

Navro‘z BOBOJONOV

ORGANIK KIMYO

NAZARIY MA'LUMOTLAR
Abituriyentlar va repetitorlar uchun

Gologrammasiz kitob qalbaki
hisoblanadi

Toshkent
«Spectrum Media Group»
2025

ORGANIK KIMYONING ASOSIY TUSHUNCHALARI VA QONUNLARI ORGANIK KIMYONING TARIXI VA TARAQQIYOT BOSQICHLARI

Organik kimyo – kimyoning katta alohida bo‘limi bo‘lib, tadqiqot doirasi uglerod birikmalari hisoblanadi. Organik kimyoni anorganik kimyodan qat’iy chegara bilan ajratib bo‘lmaydi, ular har doim bir-birni to‘ldirib turadi.

Organik kimyo – uglevodorodlar va ularning hosilalarining tuzilishi, olinish usullari, xossalari, amaliy foydalanish imkoniyatlarini o‘rganadi.

Bugungi kunda olimlar organik kimyoning taraqqiyot bosqichlarini **4 ta davrga** bo‘lishadi.

Empirik davr – insonlar organik moddalarni ehtiyojlari uchun qo‘llashni boshlashi, ularni ajratib olish va qayta ishlash usullarni o‘rganilgan vaqtdan, organik kimyoning fan sifatida vujudga kelishigacha bo‘lgan davr.

Insoniyatga qadimdan organik moddalar ma’lum bo‘lgan. Masalan, bo‘yoqlar, uzum sharbatidan sirka kislota, o‘simliklardan shakar va yog‘larni olishni hamda yog‘larni ishqorlar bilan qaytarib sovunlar hosil qilishni bilganlar. Ko‘p vaqtgacha organik moddalarni aralashma holida ishlatgan. Kishilarga ma’lum bo‘lgan moddalarni dastalabkildan biri sirka kislota bo‘lgan. IX asrga kelib alkimyogarlardan tomonidan sirka kislotani va etil spirtni ajratib olgan. Qadimda moddalarni tashqi ko‘rinishiga qarab guruhlariga ajartishgan. Masalan: **Quyuq suyuqliklar** – **moylar** deb hisoblangan. Kimyoviy xossasi moydek bo‘lmasada moysimon suyuqlikdan o‘yuvchi kaliy, konsentirlangan sulfat kislota (kuporos moyi) ni ham shu guruhga kiritishgan. **Suvda eriydigan moddalar** – **tuzlar** deb atalgan: Vino qahrabo va oksalat kislotalari ham tuzlar sinfiga kiritilgan. Barcha uchuvchan birikmalar – spirtlar deb qabul qilingan Xlorid va nitrat kislotalar, qalay ammiak (nashvadil spirt) uchuvchan bo‘lganligi sababli spirt deb hisoblangan.

Analitik davr – dastlabki nazariyalar yaratilib organik kimyo fan sifatida shakllana boshlagan (*XVIII oxiridan XIX asrning 60-yillarigacha*) «Organik kimyo» atamasi, ushbu fan rivojlanishining dastlabki yillaridagi (XVII asr oxiri) vitalistik qarashlar natijasida kelib chiqqan. Vitalistik nazariya tarafdorlari: «Organik moddalar faqatgina tirik organizmlarda ilohiy kuch natijasida hosil bo‘ladi, ularni sintetik yo‘l bilan olib bo‘lmaydi» degan fikrni olg‘a surganlar.

Biroq XIX asr boshlarida qilingan kashfiyotlar Vitalistik qarashlarni butunlay yo'qqa chiqaradi. Ulardan:

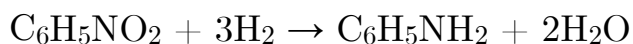
- 1824 – yilda nemis kimyogari **F. Vyoler** disiyandan oksalat kislotani va 1828-yilda NH_4OCN dan mochivinani laboratoriya sharoitida sintez qildi.



