SHIFF ASOSLARI: SINTEZ USULLARI, BIOLOGIK FAOLLIGI VA AMALIY AHAMIYATI

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Annotatsiya

Hozirgi kunda Shiff asoslari yangi dori vositalarini yaratishda muhim ahamiyatga ega bo‘lgan birikmalar sinfini tashkil etadi. Ular eng keng tarqalgan organik birikmalardan biri bo‘lib, sanoatning turli tarmoqlarida keng qo‘llanilishi bilan bir qatorda, ko‘plab biologik faolliklarga ham ega. Shiff asoslarining hosil bo‘lish mexanizmi asosan ikki bosqichli qo‘shilish–ajralish reaksiyasiga asoslanadi. Birinchi bosqichda azotli asos karbonil birikmaga qo‘shilib, karbinolamin oraliq mahsulotini hosil qiladi. Keyingi bosqichda esa suv molekulasi ajralib chiqishi natijasida uglerod–azot qo‘sh bog‘i (C=N) hosil bo‘ladi.

Shiff asoslari sintez qilish uchun qulay va strukturaviy jihatdan xilma-xil birikmalar hisoblanadi. Ular odatda aldegid yoki ketonlarning birlamchi aminlar bilan oddiy kondensatsiya reaksiyasi orqali olinadi. Ushbu birikmalar hamda ularning metall komplekslari turli biologik jarayonlarda muhim katalizatorlar sifatida qaraladi. Tibbiy kimyo sohasida yuqori selektivlikka ega va nojo‘ya ta’sirlari kam bo‘lgan Shiff asoslari hosilalarini izlash hamon dolzarb ilmiy yo‘nalishlardan biri bo‘lib qolmoqda. Mazkur sharh maqolada Shiff asoslarining sintez usullari, biologik faolliklari hamda ularning metall komplekslari haqida umumlashtirilgan ma’lumotlar keltirilgan.

Kalit so‘zlar: *antimikrob, yallig‘lanishga qarshi, saratonga qarshi, Shiff asosi, sintez.*

KIRISH

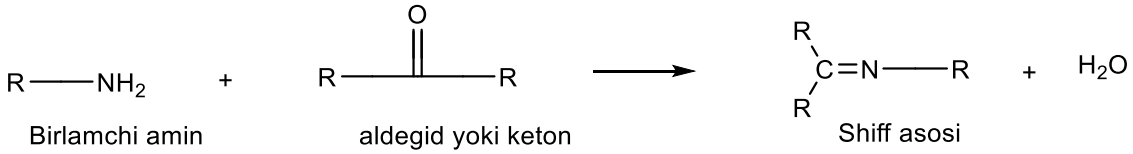
Shiff asoslari azometin (C=N) funksional guruhiga ega bo‘lgan organik birikmalar sinfi bo‘lib, ular ilk bor Hugo Shiff tomonidan tavsiflangan. Ushbu birikmalar aldegid yoki ketonlarning birlamchi aminlar bilan kondensatsiya reaksiyasi natijasida hosil bo‘ladi. Shiff asoslari sintetik jihatdan qulay olinishi, strukturaviy xilma-xilligi hamda turli metall ionlari bilan barqaror komplekslar hosil qilish qobiliyati sababli koordinatsion kimyo, farmatsevtika va bioorganik kimyoning muhim tadqiqot obyektlaridan biri hisoblanadi. Ularning antibakterial, antifungal, antivirus, yallig‘lanishga qarshi, antikonvulsant va antitumor faolliklari ko‘plab ilmiy tadqiqotlarda tasdiqlangan bo‘lib, bu esa yangi biologik faol moddalar va dori vositalarini yaratishda keng istiqbollar ochib bermoqda.

Shiff asoslari va ularning metall komplekslari turli biologik faolliklarga ega bo‘lishi bilan ilmiy va amaliy jihatdan katta ahamiyat kasb etadi. Tadqiqotlar natijasida ularning: og‘riq qoldiruvchi (analgetik) [2,3]; yallig‘lanishga qarshi [4–8]; saratonga

qarshi (antitumor) [9–13]; tirishishga qarshi [14]; hamda antimikrob [1-4] xususiyatlarga ega ekanligi aniqlangan.

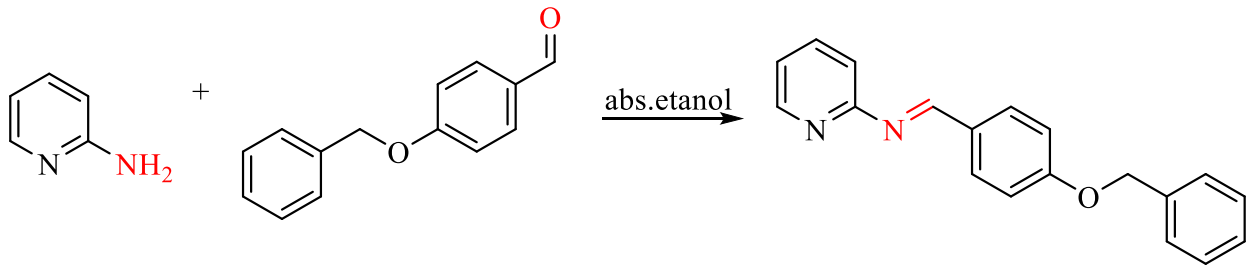
SHIFF ASOSLARINING UMUMIY TUZILISHI

Shiff asoslari odatda aldegid yoki ketonlarning birlamchi aminlar bilan kondensatsiya reaksiyasi natijasida hosil bo‘ladi [1-5]. Ushbu jarayonda karbonil guruhidagi kislorod atomi amin guruhi bilan almashib, azometin bog‘i (**C=N**) hosil qiladi. Reaksiya umumiy ko‘rinishda quyidagicha ifodalanadi:



