O‘zbekiston Respublikasi Sog‘liqni saqlash vazirligi
TOSHKENT FARMATSEVTIKA INSTITUTI
NOORGANIK, FIZIK VA KOLLOID KIMYO KAFEDRASI

6-MA’RUZA:

KOORDINATSION BIRIKMALAR KIMYOSI

Ma’ruza mualliflari:

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TOSHKENT-2022

REJA:

Mavzuning ma’ruza davomida yoritiladigan qismlari:

1. Kompleks birikmalarning olinishi;
2. Kompleks birikmalarning nomlanishi;
3. Kompleks birikmlarning eritmadagi holati;
4. Kompleks birikmlarning izomeriyasi;
5. Kompleks birikmlarning tuzilishi va geometriyasi;
6. Kompleks birikmlarning farmatsiyadagi ahamiyati.

Mavzuning talaba mustaqil o’zlashtirishi lozim bo’lgan qismlari:

1. **Kompleks birikmlar molekulyar tuzilishi aniqlash;**
2. **Kompleks birikmalar kimyoviy bog’ining tabiatini tushuntirish narazriyalari;**

2.1. Kristall maydon nazariyasi;

2.2. Valent bog‘lanishlar usuli;

2.3. Molekulyar orbitallar usuli (MOU).

ASOSIY ADABIYOTLAR:

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3. Э.Т.Оганесян, В.А.Попков, Л.И.Щербакова, А. К. Брель; под ред. Э. Т. Оганесяна. — М. : Юрайт, 2019. — 447 с. — Серия: Специалист.

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6. Шрайвер Д., Эткинс П.. Неорганическая химия. В 2-х т. Т 2/ Перевод с англ. А.И.Жирова, Д.О.Чаркина, С.Я. Истомина, М.Е.Тамм-Мир, 2004.-486 с.

7. Thomas R. Gilbert - Chemistry_ The Science in Context-Norton (2017)

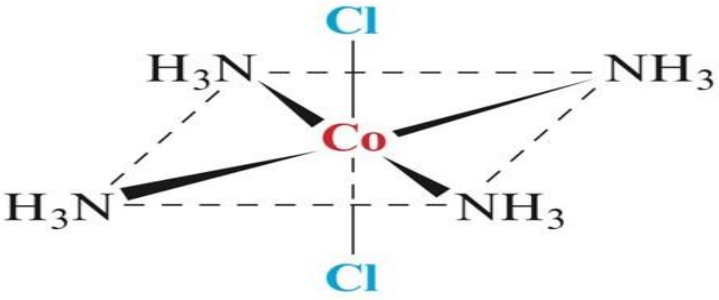
MAQSAD

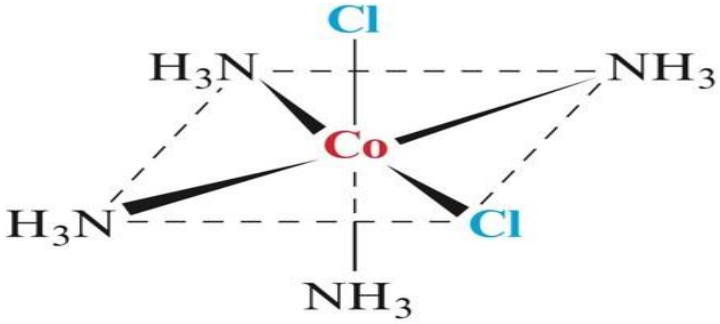
1. Quyidagi moddalar kompleks birikmami yoki tuz?

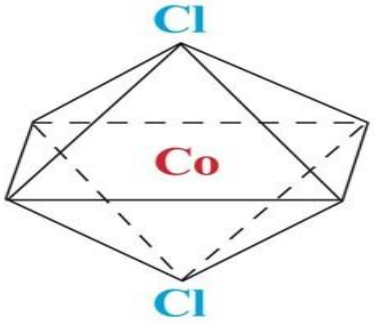
a) $Na_3Fe(SCN)_6$

b) $NaCr(CO_3)_2$

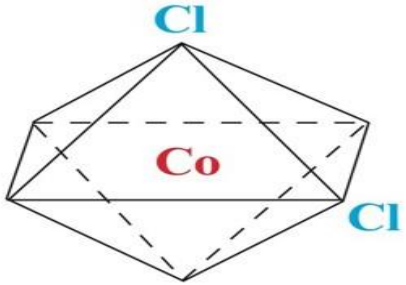
2. Quyidagilardan qaysi biri sis-izomer?





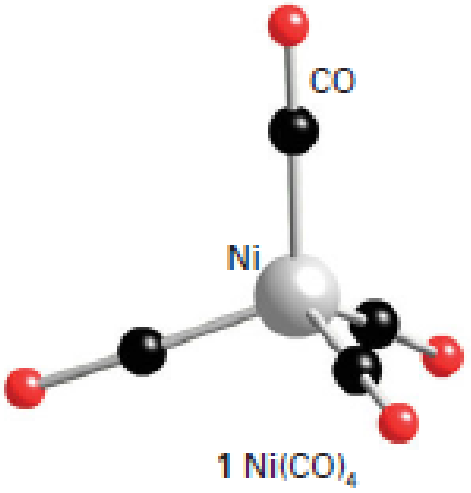


a



b

Kompleks birikmalarning olinishi



1). $NH_3 + HCl = [NH_4]Cl$

2). $CaCl_2 + 8NH_3 = [Ca(NH_3)_8]Cl_2$
kristall

3). $Cl_2 + 2NH_4OH = Cu(OH)_2\downarrow + 2NH_4Cl$
$Cu(OH)_2\downarrow + 4NH_4OH = [Cu(NH_3)_4](OH)_2 + 4H_2O$
ko'k-siyoh rang

4). $Fe(CN)_2 + 4KCN = K_4[Fe(CN)_6]$ Sariq qon tuzi
$Fe(CN)_3 + 3KCN = K_3[Fe(CN)_6]$ Qizil qon tuzi

5). $CrCl_3 + 6H_2O \rightarrow [Cr(H_2O)_6]Cl_3$

Kompleks birikmalarni kislota-asos xossasi bo'yicha tasnifi

To'q-yashil rangli $[Cr(H_2O)_5Cl]Cl_2$

Och-yashil rangli $[Cr(H_2O)_4Cl_2]Cl$

1. Asoslar	2. Kislotalar	3. Tuzlar
$[Ag(NH_3)_2]OH$	$H[AuCl_4]$	$[Ni(NH_3)_4]SO_4$
$[Cu(NH_3)_2](OH)_2$	$H_2[SnF_6]$	$Na_3[AlF_6]$
$[Ni(NH_3)_4](OH)_2$	$H_2[PtCl_6]$	$K_3[Fe(CN)_6]$

4. Noelektrolitlar $[Pt(NH_3)_4Cl_2]$, $[Ni(CO)_4]$, $[Fe(CO)_5]$.

Verner nazariyasi

1893-yil Alfred Verner:

1. Ko’p elementlar asosiy va qo’shimcha valentliklar namoyon qiladi;
2. Har bir element o’zining asosiy va qo’shimcha valentliklarini to’yintirishga harakat qiladi;
3. Markaziy atomning qo’shimcha valentliklari fazoning ma’lum nuqtalariga yo’nalgan.

Koordinatsion son 2 dan 12 gacha bo’lishi mumkin.

Kompleks birikmalar markazida kompleks hosil qiluvchi ion, metallar:

(Ag^{+}, Cu^{2+}, Cr^{3+}, Fe^{2+}, Fe^{3+}, Pt^{2+}, Pt^{4+}

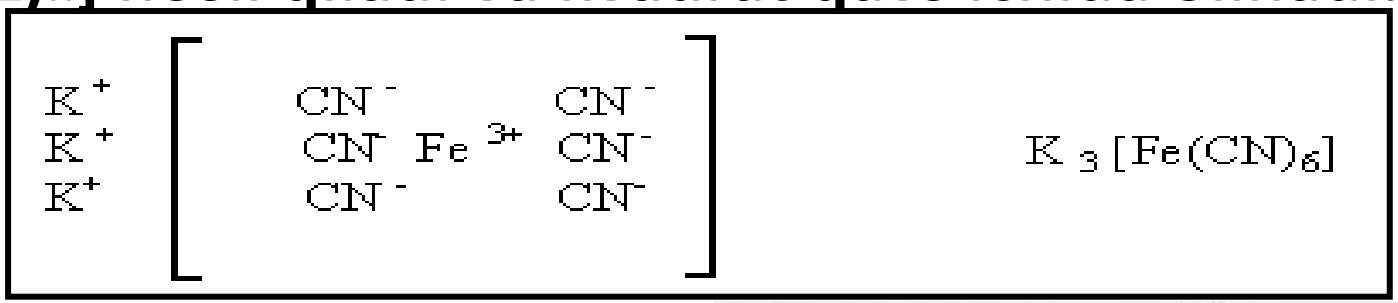
ba’zan metallmaslar (N, Si, B, O).

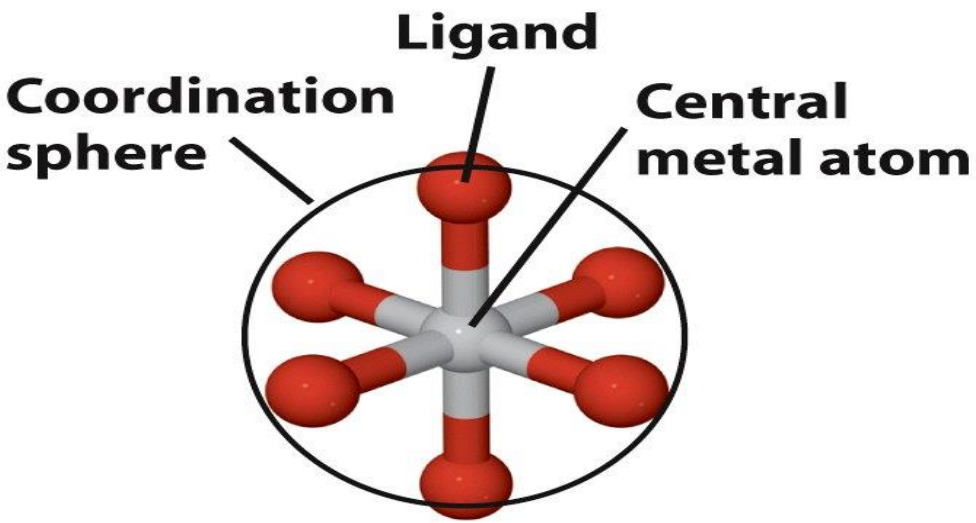
Alfred Verner 1866-1919
1913 y. nobel mukofoti laur.