- 1845 – yilda nemis kimyogari **A.V. Kolbe** sirka kislotani sintez qildi:



- 1845 – yilda fransuz kimyogari **M. Bertlo** yog'ni olishga erishdi;
- 1861 – yilda rus olimi **A.M. Butlerov** oddiy chumoli aldigedidan shakarsimon moddani oldi;
- 1842 – yilda **Zinin** nitro benzolni qaytarib Anilin sintez qildi.



Tuzilish nazariyasining davri – XIX asrning 60 – yillaridan to XX asrning boshlarini o'z ichiga oladi.

Organik birikmalarni tuzilish nazariyasining rivojlanishiga XIX asrda qilingan bir qator kashfiyotlar asos bo'ldi.

- 1852 – yilda **E. Franklend** tomonidan Valentlik tushunchasi kiritildi;
- 1857 – yilda **A. Kolbe** va **F. Kekule** uglerodni doimiy IV valentli ekanligini aniqladi;
- 1858 – yilda **F. Kekule** va **A. Kuper** uglerod atomlari o'zaro C—C bog'ni hosil qilishini aniqladi.

Ushbu kashfiyotlarni birlashtirib va to'ldirishlar kiritib, kimyoning kelajagiga yo'l ochadigan yangi nazariyani rus olimi **A.M. Butlerov 1861-yilda** Germaniyada bo'lib o'tgan tabiat-shunoslarning oldida e'lon qildi.

Organik kimyoning rivojlanish davri – hozirgi zamon molekulyar atomistik yoki ilmiy takomillashuv davri.

ORGANIK MODDALARNING TUZILISH NAZARIYASI

Rus olimi A.M. Butlerov organik birikmalarning kimyoviy tuzilish nazariyasini taklif etdi. Ushbu nazariya quyidagicha ta'riflanadi:

Murakkab zarrachaning kimyoviy tabiati uning tarkibini tashkil etuvchi moddiy zarrachalarning tabiati, ularning miqdori va kimyoviy tuzilishi bilan belgilanadi.

FENOLLAR VA AROMATIK SPIRTLAR

Benzol halqasiga birikkan **OH** guruhi bor birikmalar **fenollar** deb ataladi.

Fenolni birinchi bo'lib **1851 – yil Bertlo** sintez qilgan. Birinchi vakili fenol (fenol – **karbol kislota** ham deyiladi. Molekulasidagi gidroksil gruppalarining soniga qarab, fenollar bir atomli, ikki atomli, uch atomli va ko'p atomli bo'ladi.

Bir atomli fenollar $C_nH_{2n-7}OH$ yoki $C_nH_{2n-6}O$.

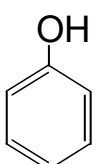
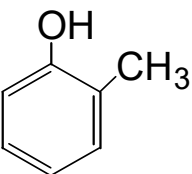
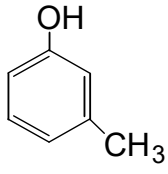
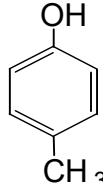
Ikki atomli fenollar $C_nH_{2n-8}(OH)_2$ yoki $C_nH_{2n-6}O_2$.

Uch atomli fenollar $C_nH_{2n-9}(OH)_3$ yoki $C_nH_{2n-6}O_3$.

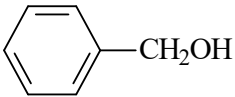
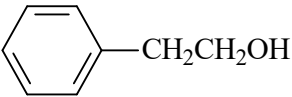
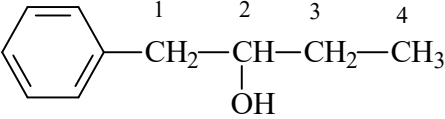
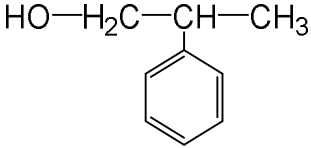
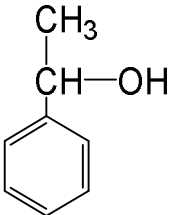
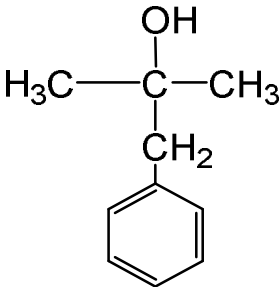
Bir atomli Fenollar va Aromatik spirtlarda