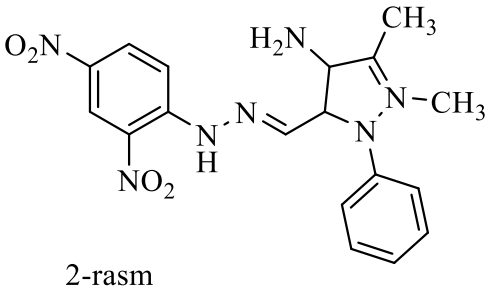
Bu reaksiyada suv molekulasi ajralib chiqadi va natijada Shiff asosi hosil bo‘ladi. Ushbu mexanizm asosida tibbiyot, sanoat va boshqa sohalar uchun muhim bo’lgan ko’plab reaksiyalar amalga oshirilgan. Quyida shulardan ayrimlarini ko’rib chiqamiz.

Aysen va hamkorlari tomonidan Shiff asosi ligandlarining sintezi, tavsiflanishi va ularning besh xil bakteriyaga nisbatan antibakterial faolligi o‘rganilgan. Shiff asosi ligandlarining tuzilishini aniqlash va tavsiflash uchun element tahlili, IQ-spektroskopiya (FT-IR) hamda proton yadro magnit rezonansi (^1H NMR) usullaridan foydalanilgan. Tadqiqot davomida 4-benzyloxy-benzaldehid va 2-aminopiridin o‘rtasidagi kondensatsiya reaksiyasi natijasida (4-benzyloxy-benzylidene)pyridine-2-yl-amine nomli Shiff asosi hosil qilingan [4]. Bu natijalar Shiff asoslarining yangi antimikrob vositalar yaratishdagi istiqbolli birikmalar ekanligini ko‘rsatadi.



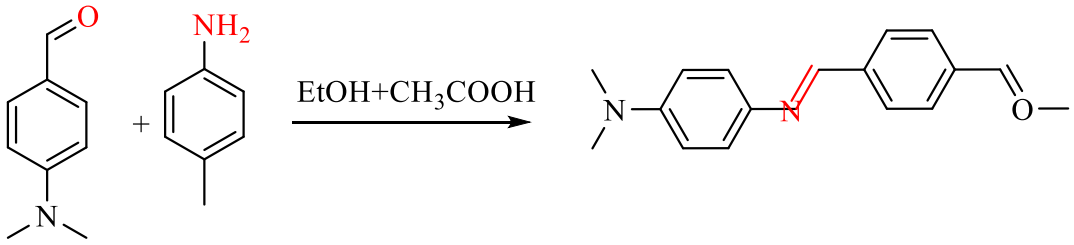
1-rasm.

Ak Kaura va hammualliflar biologik ahamiyatga ega bo‘lgan ayrim yangi Shiff asoslarining sintezi haqida ma’lumot berganlar. Sintez qilingan barcha birikmalarning in vitro antibakterial faolligi agar-diffuziyasi usuli yordamida baholangan. Tadqiqotda ikkita gram-musbat (Gram +) va ikkita gram-manfiy (Gram –) bakterial shtammlarga nisbatan antibakterial faollik tekshirilgan. Olingan natijalarga ko‘ra, antibakterial faollik uchun sinovdan o‘tkazilgan barcha birikmalar orasida 2-rasmda keltirilgan birikma *Bacillus subtilis* bakteriyasiga nisbatan eng yuqori faollikni namoyon etgan [4]