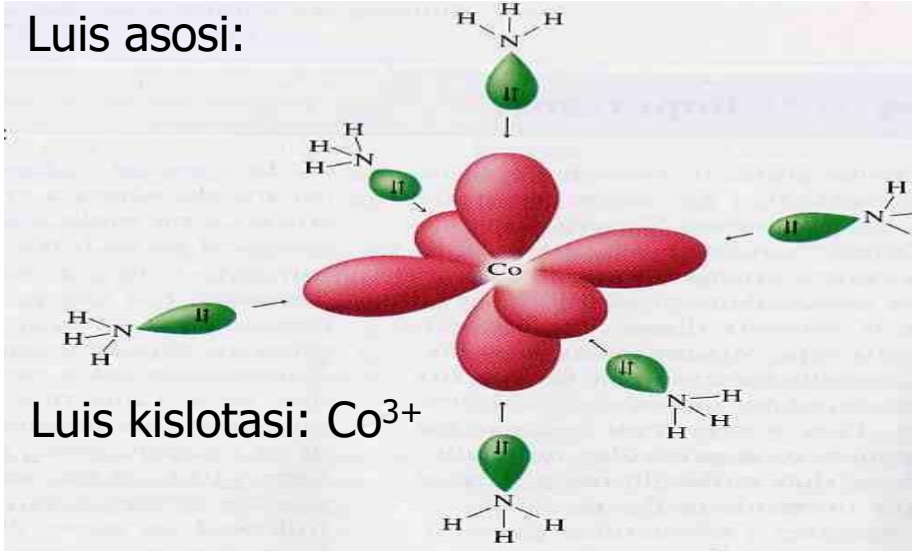
Kompleks birikmalarning tuzilishi

Kompleks hosil qiluvchi ionlar bilan bevosita bog'langan neytral molekulalar (H_2O, NH_3, CO, NO, Cl_2, I_2 и др.), hamda ionlar (F-, Cl-, SO_4^{2-}, NO^{2-}, NO^{3-}, OH-, CN-, CNS-, SO_3^{2-}, CO_3^{2-} , $C_2O_4^{2-}$ и др.) ligandlar deyiladi.

Kompleks hosil qiluvchi ion va ligandlar ichki sferani $[Me(L)_n]$ hosil qiladi va kvadrat qavs ichida olinadi.







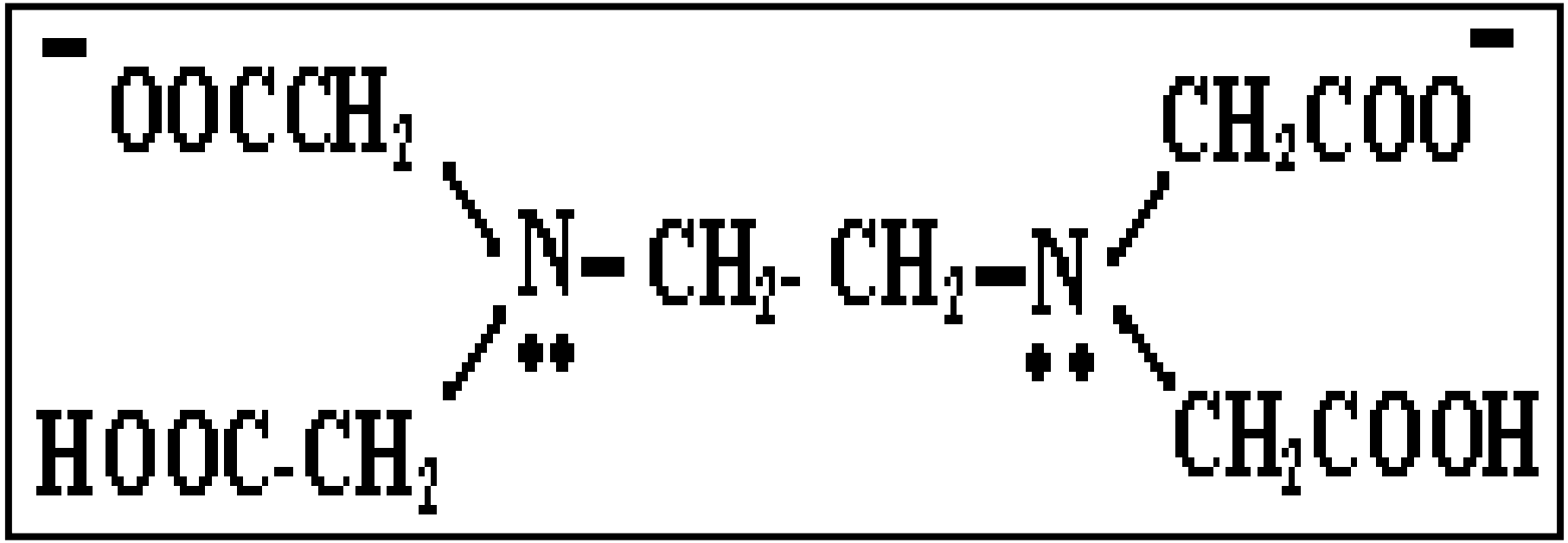
Ligandlarni tasnifi

Monodentant ligandlar: Cl^- NO_2^-, NO_3^-, OH^-, CN^-, CNS^-.

Bidentant ligandlar: etilendiamin (NH_2-$CH_2CH_2NH_2$), glitsin (NH_2CH_2COO-), oksalat, karbonat.

Tridentant ligandlar: PO_4^{3-}

Tetradentant ligandlar: etilendiammintetrasirka kislotasining dinatriyli tuzi (trilon B):



KOMPLEKS BIRIKMALARNING NOMLANISHI

1. Dastlab kation, keyin anion nomlanadi.
2. Ligandlar soni tarrorlansa, yunoncha raqamlarning so'z bilan yoziladigan quyidagi qo'shimchalarini qo'shib hosil qilinadi di (2), tri (3), tetra (4), penta (5), geksa (6) hamda dastlab anion ligandlar, so'ngra neytral ligandlar nomi o'qiladi.
3. Anion ligandlarning oxiriga "o" qo'shimchasi qo'shildi.
4. F^- - ftoro, Cl^- - xloro, Br^- - bromo, I^- - yodo, CN^- - siano, SO_4^{2-} - sulfato, $S_2O_3^{2-}$ - tiosulfato, CO_3^{2-} - karbonato, CH_3COO^- - atsetato, OH^- - gidrokso, -O-O- perokso, H - gidrido.
5. Neytral ligandlar uchun: suv - akva, ammiak – ammin, CO - karbonil, NO - nitrozil, S - tio va h.k.
6. Kation kompleks birikmalarni nomlashda dastlab ligandlar soni va nomi o'qilib, so'ngra kompleks hosil qiluvchining o'zbekcha nomi o'qiladi va qavs ichida uning valentligi yoki oksidlanish darajasi ko'rsatiladi. Ligandlarni nomlashda avval anion, so'ngra neytral ligandlar va oxirida tashqi sfera ionlari o'qiladi. Ular ikki so'zni hosil qiladi:

Eng keng tarqalgan ligandlarning nomlari

Лиганд	Название лиганда	Лиганд	Название лиганда
en	*Этилендиамин*	O^{2-}	*Оксо*
H_2O	*Аква*	H^-	*Гидридо*
NH_3	*Аммин*	H^+	*Гидро*
CO	*Карбонил*	OH^-	*Гидроксо*
NO	*Нитрозил*	SO_4^{2-}	*Сульфато*
NO^-	*Нитрозо*	CO_3^{2-}	*Карбонато*
NO_2^-	*Нитро*	CN^-	*Циано*
N_3^-	*Азидо*	NCS^-	*Тиоционато*
S_2^{2-}	*Дисульфидо*	$C_2O_4^{2-}$	*Оксалато*
S^{2-}	*Тио (или сульфидо)*	$C_5H_5^-$	*Циклопентадиенил*
O_2^{2-}	*Пероксо*	ClO^-	*Гипохлорито*
P^{3-}	*Фосфидо*	ClO_2^-	*Хлорито*
NH_2^-	*Амидо*	ClO_3^-	*Хлорато*
HS^-	*Тиоло (меркапто)*	O_2^-	*Надпероксо*
HO_2^-	*Гидропероксо*	HCO_3^-	*Гидрокарбонато*
NH^{2-}	*Имидо*	OCN^-	*Цианато*

$[Cu(NH_3)_4]SO_4$ – tetraamminmis (II) sulfat;

$[Pt(NH_3)_5Cl]Cl_3$ – xloropentaamminplatina (IV) xlorid;

$[Co(NH_3)_5Br]SO_4$ – bromopentaamminkobalt (III) sulfat.

Agar markaziy atom o'zgarmas oksidlanish darajasiga ega bo'lsa, unda valentlik ko'rastilmasa ham bo'ladi (Ag, Al, Mg, Zn):

$[Ag(NH_3)_2]NO_3$ – diamminkumush nitrat;

$[Al(H_2O)_6]Cl_3$ – geksaakvaalyuminiy xlorid.

Anion komplekslarni nomlashda avval tashqi sfera kationi o'qilib, so'ngra ligandlar soni va nomi o'qiladi. Oxirida kompleks hosil qiluvchining nomiga – "at" qo'shimchasi qo'shiladi va oksidlanish darajasi ko'rsatiladi. Anionlarni nomlashda dastlab oddiy anion, keyin esa ko'p atomli anionlar aytiladi:

$K[Ag(CN)_2]$ – kaliy disianoargentat;

$K_3[Fe(CN)_6]$ – kaliy geksasianoferrat (III);

$K_4[Fe(CN)_6]$ – kaliy geksasianoferrat (II);

$H[CuCl_2]$ – vodorod (I) dixlorokuprat;

$K_2[Be(OH)_4]$ – kaliy tetragidroksoberillat (II);

$Na[BiJ_4]$ – natriy tetrayodovismutat (III);

$(NH_4)_2[Pt(OH)_2Cl_4]$ – ammoniy tetraxlorodigidroksoplatinat (IV);

$Ba[Cr(NH_3)_2(SCN)_4]_2$ – bariy tetrarodanidodiamminxromat (III).

Neytral komplekslar:

$[Cr(H_2O)_3PO_4]$ – fosfatotriakvaxrom (III);

$[Cu(NH_3)_2(SCN)_2]$ – dirodanidodiamminmis (II);

$[Fe(CO)_5]$ – pentakarbonil temir;

$[Pt(NH_3)_2Cl_4]$ – tetraxlorodiamminplatina (IV).