$n + 3$	C–C bog'lar soni	$3n - 5$	σ bog'lar soni
$2n - 7$	C–H bog'lar soni	$6n - 2$	Umumiy orbitallar soni
1	C–O bog'lar soni	3	$\pi(\pi)$ bog'lar soni
$8n + 2$	Elektron (pratonlar) soni	6	p – orbitalar
$22n + 12$	Umumiy zarrachalar soni (N)	18	Sp^2 gibridlangan orbitallar soni
$2n - 6$	s orbitallar soni	$6n + 8$	Neytronlar soni
$4n - 20$	Sp^3 gibridlangan orbitallar soni	$14n + 26$	Molekulyar massasi

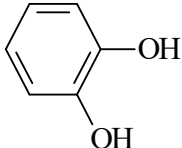
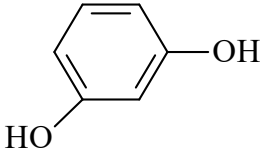
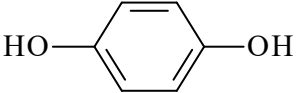
Fenollarning ayrim vakillari

 Karbolic kislota fenol	 o-krezol; 2-metilfenol; o-metil fenol.	 m-krezol; 3-metil Fenol; m-metil fenol.	 p-krezol; p-metil fenol; 4-metilfenol.
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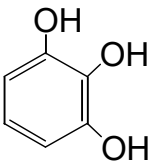
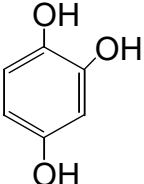
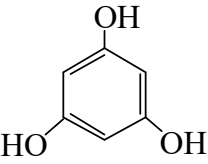
Bir qator bir atomli aromatik spirtlarning birinchi vakili benzil spirti yoki fenilmetanoldir. Ushbu qatorning boshqa vakillarida yon uglerod zanjiri chiziqli (feniletanol yoki fenetil spirti) yoki tarmoqlangan tuzilishga (uglerod skeleti izomeriyasi) ega bo'lishi mumkin. Bundan tashqari, gidroksil guruhining zanjir izomeriyasi mavjud.

 Benzil spirti	 2 - feniletanol	 1 - fenilbutanol - 2
 2 - Fenilprapanol - 1	 1 - Feniletanol	 2 - metil - 1 - fenilpropanol - 2

Ikki atomli fenollar uchta izomerga ega:

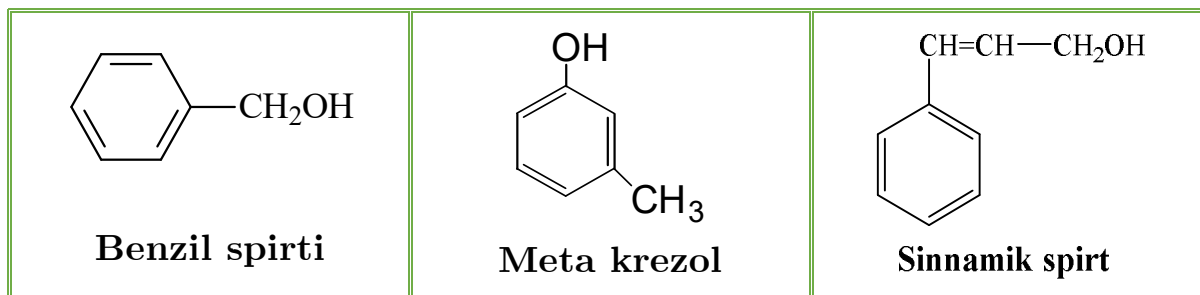
 Pirokatexin benzoldiol - 1,2 o - dioksibenzol	 Rezortsin benzoldiol - 1,3 m - dioksibenzol	 Gidroksinon benzoldiol - 1,4 p - dioksibenzol
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Uch atomli fenollar uchta izomerga ega:

