Bu borada tabiiy qayta tiklanadigan xomashyo asosida asosiy birikmalar olish yo‘nalishi istiqbollidir. Fan texnikaning so‘nggi yutuqlari vaqtda turli kimyoviy tabiatga ega bo‘lgan komponentlar kombinatsiyasi asosida shakllantirilgan polimer kompozitsion materiallar yangi sinfi hisoblanib ular o‘z tavsifi bo‘yicha alohida olingan tarkibiy komponentlar ko‘rsatkichlaridan ancha ustun turadi. Kompozitsion xususiyatlari yig‘indisi jihatidan ular o‘ziga xos fizik - mexanik, magnit, optik-elektron xususiyatlarni namoyon qiladi, yuqori kimyoviy va termik

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barqarorlikka ega bo‘ladi hamda, turli xil nurlanishga chidamliligi ortadi. So‘nggi yillarda furan hosilalari kerakli xususiyatlarga ega bo‘lgan materiallar va kompozitsiyalarni yaratishda tobora muhim axamiyat kasb etmoqda.

Furfurol – bargli daraxtlardan tashqari, qishloq xo‘jaligi chiqindilari bilan ifodalanadigan pentozan xomashyosi gidrolizining asosiy maxsuloti. Furfurolning jahon ishlab chiqarishi yiliga 250000 tonnani, narxi esa har bir tonna uchun 1000 $ tashkil qiladi [8; 103-107 b]. Bugungi kunda bu birikma asosiy organik sintezda xom neft o‘rnini bosa oladi [9; 185 b]. Furfurolni gidrogenlab sanoat erituvchilarni [10; 67-74 b], yoqilg‘ilar uchun qo‘shimchalarni [6; 1250-1284 b:, 7; 1446-1450 b], turli biodegradatsiyalanadigan polimerlarni [11; 404-405 b] oladilar. Masalan, furfurol, asosan, furan smolalari, adgezivlar, bo‘yoqlar olish uchun ishlatiladi. Tetragidrofurfuril spirti akrilatlar va epoksid smolalarni ishlab chiqarishda sanoatda qo‘llash uchun “yashil” erituvchi sifatida tan olingan, shuningdek tetragidrofurfuriloleat turidagi plastifikatorlarni ishlab chiqarishda qo‘llaniladi [12; 7164-7183 b].

Furfurolni vinilatsetilen bilan to‘g‘ridan-to‘g‘ri vinillash haqida ma’lumotlar juda cheklangan. Ishqoriy muhitda furfurolni Kanitsarro reaksiyasiga kirishishini e’tiborga olgan holda toza furfurol tanlandi. Kannitssaro reaksiyasi- aldegidlarning ishqorlar ta’sirida disproporsiyalanishi natijasida birlamchi spirtlar va karbon kislotalarga aylanishi. Bunda aldegidning bir molekulasi qaytarilib, spirtga, ikkinchi molekulasi oksidlanib, kislotaga aylanadi. Reaksiya ishqoriy muhitda borganda kislota emas, balki uning tuzi hosil bo‘ladi.

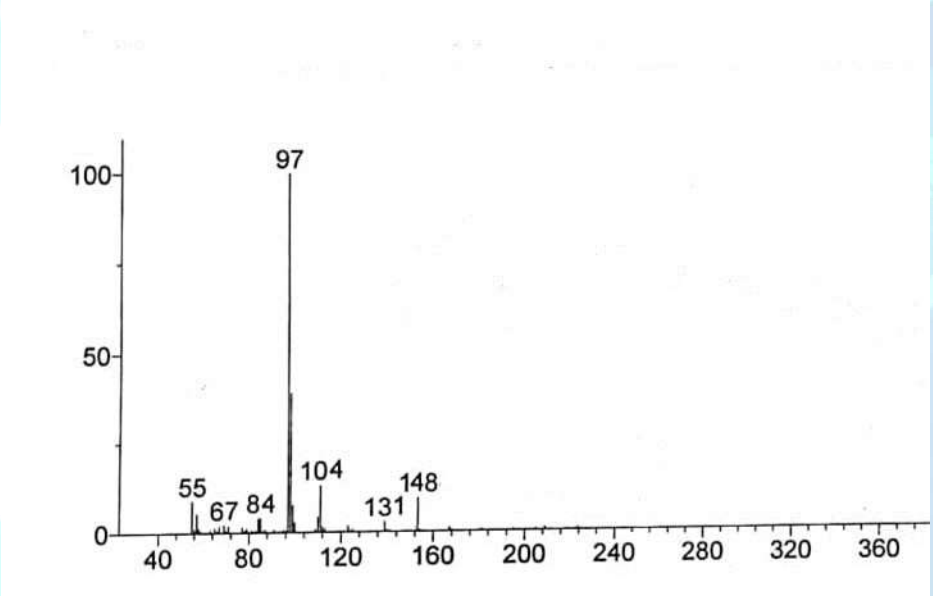


Kuchli asosli sistemada DMSO oraliq dimsil kompleksini hosil qilib reaksiyaning unumini ta’minlab beradi. Shuningdek, vinillovchi agent sifatida vinilatsetilenning tanlanishi uning reaksion qobiliyati va atsetilenga nisbatan fizik ko‘rsatgichlarini farqiga asoslanib tanlandi. Dimsil ioni furfuroldagi qutbli qism