KOMPLEKS BIRIKMLARNING TUZILISHINI ANIQLASH

1. $CoCl_3*5NH_3 + 2\ AgNO_3 \rightarrow 2$ mol AgCl

Uning tuzilishi: $[Co(NH_3)_5Cl]Cl_2$

2. $PtCl_4*6NH_3 + AgNO_3 \rightarrow 4$ mol AgCl

Uning tuzilishi: $[Pt(NH_3)_6]Cl_4$

3. $CrCl_3*6H_2O + AgNO_3 \rightarrow 3$ mol AgCl

Uning tuzilishi: $[Cr(H_2O)_6]Cl_3 \leftrightarrow [Cr(H_2O)_6]^{3+} + 3Cl^-$

4. $PtCl_4*2NH_3 + AgNO_3 \rightarrow$ cho'kma hosil bo'lmaydi.

Uning tuzilishi va nomi: $[Pt(NH_3)_2Cl_4]$ diamintetraxloroplatina (IV)

5. $PtCl_4*2KCl + AgNO_3 \rightarrow$ cho'kma hosil bo'lmaydi.

Uning tuzilishi va nomi: $K_4[PtCl_6]$ kaliy geksaxloroplatina (IV)

KB larning molyar elektr o’tkazuvchanligi

KB	Ionlar soni	Molyar elektr o’tazuvchanlik $Om^{-1}{}_{*}sm^{2}mol^{-1}(\mu)$
$[Ag(NH_3)_2]Cl$	2	100
$K_2[PtCl_4]$	3	250
$Cr(H_2O)_6]Cl_3$	4	400
$K_4[(Fe(CN)_6]$	5	500

$PdCl_5$*$ReCl_5$ 2 ta ion bor.
$[PdCl_4]$+$[ReCl_6]$ - formula IQ, kriometriya, rengenostruktaviy analiz usuli bilan

Kompleks birikma turlari

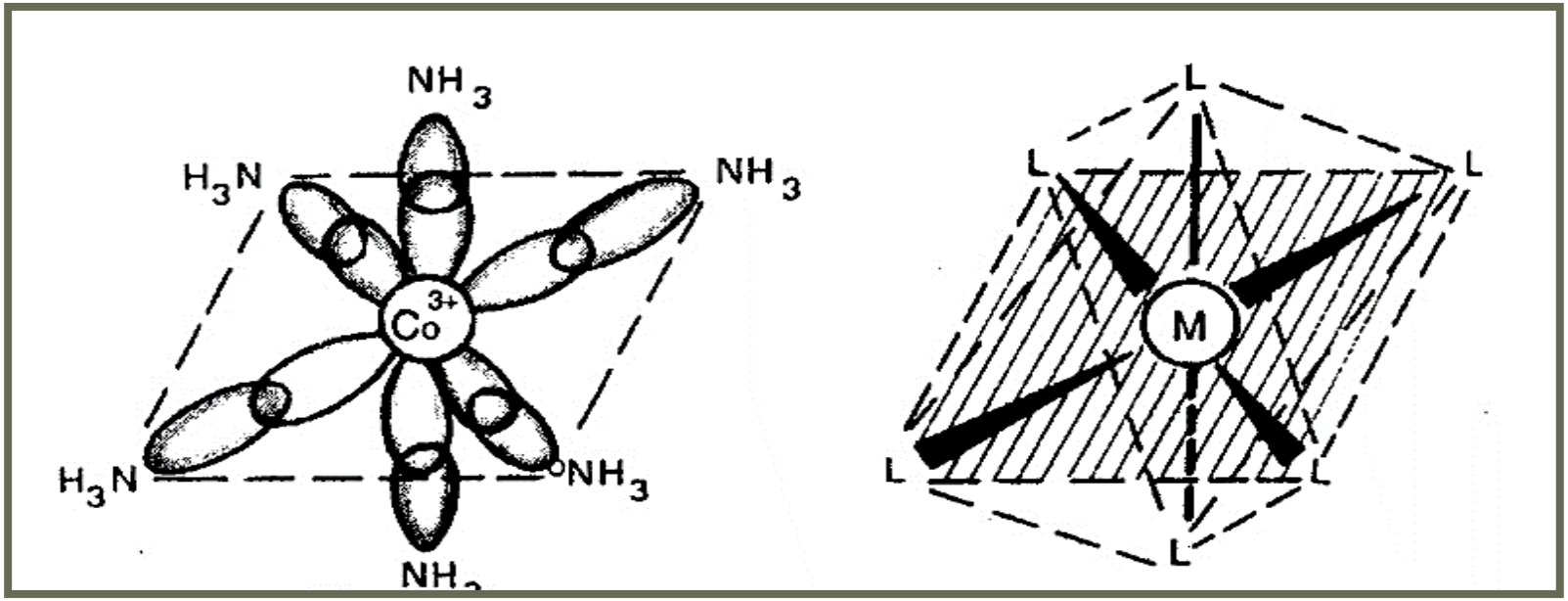
1. Ammiakatlar – ligandlar ammiak va amminlar.

$[Cu(NH_3)_4]SO_4$, $[Ag(NH_3)_2]Cl$,
$[Ni(NH_3)_4]SO_4$, $K_3[Co(NH_3)_6]$.

2. Akvakomplekslar – ligand suv.

$[Co(H_2O)_6]Cl_3$ –
$[Al(H_2O)_6]Cl_3$ –
$[Cr(H_2O)_6](NO_3)_3$ –

$[Cu(H_2O)_4]SO_4*H_2O$ –
$[Fe(H_2O)_6]SO_4*H_2O$ –



3. Asidokomplekslar – ligandlar kislota qoldiqlari.

$K_4[Fe(CN)_6]$ –

$K_2[Pt(NO_2)_6]$ –

Bu kabi birikmalarga qo'sh tuzlar kiradi:

$K_4[Fe(CN)_6]$	$Fe(CN)_2*4KCN$
$K_3[Fe(CN)_6]$	$Fe(CN)_3*3KCN$
$K_2[PtCl_6]$	$PtCl_4*2KCl$
$K_2[PtCl_4]$	$PtCl_2*2KCl$

4. Kompleks kislotalar:

$H_2[SiF_6]$ –

$H_2[CoCl_4]$ –

$H_2[PtCl_6]$ –

5. Gidroksokomplekslar – ligandlar gidroksil ionlar:

$Na_2[Sn(OH)_4]$ –

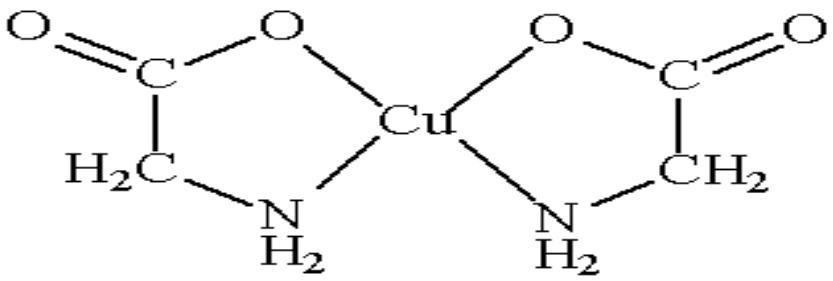
$Na_3[Al(OH)_6]$ –

$Na[Al(H_2O)_2(OH)_4]$ –

Siklik yoki xelat komplekslar

Etilendiammin $[Cu(NH_2CH_2CH_2NH_2)_2]Cl_2$, Glitsin:

$$Cu(OH)_2 + 2NH_2CH_2COOH = [Cu(NH_2CH_2\text{-}COO)_2] + H_2O$$



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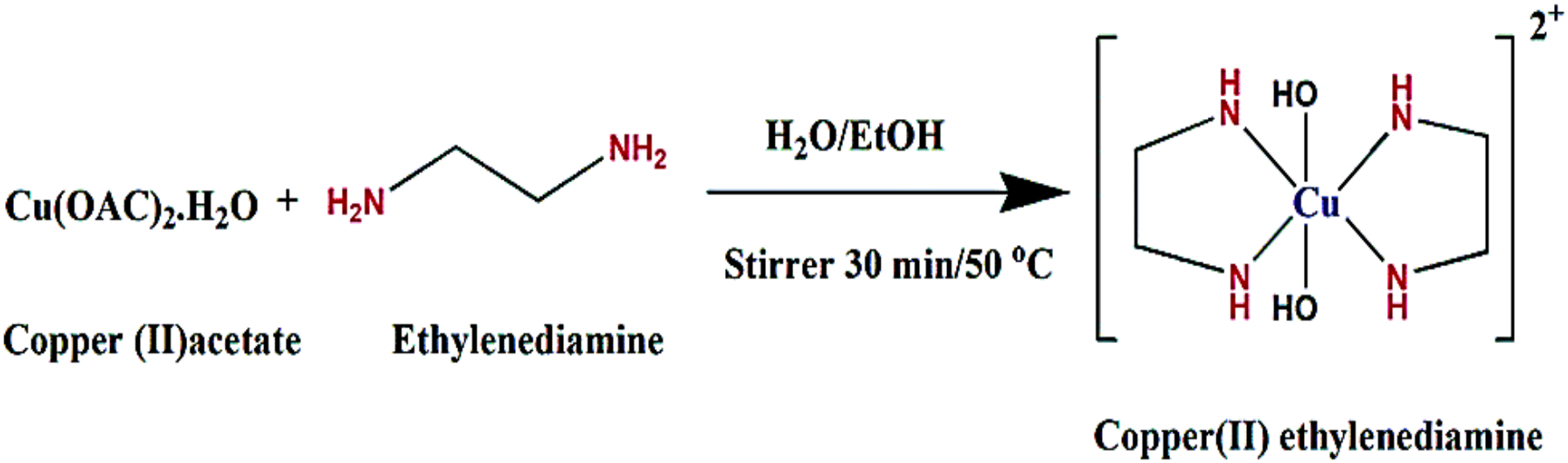
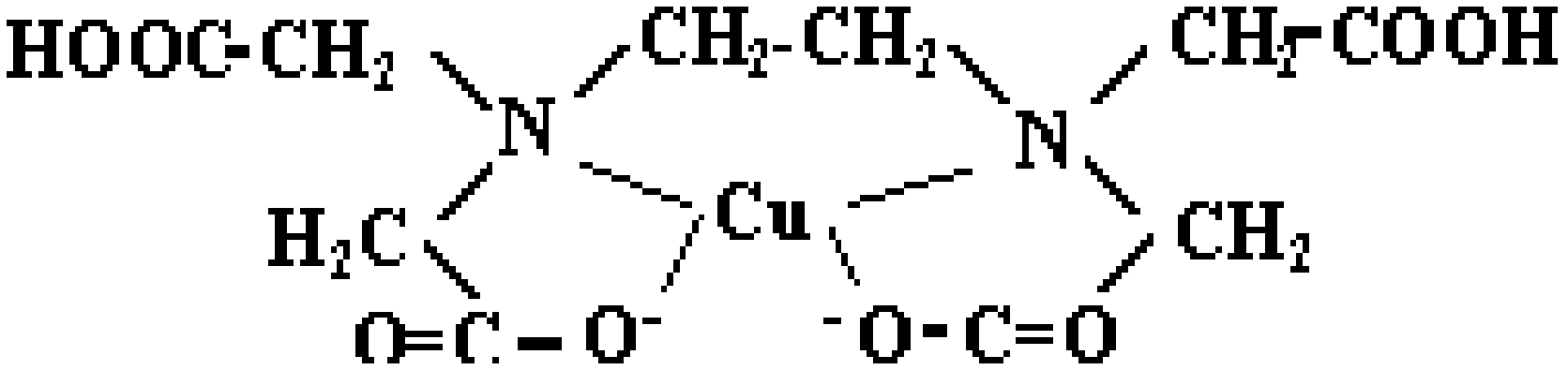
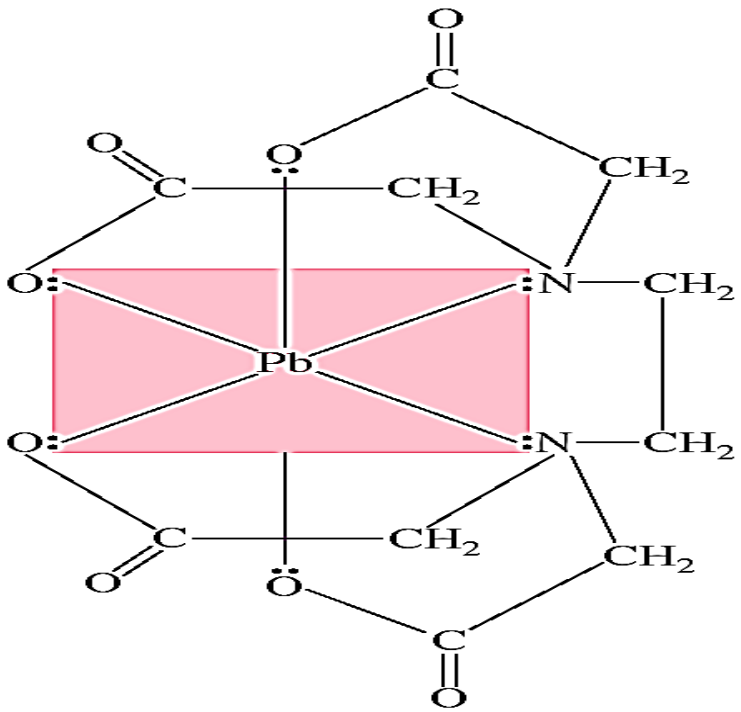
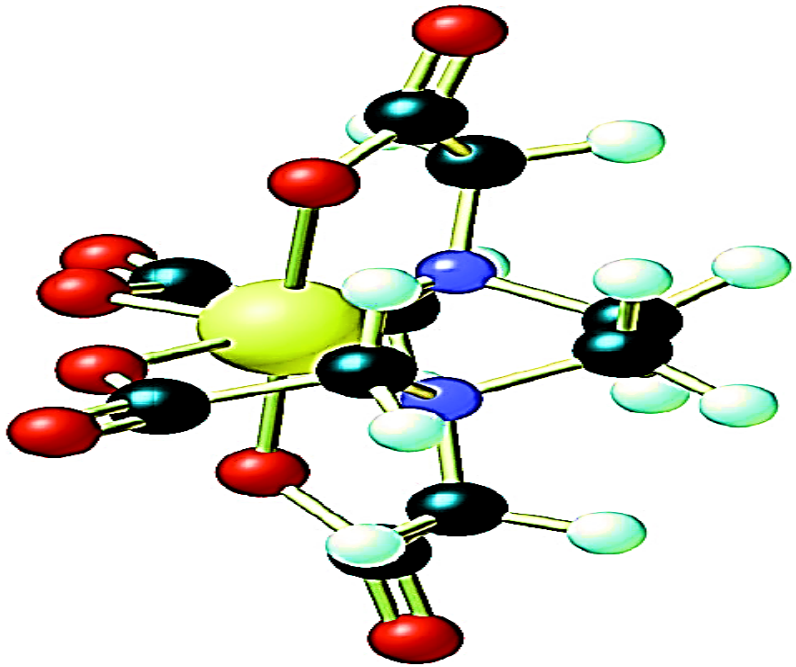


Cu ning trilon B bilan kompleks birikmasi



Trilon-B ning kompleksi $[Pb(EDTA)]^{2-}$





KB eritmadagi holati

$$[Cu(NH_3)_4]SO_4 = [Cu(NH_3)_4]^{2+} + SO_4^{2-}$$

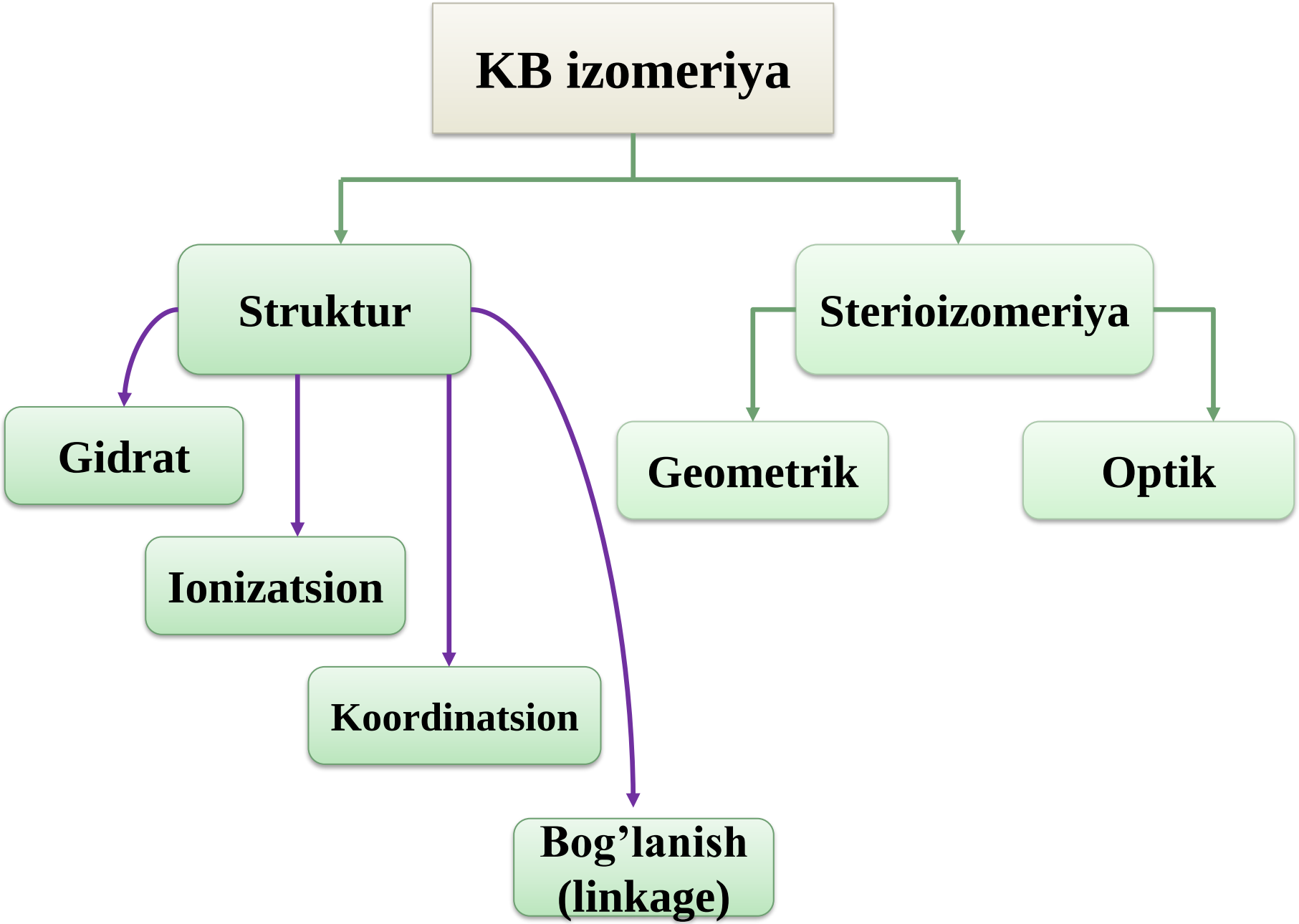
$$K_4[Fe(CN)_6] = 4K^+ + [Fe(CN)_6]^{4-}$$

$$[Cu(NH_3)_4]^{2+} = Cu^{2+} + 4NH_3$$

$$[Fe(CN)_6]^{3+} = Fe^{3+} + 6CN^-$$

$$K_{beq} = \frac{[Cu^{2+}]*[NH_3]^4}{\{[Cu(NH_3)_4]^{2+}\}} \qquad K_{beq} = \frac{[Fe^{3+}]*[CN^-]^6}{\{[Fe(CN)_6]^{3-}\}}$$

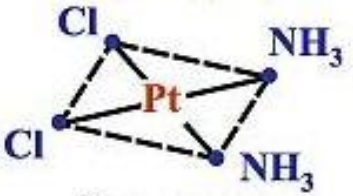
$$K_{barkarorlik} = \frac{\{[Cu(NH_3)_4]^{2+}\}}{[Cu^{2+}]*[NH_3]^4} = \frac{1}{K_{beqaror}}$$


KB izomeriya
Struktur
Sterioizomeriya
Gidrat
Ionizatsion
Koordinatsion
Bog’lanish (linkage)
Geometrik
Optik

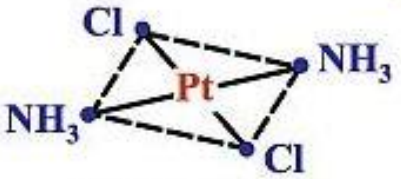
ИЗОМЕРИЯ КОМПЛЕКСНЫХ СОЕДИНЕНИЙ

Изомерия

- **Структурная изомерия**
  - **Гидратная изомерия**
    - $[Cr(H_2O)_6]Cl_3$ серо - фиолетового цвета
    - $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$ зелено - фиолетового цвета
    - $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$ темно - зеленого цвета
  - **Ионизационная изомерия**
    - $[Co(NH_3)_5Br]SO_4$ красно - фиолетового цвета
    - $[Co(NH_3)_5SO_4]Br$ красного цвета
  - **Координационная изомерия**
    - $[Pt(NH_3)_4]\ [PdCl_4]$ и $[Pd(NH_3)_4]\ [PtCl_4]$
    - $[Co(NH_3)_6]\ [Cr(CN)_6]$ и $[Cr(NH_3)_6]\ [Co(CN)_6]$
- **Стереоизомерия**
  - **Геометрическая изомерия (цис- и транс-)**
    - Плотно-квадратный комплекс 1 $Pt(NH_3)_2Cl_2$