 Pirogallol yoki 1,2,3 - trioksi - benzol Benzoltriol - 1,2,3	 Oksigidroksinon (benzoltriol - 1,2,4) 1,2,4 - trioksibenzol	 Floroglyutsin (benzoltriol - 1,3,5) 1,3,5 - trioksibenzol
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Fenollar va aromatik spirtlarning o'zaro farqi

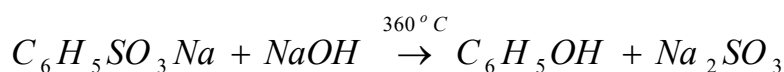
Aromatik spirtlarni fenollar bilan aralashtirib yubormaslik kerak – bu boshqa sinf. Fenollarda gidroksil guruhi bevosita benzol halqasida, aromatik spirtlarda esa uglevodorod radikalida joylashgan.



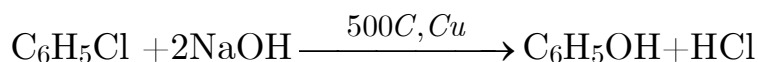
Fenollar va aromatik spirtlar.

Olinishi:

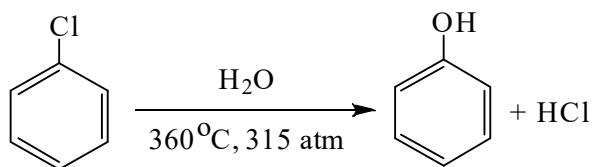
1. Aromatik sulfokislota tuzlari o'yuvchi ishqorlar bilan qo'shib qizdirilganda fenollar hosil bo'ladi (Kekule usuli):



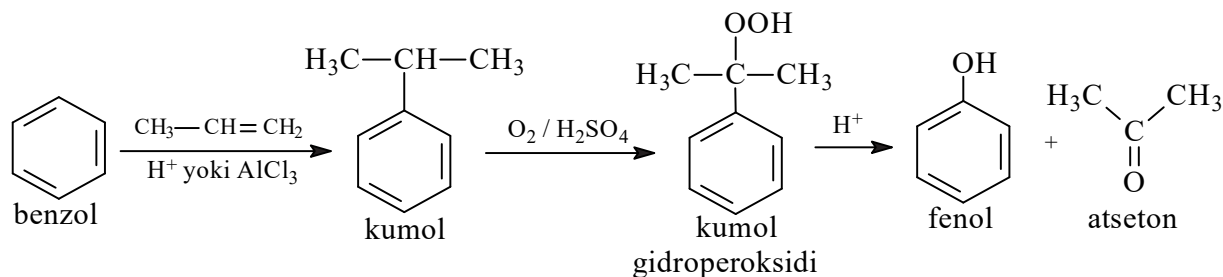
2. Sanoatda fenol xlorbenzolni o'yuvchi ishqorlar ishtirokida gidrolizlab olinadi:



3. Benzolni galogenli hosilasini gidrolizlab olinadi:



4. Benzol va propilendan foydalanib fenol olishga asoslangan usul kimyogar olimlar P.G. Sergeev, B.D. Krujalov, R.Y. Udrislar tomonidan amalga oshirildi. Jarayonni quyidagicha ifodalash mumkin: izopropilbenzol (kumol) oksidlanib, so'ngra konsentrlangan sulfat kislota ta'sirida parchalanganda fenol va atseton hosil bo'ladi:



AZOTLI ORGANIK BIRIKMALAR

Azotli organik birikmalar deb, molekulasida azot atomi bor bo'lgan organik moddalarga aytiladi.