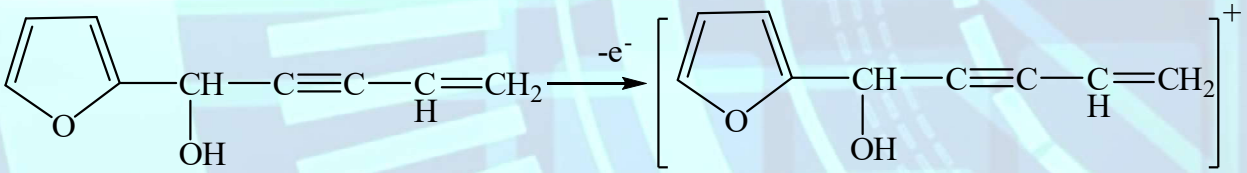
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gidrooksil guruhidagi uglerod atomiga S_{N1} hujum qiladi va birikish reaksiyasi sodir bo‘ladi.

Ekstraksiya aralashmasining bir qatlamida reaksiyaga kirishmagan va efirda erigan moddalar (KOH+DMSO+furfurol), ikkinchi qavatida efirda erimaydigan, reaksiyaga ko‘ra hosil bo‘lgan sintezlangan mahsulot 1-(furanil-2)penten-4-in-2-ol-1ekanligi aniqlandi. 1-(furanil-2)penten-4-in-2-ol-1ning xromato-mass spektrometriga kiritilgandan keyin, tanlangan sharoitda 3.573 dan 3.597 minut oralig‘ida m/z 148 bo‘lgan 1-(furanil-2)penten-4-in-2-ol-1 molekulyar ioni hosil bo‘ldi.



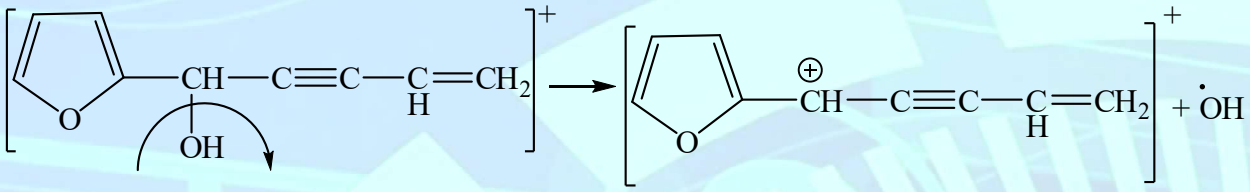
1-(furanil-2)penten-4-in-2-ol-1ningning xromato-mass spektri



Mr=148

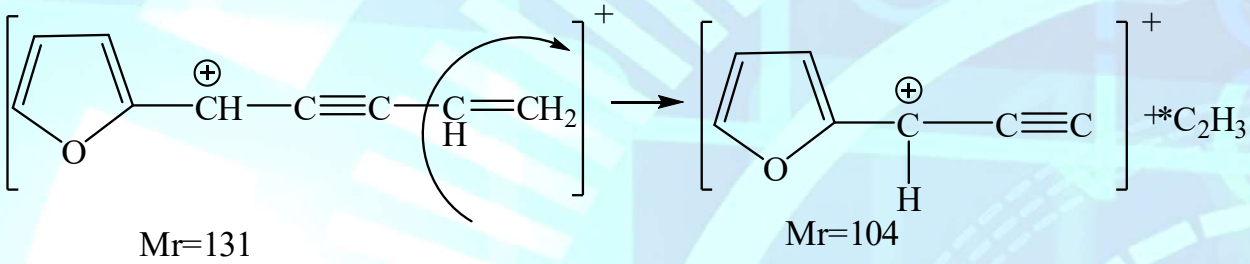
Bundan tashqari spektrda massasi m/z 131, m/z 104, m/z 97, m/z 84, m/z 67 va m/z 55 bo‘lgan bo‘lakli ionlarning hosil bo‘lishi aniqlandi. 1-(furanil-2)-penten-4-in-2-ol-1 ionidan 3.573 minutda gidroksil (-OH) radikalining ajralib chiqishi natijasida m/z 131 ionining ajralishi namoyon bo‘ldi. Bu cho‘qqi m/z 131 bo‘lgan 1-(furanil-2)-penten-4-in-2-ol-1 ioniga mos keladi va bu bog‘ energiyalariga ham mos keladi.