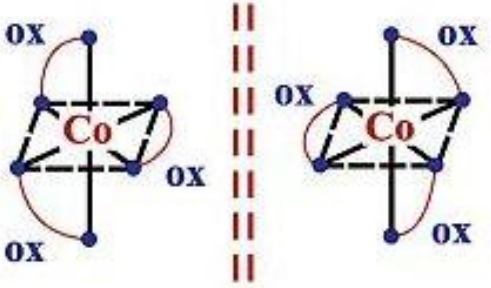
Цис - изомер (оранжевого цвета)



Транс - изомер (желтого цвета)

  - **Оптическая изомерия**

Зеркальная плоскость



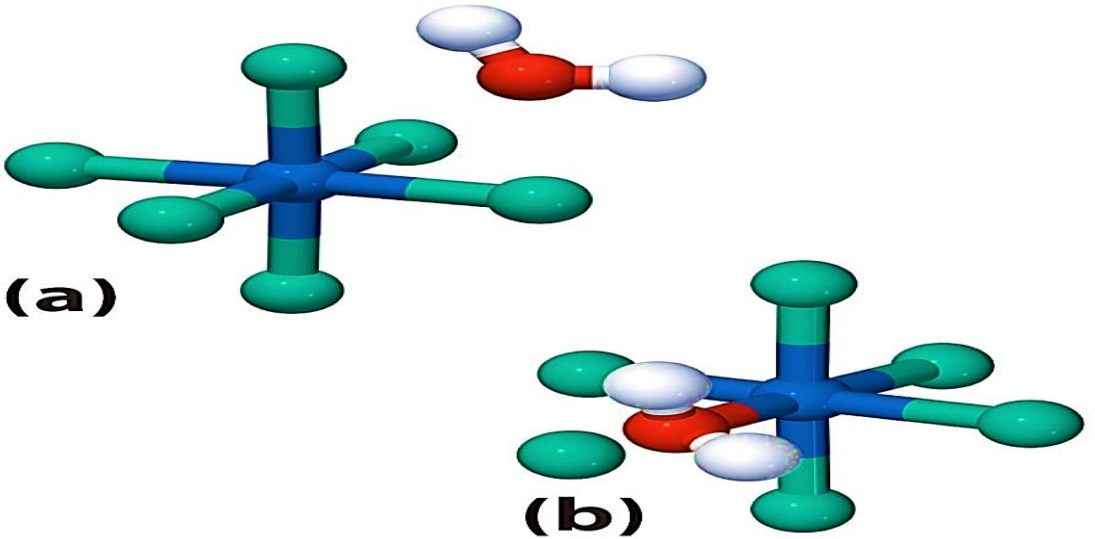
Оптические изомеры октаэдрического аниона $[Co(ox)_3]^{3-}$

454080, Челябинск, пр. Ленина, 76, ЮУрГУ, ЧРЦВШ, т. (3512)65-59-59, www.cnit.susu.ac.ru

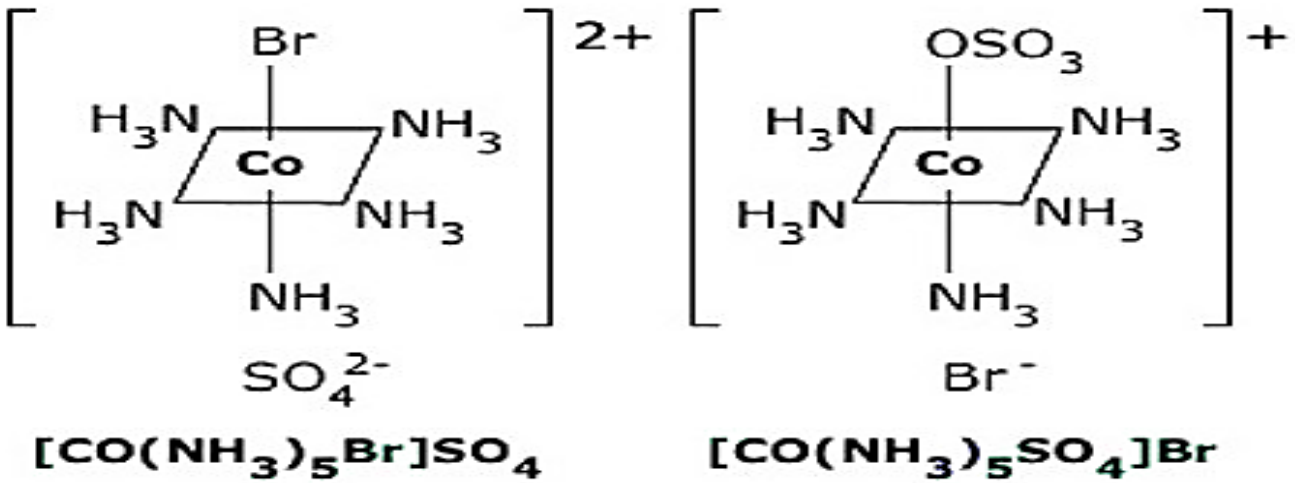
Ligandlarning joylashishiga ko'ra izomeriya:

1) Gidrat izomeriya:

$[Cr(H_2O)_6]Cl_3$; $[Cr(H_2O)_5Cl]Cl_2*H_2O$; $[Cr(H_2O)_4Cl_2]Cl*2H_2O$.



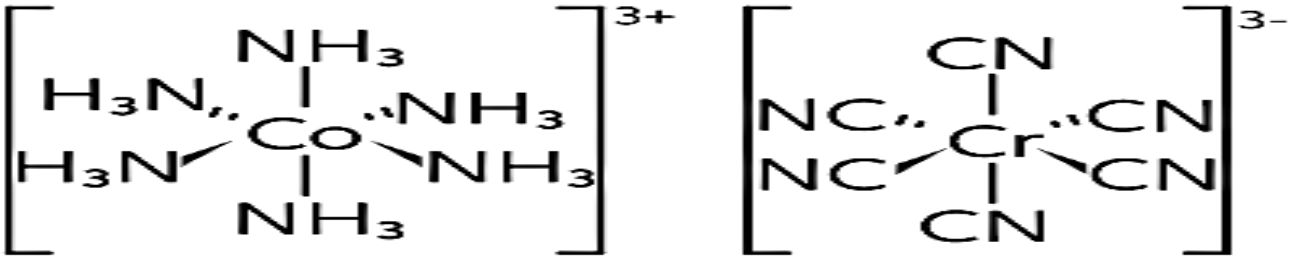
2) Ionizatsion izomeriya: $[Pt(NH_3)_4Cl_2]Br_2$; $[Pt(NH_3)_4Br_2]Cl_2$.



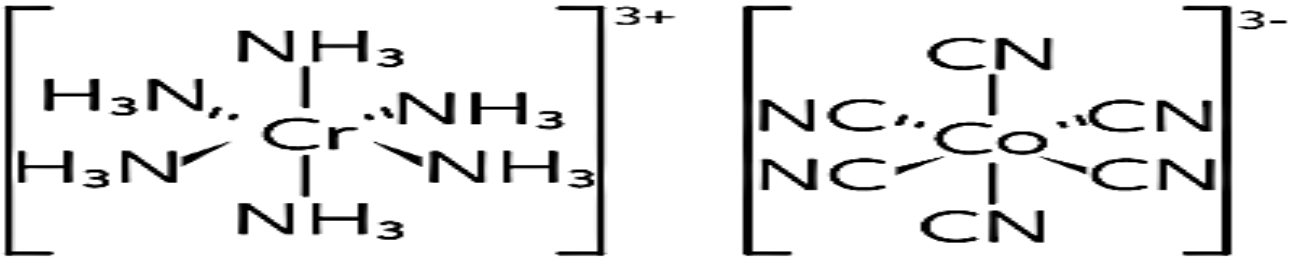
Ligandlarning joylashishiga ko'ra izomeriya:

3) Koordinatsion izomeriya:

$[Co(NH_3)_6]*[Cr(CN)_6]$; $[Cr(NH_3)_6]*[Co(CN)_6]$.



$[Co(NH_3)_6][Cr(CN)_6]$



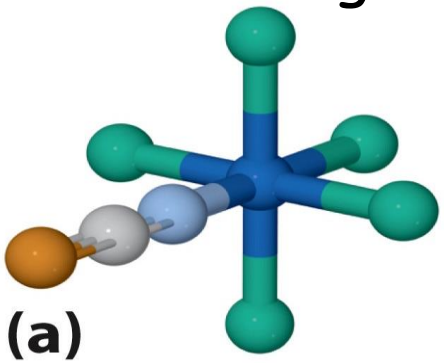
$[Cr(NH_3)_6][Co(CN)_6]$

4) Dimerlar, tetramerlar, polimerlar ko'rinishidagi izomerlar:

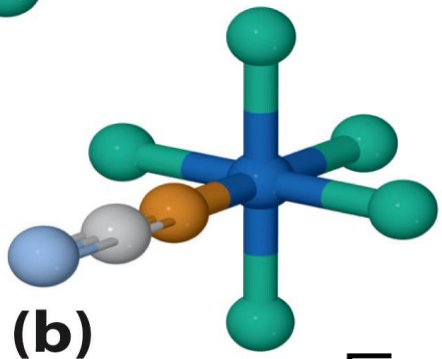
$[Pt(NH_3)_2Cl_2]$; $[Pt(NH_3)_4][PtCl_4]$.

5. Bog'lanish (linkage) izomeriyasi

Kompleks ionning tarkibi bir xil, ammo ligandlardan kamida bittasining birikish nuqtasi farq qiladi.