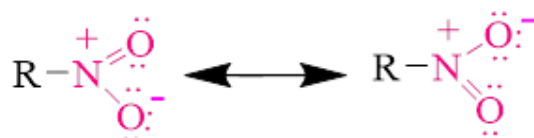
NITROBIRIKMALAR $\longrightarrow$ $R-NO_2$

AMINOBIRIKMALAR $\longrightarrow$ $R-NH_2$

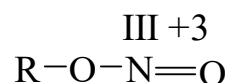
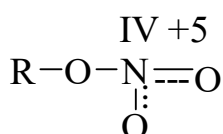
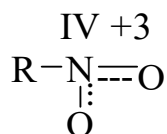
NITROBIRIKMALAR

Molekula tarkibidagi uglerod atomi nitrogruppaga NO_2 bilan bevosita bog'langan birikmalar nitrobirikmalar deyiladi.

Umumiy formulasi: $C_nH_{2n+1}NO_2$



Nitrobirikmalar, nitrat hamda nitrit kislota murakkab efirlaridan tuzilishi va xossalari jihatidan farq qiladi



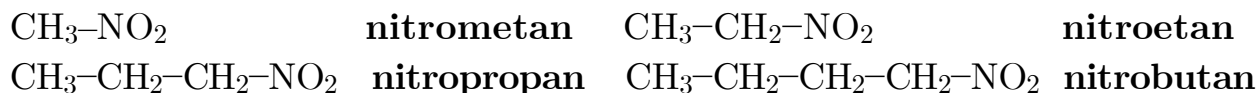
Nitrobirkma nitrat kislota murakkab efiri nitrit kislota murakkab efiri

Gomologik qatori

Formulasi	Nomi	Ayrim vakillari
CH_3NO_2	Nitrometan	2,4,6-trinitrotolul trotil 2,4,6-trinitrofenol pikrin kislota nitrobenzol
$C_2H_5NO_2$	Nitroetan	
$C_3H_7NO_2$	Nitropropan	
$C_4H_8NO_2$	Nitrobutan	
$C_5H_{10}NO_2$	Nitropentan	
$C_6H_{12}NO_2$	Nitrogeksan	

Nomenklaturasi

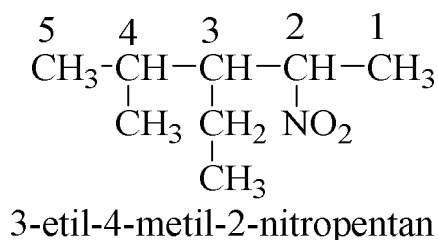
Ratsional nomenklatura bo'yicha nitrobirikmalarni nomlaganda tegishli uglevodorod nomiga «nitro» so'zi qo'shib aytiladi.



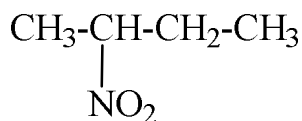
Sistematik nomenklatura

Xalqaro (sistematik) nomenklaturaga ko'ra nitrobirikmalar nomlashda quyidagi qoida va ketma-ketlikka amal qilinadi:

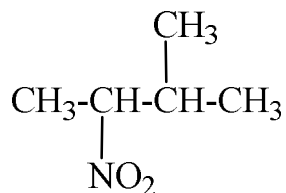
1. Nitrogruppa asosiy uglerod zanjirida bo'lishi kerak;
2. Asosiy zanjirdagi uglerod atomlarini nitrogruppa yaqin tomondan raqamlab chiqiladi;
3. Yonaki zanjirdagi radikallar yoki nitroguruh nomi ularni asosiy zanjirdagi ular bog'langan uglerodni tartib raqami ko'rsatilgan holda alifbo tartibida aytib o'tiladi va oxirida asosiy zanjirni nomi aytiladi.