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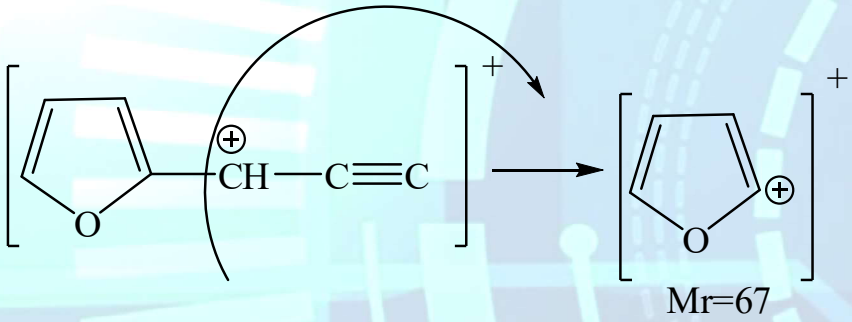
Mr=148 Mr=131

Uchlamchi 1-(furan-2-il)penten-4-in-2-il-1 ionidan metilen radikalining ajralib chiqishi hisobiga m/z 86 ionining ajralishi namoyon bo‘ladi. Bu cho‘qqi m/z 104 bo‘lgan 1-(furan-2-il)-3λ^3-propin-2-il-1 ioniga mos keladi.



Mr=131 Mr=104

O‘z navbatida 1-(furan-2-il)-3λ^3-propin-2-il-1 ionidan 3.597 minutda radikalarining ajralib chiqishidan m/z 67 ionining ajralishi namoyon bo‘ldi.



Mr=67

Tahlil oxirida hosil bo‘lgan ionlarning kinetik qonuniyatlari ham o‘z navbatida halqaning ochilish murakkabligiga mos holda sodir bo‘ladi. Dastlabki bosqichda yon zanjirning ionlari ajralishi va so‘nggra halqaning parchalanishi moddaning strukturasini to‘g‘riligi va aniq identifikatsiya qilinganligi, qonuniyatlarga mosligi bilan tasdiqlaydi.

REFERENCES

1. Firuz O., Vohid A. Synthesis of ionites based on cremnisole //Universum: технические науки. – 2022. – №. 4-13 (97). – С. 19-21.

2. Abror o‘g‘li, A. A. (2023). Improving the physico-chemical properties of urea furfural resin. American Journal of Pedagogical and Educational Research, 12, 268-271.

3. Davron o‘g‘li, N. D. (2023). Application of urea-formaldehyde and urea-furfural resins in different solvents. American Journal of Pedagogical and Educational Research, 12, 265-267.

ISSN 3030-3907

4. Firuz O., Vokhid A. Synthesis and properties of complex forming ionites //Universum: технические науки. – 2023. – №. 2-6 (107). – С. 38-40.
5. Ostonov F., Akhmedov V., Olimov B. Preparation of hybrid composites by sol-gel method and analysis of its properties //Scientific Collection «InterConf». – 2022. – №. 123. – С. 256-259.
6. Zuhriddin, R., & Niginabonu, J. (2022). Production of polyethylene terephthalate. Universum: технические науки, (5-11 (98)), 58-62.
7. O‘G‘Li, R. Z. K., & Qizi, J. N. Q. (2022). Analysis of importance and methods of production of block sopolymers based on polyetylenterephtalate. International Journal of Advanced Technology and Natural Sciences, 3(1), 51-55.
8. Zuhriddin, R., Niginabonu, J., Aminjon, V., & Temurbek, D. (2022). Mechanisms of eterification of tereftalic acid with etylenglycol. Universum: технические науки, (5-11 (98)), 63-67.
9. Nigina J., Mizrob Z. Production of vinyl ethers of furfuryl alcohol //Universum: химия и биология. – 2023. – №. 9-2 (111). – С. 57-62.
10. Bobir, O., Vokhid, A., Gulnoz, G., & Sherzod, R. (2022). Synthesis and properties of nitrogen-retaining corrosion inhibitors. Universum: химия и биология, (4-2 (94)), 43-46.
11. Ostonov F. Кремнийорганик бирикмалар билан модификацияланган акрил бирикмаларининг олиниши //центр научных публикаций (BuxDU. uz). – 2020. – Т. 1. – №. 1.
12. Olimov, B. B., & Rakhmatov, S. (2022). Synthesis and use of corrosion inhibitors on the basis of diatomic phenols in the oil and gas industry. In Kimyo va tibbiyot: nazariyadan amaliyotgacha (pp. 141-143).
13. Chavez-Sifontes, M. H., Domine, M. E., & Valencia, S. (2015). Synthesis of furan derivatives via cascade-type reactions catalyzed by solid acids. Catalysis Today, 257, 305-317.
14. Gaboriaud, F., Nonat, A., Chaumont, D., & Craievich, A. (2005). Structural model of gelation processes of a sodium silicate sol destabilized by calcium ions: combination of SAXS and rheological measurements. Journal of Non-Crystalline Solids, 351(4), 351-354.
15. Yang, Z., Chou, X., Kan, H., Xiao, Z., & Ding, Y. (2022). Nanoporous copper catalysts for the fluidized electrocatalytic hydrogenation of furfural to furfuryl alcohol. ACS Sustainable Chemistry & Engineering, 10(22), 7418-7425.
16. Venegas-García, D. J., Mir, M., Steiger, B. G., & Wilson, L. D. (2024). Furfuryl-pyridinium-functionalization of flaxseed gum for effective methylene blue removal from aqueous solution. Canadian Journal of Chemistry.

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