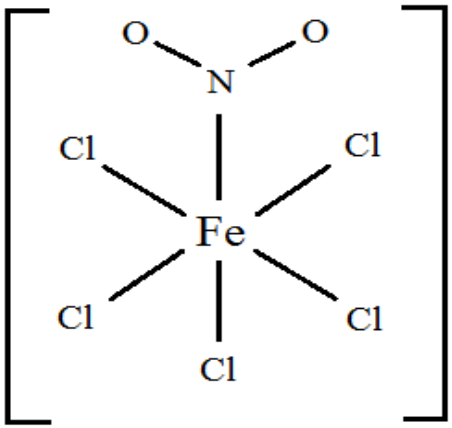


Me ioni N atomi bilan bog'langan

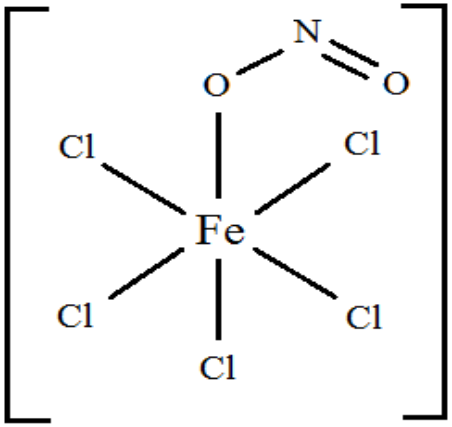


Me ioni O atomi bilan bog'langan

LINKAGE ISOMERS



$[FeCl_5(NO_2)]^{3-}$



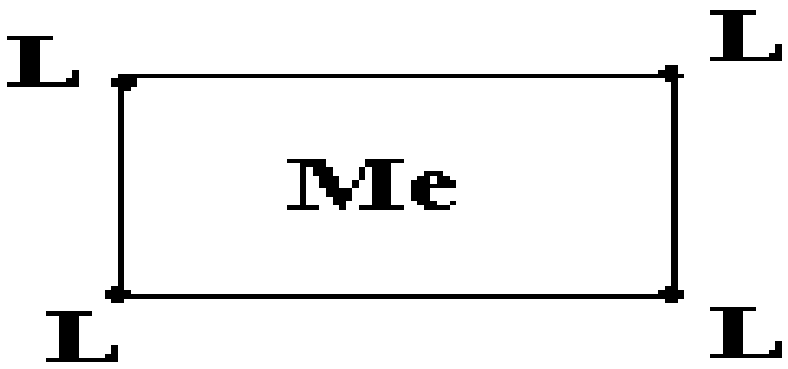
$[FeCl_5(ONO)]^{3-}$

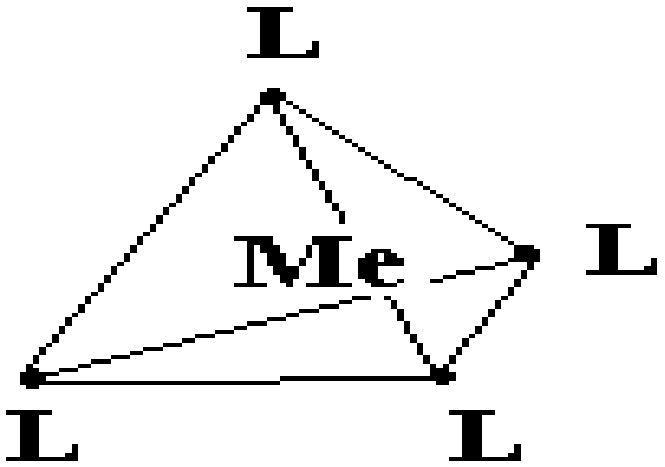
Geometrik izomeriya

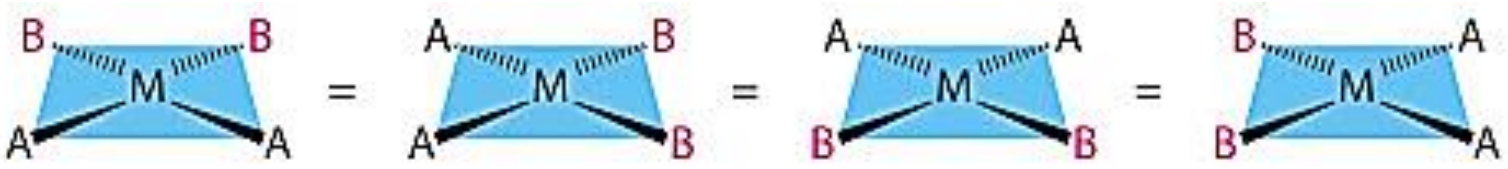
K.s. 2 chiziqli tuzilish:

L -------Me------- L

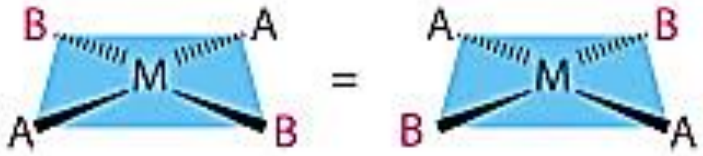
K.s. 4 tekis kvadrat yoki tetraedr:





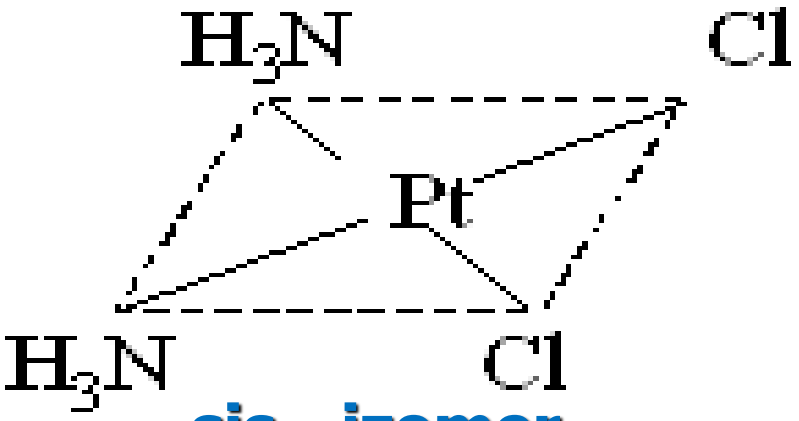


MA_2B_2 square planar complex, *cis* isomer

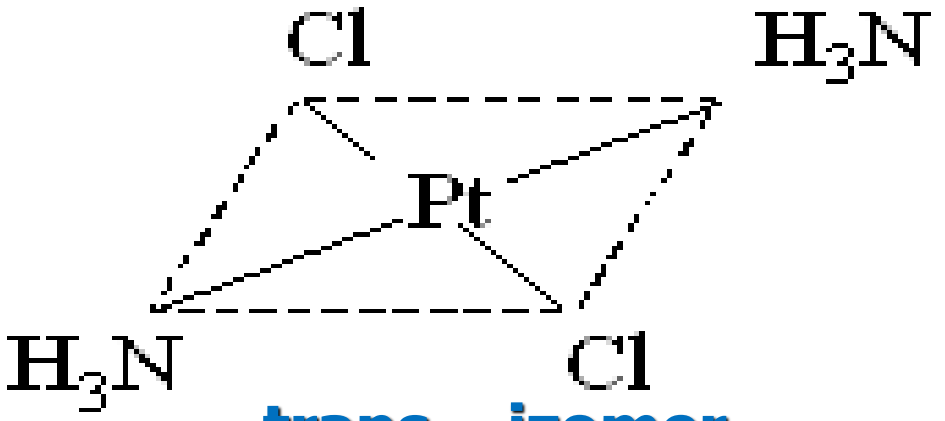


MA_2B_2 square planar complex, *trans* isomer

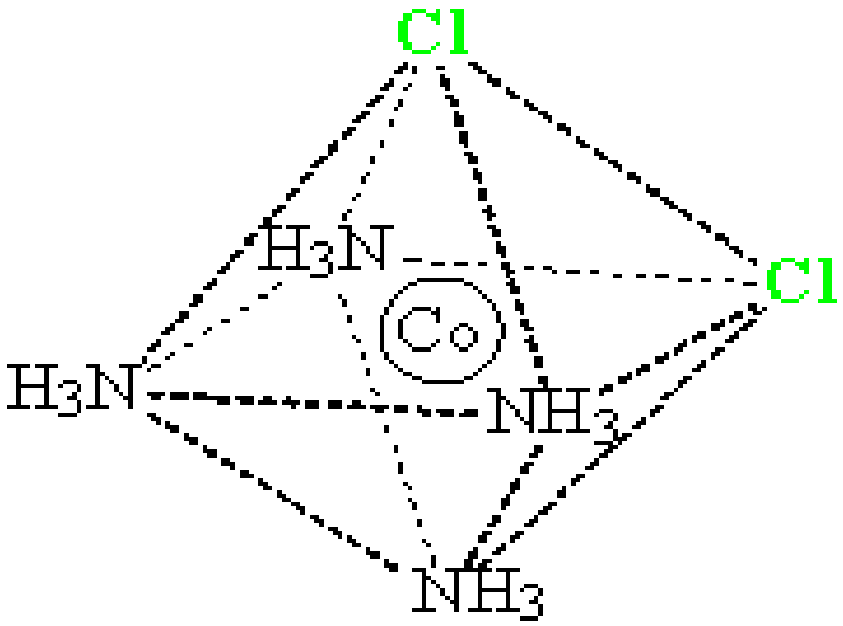
Tekis kvadrat shakliga: $[Pt(NH_3)_2Cl_2]$