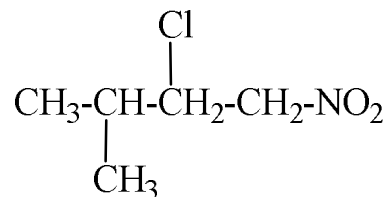
Formula	Ratsional nomenklatura	Sistematik nomenklatura
$\text{CH}_3\text{--CH}_2\text{--CH}_2\text{--NO}_2$	birlamchi nitropropan	1 – nitropropan
$\text{CH}_3\text{--CH}(\text{NO}_2)\text{--CH}_2\text{--CH}_3$	ikkilamchi nitrobutan	2 – nitropropan
$\text{CH}_3\text{--C}(\text{CH}_3)(\text{NO}_2)\text{--CH}_3$	uchlamchi nitrobutan	2 – metil – 2 – nitropropan



2 – nitrobutan



**3 – metil,
2 – nitrobutan**

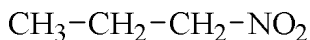


**3 – metil, 2 – xlor,
1 – nitrobutan**

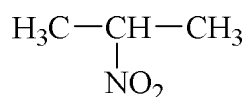
Izomeriyasi

1. Tuzilish (zanjir) izomeriya;
2. Nitroguruh o'rni.

$C_3H_7NO_2$ -Izomeriyalari

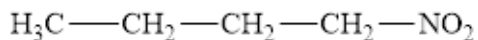


1-nitro-propan (S)
birlamchi-nitro-propan (R)

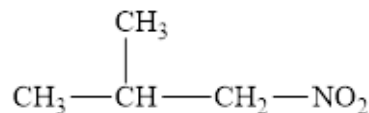


2-nitro-propan (S)
ikkilamchi-nitro-propan(R)

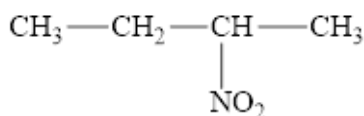
$C_4H_9NO_2$ -Izomeriyalari



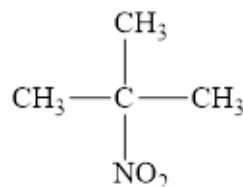
1-nitro-butan (S)
birlamchi-nitro-butan (R)



2-metil-1-nitropropan (S)
birlamchi-nitro-izobutan (R)



2-nitro-butan (S)
ikkilamchi-nitro-butan(R)

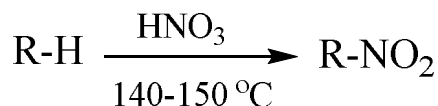


2-metil-2-nitropropan(S)
uchlamchi-nitro-butan(R)

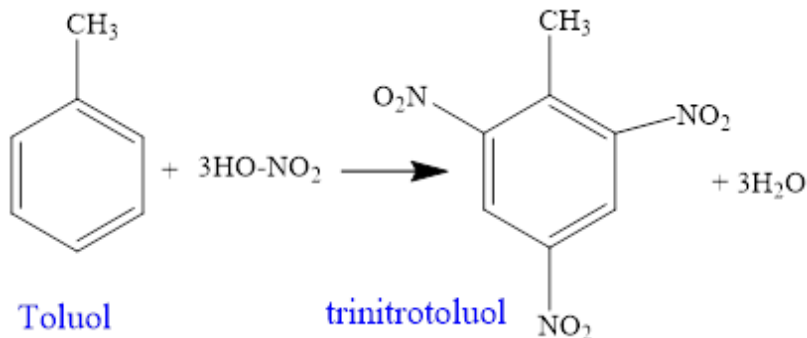
Vazifa: $C_5H_{11}NO_2$ ushbu moddaning nitrobirikmalarga xos barcha izomerlarini yozing. Ularni Sistematik va Ratsional nomenklatura bo'yicha nomlang.

Olinish usullari:

1. Konovalov reaksiyasi:



2. Aromatik birikmalarga konsentrlangan nitrat va sulfat kislotalarning aralashmasini (birinchi – nitrolovchi agent, ikkinchisi – suvni tortib oluvchi modda) ta'sir ettirish yo'li bilan nitrolash mumkin:



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