2-rasm

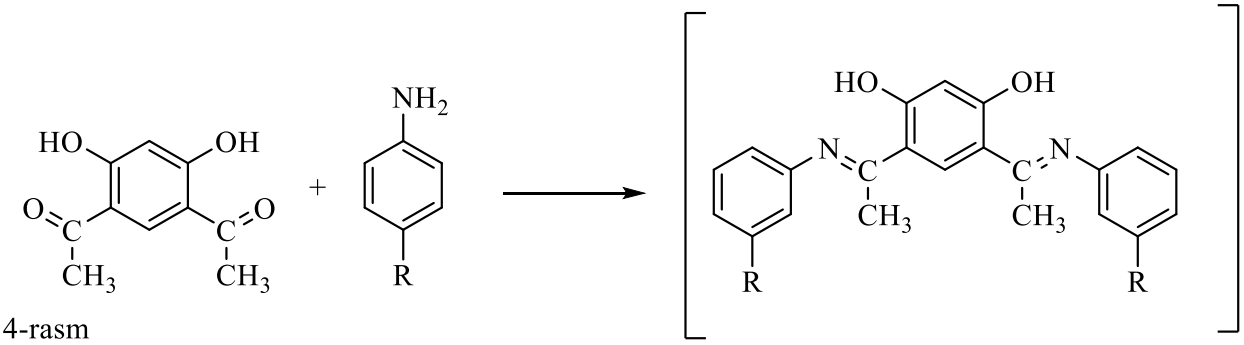
Ibrahim Razzaq va hammualliflar tomonidan 4-aminoantipirin asosida yangi bis-azometin tipidagi Shiff asosi ligandi sintez qilingan. Ligand p-dimetilaminobenzaldegid va p-aminobenzaldegid bilan ketma-ket kondensatsiya reaksiyalari natijasida olingan bo‘lib, uning tuzilishi 4-(4-(4-dimetilaminobenzilidenamino)benzilidenamino)-1,5-dimetil-2-fenilpirazol-3-on shaklida ifodalanadi. Ushbu ligand asosida Mn(II), Co(II) va Ni(II) metall ionlari bilan kompleks birikmalar sintez qilingan. Tadqiqot natijalari Shiff asoslari va ularning metall komplekslari koordinatsion kimyo hamda biologik faol birikmalar yaratishda muhim ahamiyatga ega ekanligini ko‘rsatadi [5].



3-rasm

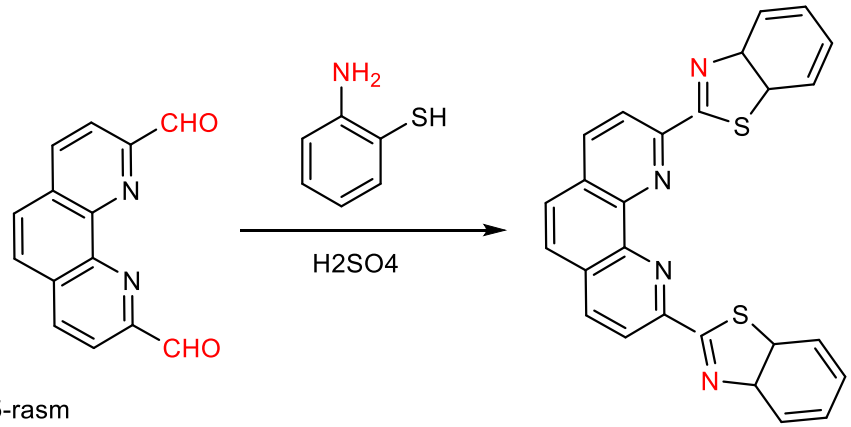
Pandya H. Jignesh va hamkorlari tomonidan yangi Shiff asosi ligandlari H_2L_1 va H_2L_2 sintez qilingan hamda ular asosida Cu(II), Ni(II) va Co(II) metall komplekslari olingan. Ligandlar 4,6-diatsetilrezorsinolning 4-bromoanilin va 4-metoksianilin bilan kondensatsiya reaksiyasi natijasida hosil qilingan.

Sintez qilingan metall komplekslarining biologik faolligi o‘rganilganda, xelatlangan birikmalar erkin ligandlarga nisbatan yuqori antimikrob ta’sir namoyon etishi aniqlangan. Bu holat metall ionlari bilan kompleks hosil bo‘lishi natijasida birikmalarning biologik membranalardan o‘tish qobiliyati va biologik nishonlarga ta’siri kuchayishi bilan izohlanadi [7].



4-rasm

Arifuzzaman Md. va hamkorlari tomonidan 1,10-fenantrolin-2,9-dikarbaldegid asosida yangi to‘rtta Shiff asosi ligandlari sintez qilingan. Ushbu sintezda 2-merkptoanilin, S-alkil va S-aril ditiyokarbazatlar hamda tiosemikarbazid kabi oltingugurt tutuvchi aminlar qo‘llanilgan.



5-rasm

Olingan natijalar Shiff asoslarining geteroatom (S, N) tutuvchi ligandlar sifatida koordinatsion kimyoda yuqori ahamiyatga ega ekanligini ko‘rsatadi. Bu turdagi ligandlar metall ionlari bilan barqaror komplekslar hosil qilish va biologik faollik namoyon etish qobiliyati bilan ajralib turadi [9].

XULOSA

Xulosa qilib aytganda, Shiff asoslari koordinatsion va tibbiy kimyoda muhim o‘rin tutuvchi biologik faol ligandlar sinfini tashkil etadi. Ular aldegidlar va birlamchi aminlarning oddiy kondensatsiya reaksiyasi orqali oson sintez qilinishi bilan ajralib turadi. Shiff asoslari hamda ularning metall komplekslari klinik, analitik, sanoat va katalitik sohalarda keng qo‘llanilib kelinmoqda. Mazkur sharhda ularning biologik faolliklari tizimli ravishda tahlil qilindi. Olingan natijalar Shiff asoslari hosilalari kelgusida yangi avlod farmakologik preparatlarni ishlab chiqishda istiqbolli manba bo‘lib xizmat qilishini ko‘rsatadi.

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