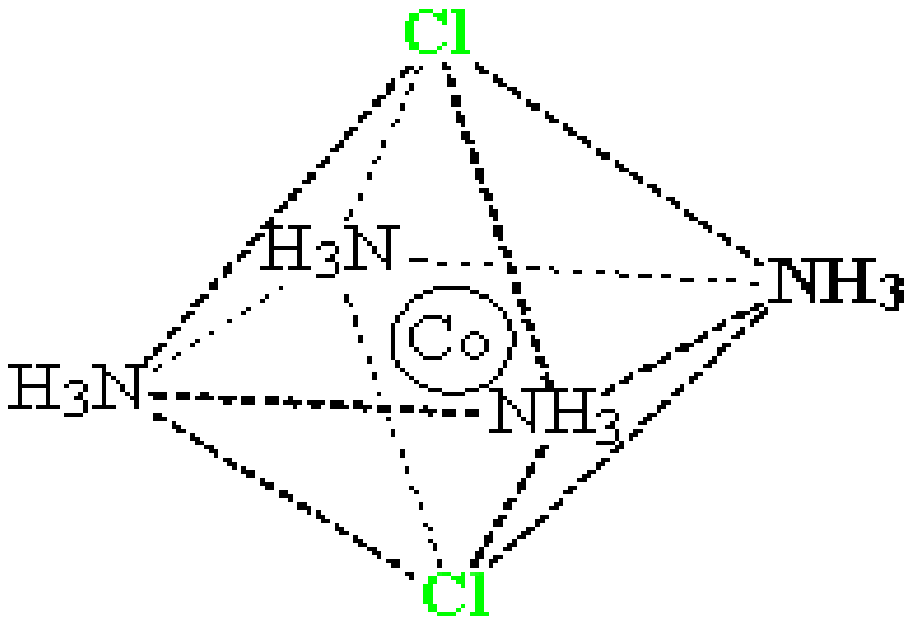


sis - izomer

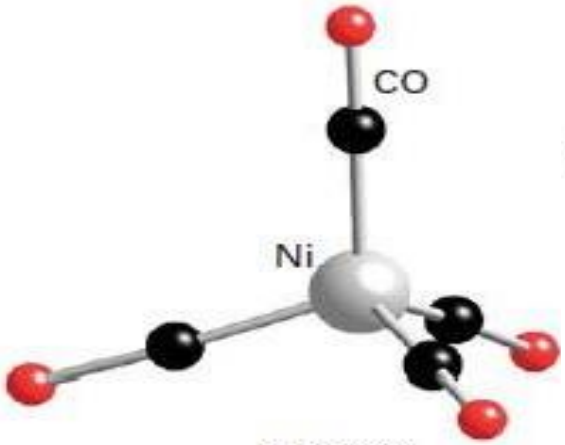


trans – izomer

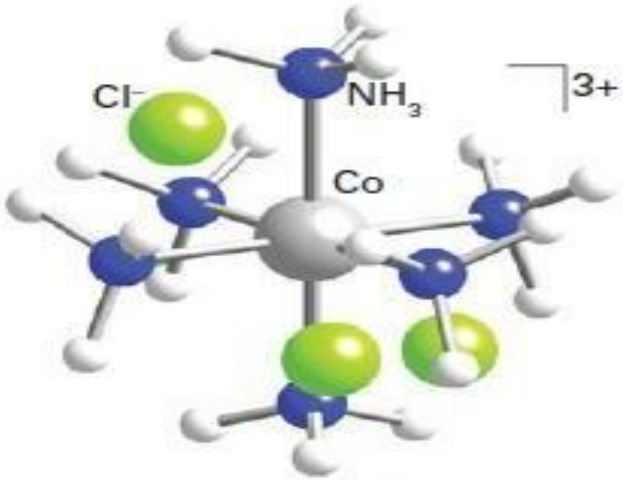




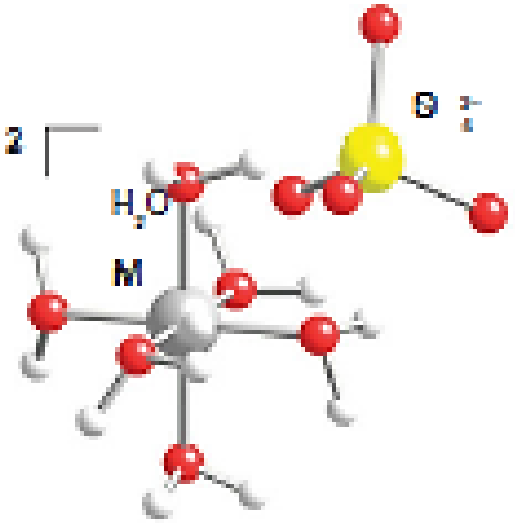
Izomerlar: eruvchanligi, rangi, dipol momenti, reaksiyaga kirishish qobiliyati bilan bir biridan farq qiladi.



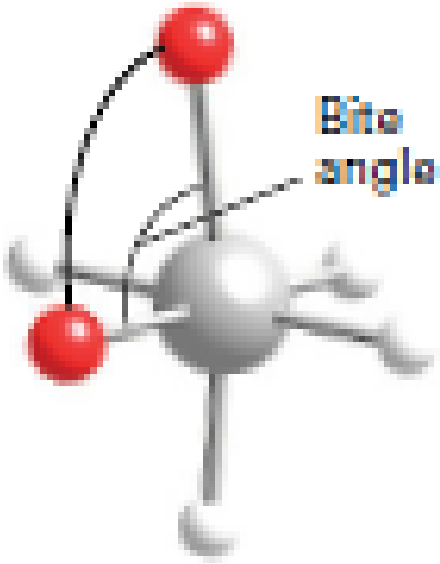
1 $Ni(CO)_4$



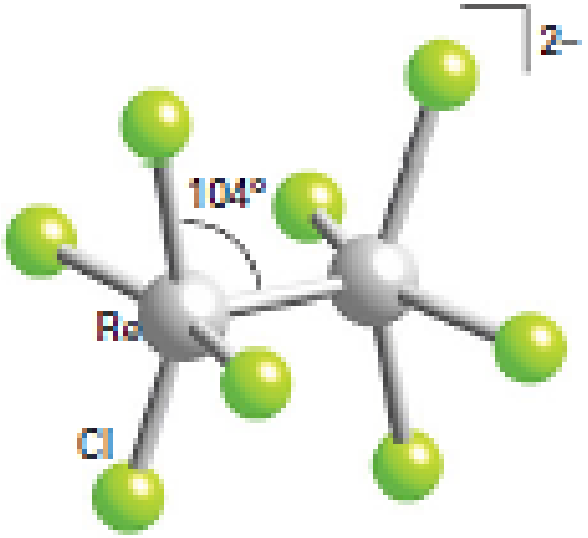
2 $[Co(NH_3)_6]Cl_3$



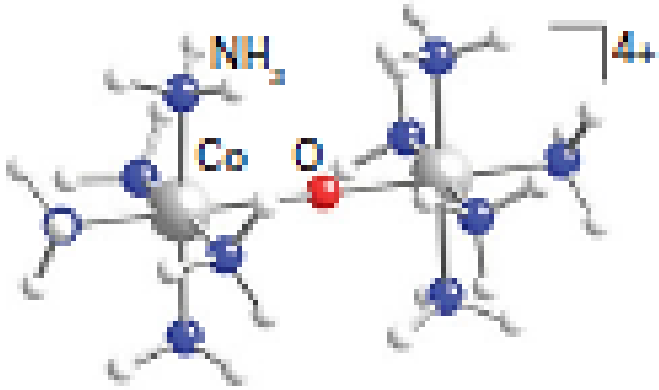
3 $[Mn(OH_2)_6]SO_4$



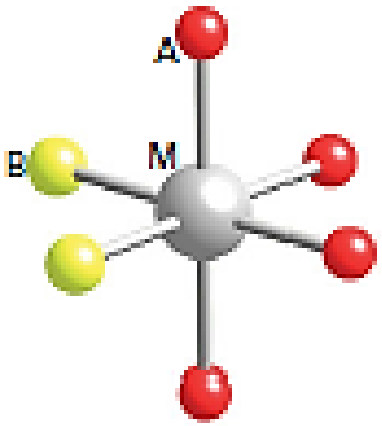
10



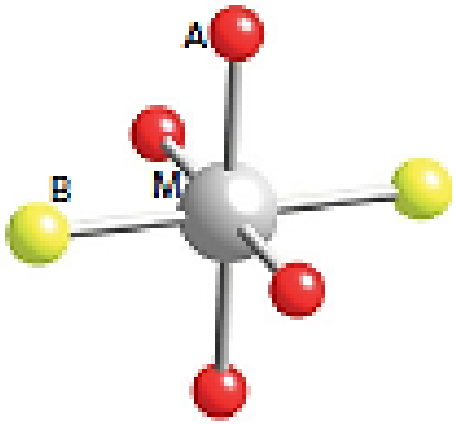
11 $[Re_2Cl_8]^{2-}$



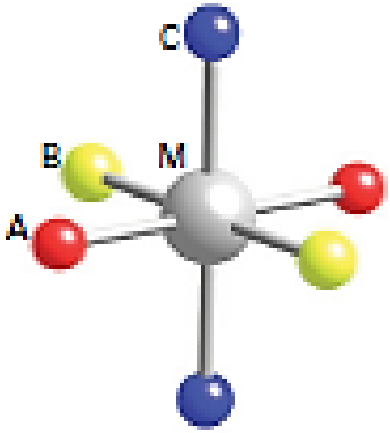
12 $[(H_3N)_5CoOCo(NH_3)_5]^{4+}$



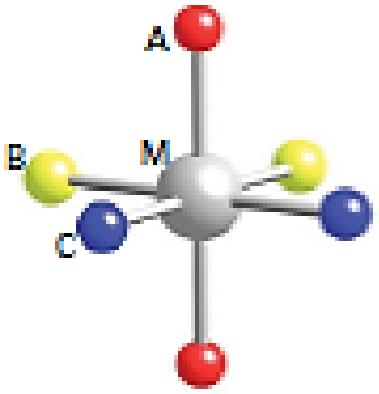
54 *cis*-[MA_4B_2]



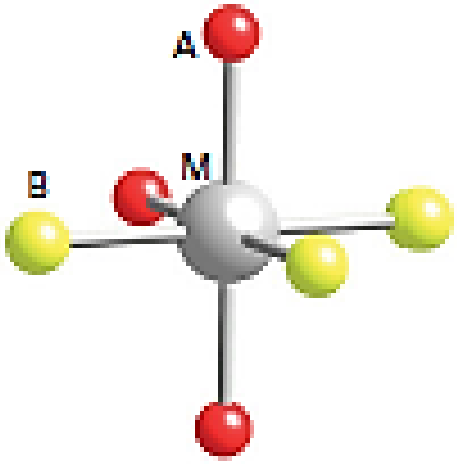
55 *trans*-[MA_4B_2]



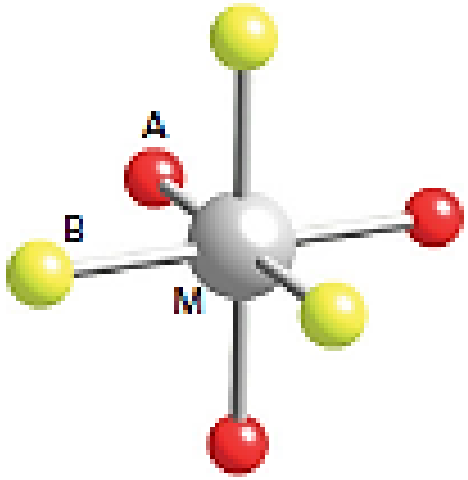
58 [$MA_3B_2C_2$]



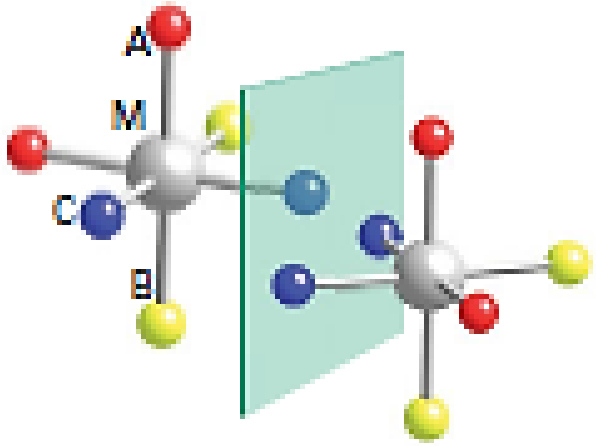
59 [$MA_3B_2C_2$]



56 *mer*-[MA_3B_3]



57 *fac*-[MA_3B_3]



62 [$MA_2B_2C_2$] enantiomers

KB kimyoviy bog’lanishning tabiati

KB 3 xil:

1) Kristall maydon nazariyasi
2) Valent bog’lanish usuli (VBU)
3) Molekulyar orbitallar usuli (MOU)

1. Kristall maydon nazariyasi KB da K.H.ion va ligandlar orasida elektrostatik ta’sir kuchlariga asoslangan.

Kompleks h. q. d-orbitallarining fazoviy shakli hisobga olinadi.

Ligandlar hosil qilgan elektr maydoni kuchiga qarab k. h. Q. d-orbitallari har xil energetik orbitalga ajraydi.

KB ning fazoviy shakli ham turlicha bo’ladi.

Erkin ionda m. a. d-orbitallari bir xil energiyaga ega bo’ladi:

a) erkin ion	b) sferik ion	g) ligandlarning oktaedrik maydoni ta’siridagi ion
dxy dxz dyz dz^2 dx^2y^2	dx^2y^2 dz^2 — — Δ — — — dxy dxz dyz	dz^2 dx^2y^2 dγ — — Δ — — — dxy dxz dyz dε

(dγ va dε).

Energiya farqi (Δ) – parchalanish energiyasi deyiladi.

U KB yutilish spektrlari orqali aniqlanadi.

Ligandlar parchalanish spektrlarini qiymati bo'yicha spektrokimyoviy qator:

CO, CN^-, NO, NO_2^- -> En > NH_3 > H > NCS^- -> H_2O > OH^- > F^- > Cl^- > Br^- > J^-

Kuchli | o'rtacha kuchli | kuchsiz maydon

maydon

$[Co(CN)_6^{3-}]$

diamagnit kompleks

$[CoF_6]^{3-}$

paramagnit kompleks hosil qilishi

CN^- - kuchli maydon parchalanish energiyasi yuqori.

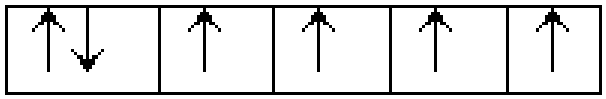
F^- - ioni kuchsiz maydon hosil qiladi d-orbitallarning ajralish energiyasi kichik, elektronlar Xund qoidasiga ko'ra.

CN^- - ioni kuchli maydon hosil qiladi, ajralish energiyasi juftlashmagan elektronlar qolmaydi.

Kristall maydon nazariyasini $[CoF_6]^{3-}$ va $[Co(CN)_6]^{3-}$ ionlari uchun qo'llanilishi

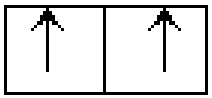
a)sferik ion

d_{xy} d_{xz} d_{yz} d_{z^2} $d_{x^2y^2}$



b) ligandning oktaedrik maydoni ta'siridagi ion

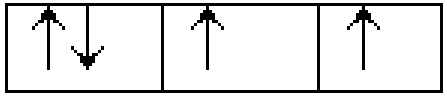
$d\gamma$



d_{z^2} $d_{x^2y^2}$

Δ

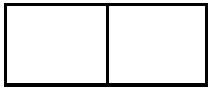
$d\varepsilon$



d_{xy} d_{xz} d_{yz}

$[CoF_6]^{3-}$

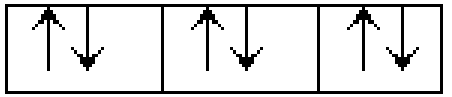
$d\gamma$



d_{z^2} $d_{x^2y^2}$

Δ

d_{xy} d_{xz} d_{yz}



$d\varepsilon$

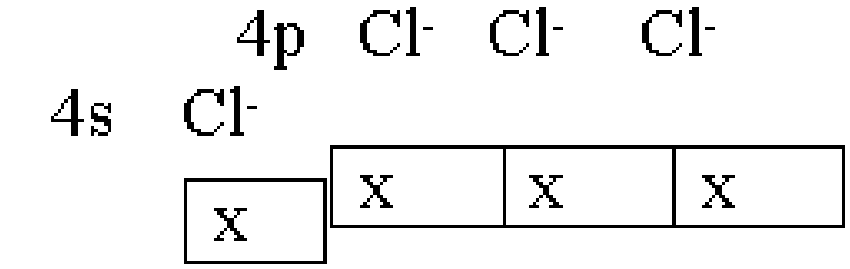
$[Co(CN)_6]^{3-}$

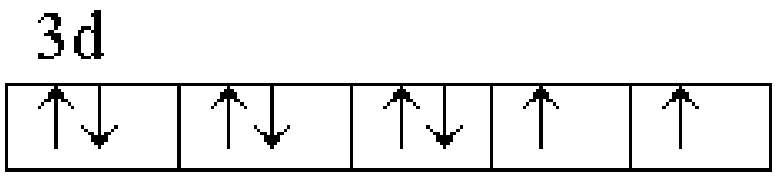
2.VBU usuli.

- **KB hosil qiluvchi va ligandlar orasida kovalent bog' donor-akseptor .**
- **$[NiCl_4]^{2-}$ Cl^- ioni elektron donor,**
- **Ni^{2+} ioni akseptor.**

$Ni - 2e \rightarrow Ni^{2+}$ $K_2[NiCl_4]$

$3s^2 3p^6 3d^8 4s^2 \rightarrow 3s^2 3p^6 3d^8 4s^0$

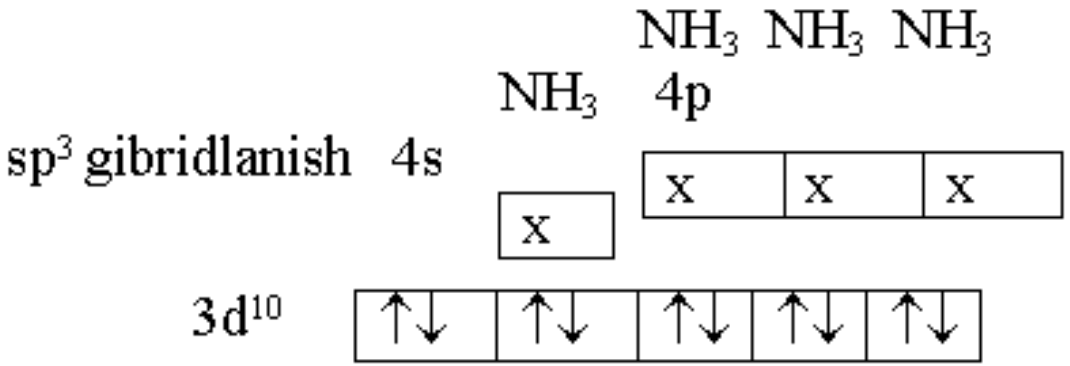




$[Zn(NH_3)_4]Cl_2$ k. b. tetraedrik tuzilishga ega:

$Zn - 2e \rightarrow Zn^{2+}$ $\quad 3s^2 3p^6 3d^{10} 4s^2 \rightarrow 3s^2 3p^6 3d^{10}$

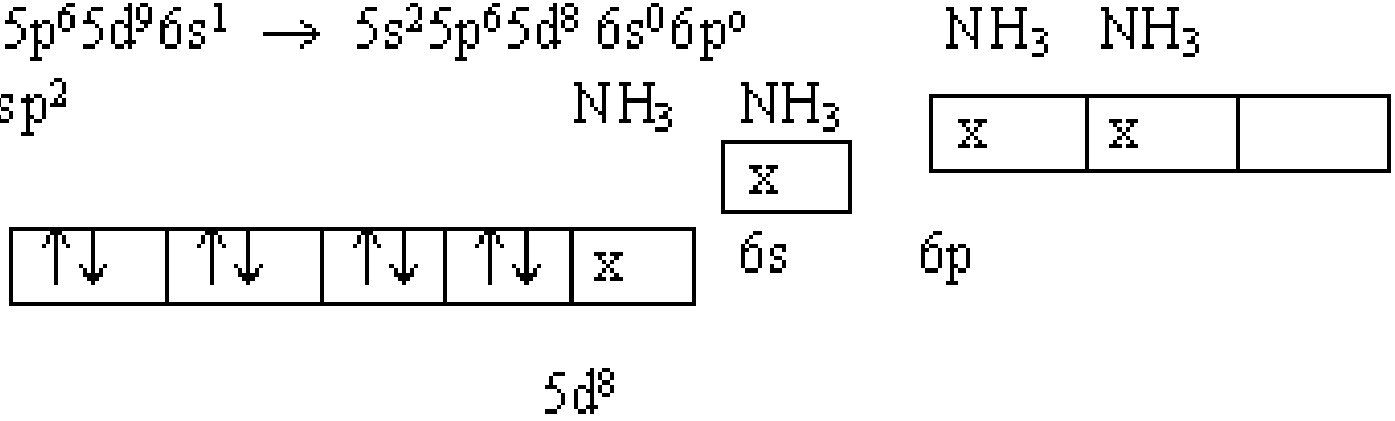
$[Zn(NH_3)_4]^{2+}$



$[Pt(NH_3)_4]^{2+}$ $\quad Pt - 2e \rightarrow Pt^{2+}$

$5s^2 5p^6 5d^9 6s^1 \rightarrow 5s^2 5p^6 5d^8\ 6s^0 6p^0$

Gibridlanish dsp^2



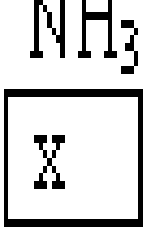
K. s. 6 d^2sp^3 gibridlanish K.B. oktaedr shaklida:

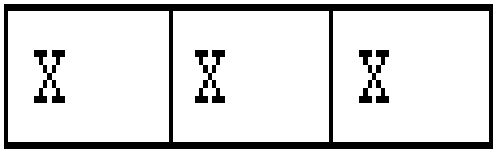
$[Pt(NH_3)_6]^{4+}$ $Pt - 4e \rightarrow Pt^{4+}$

$5s^2 5p^6 5d^9 6s^1 \rightarrow 5s^2 5p^6 5d^6$

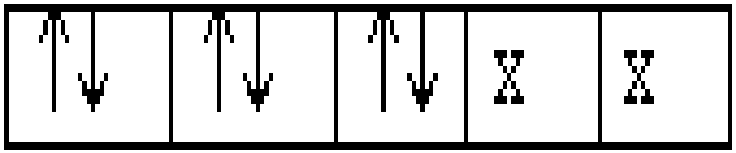
6p NH_3 NH_3 NH_3

6s NH_3





$5d^6$ NH_3 NH_3



$[Co(NH_3)_6]^{3+}$, $[Fe(CN)_6]^{3-}$ lar ham shu tuzilishiga ega.

VBU KB k.soni, geometrik shakli va magnit xossalarini to'g'ri tushuntiradi.

Kamchiliklari:

- **yutilish spektrlarini VBU bilan tushuntirib bo'lmaydi.**
- **ligandlar borki, ular metaldagi elektronlarni o'zining vakant orbitallariga qabul qila oladi.**
- **PF_3 yoki $SnCl_4$ ioni o'zining bo'shashtiruvchi orbitallariga CO, NO kabi molekulalarni qabul qila oladi.**

MO usuli KB tuzilishini nazariyasi to'liqroq tushuntiradi.

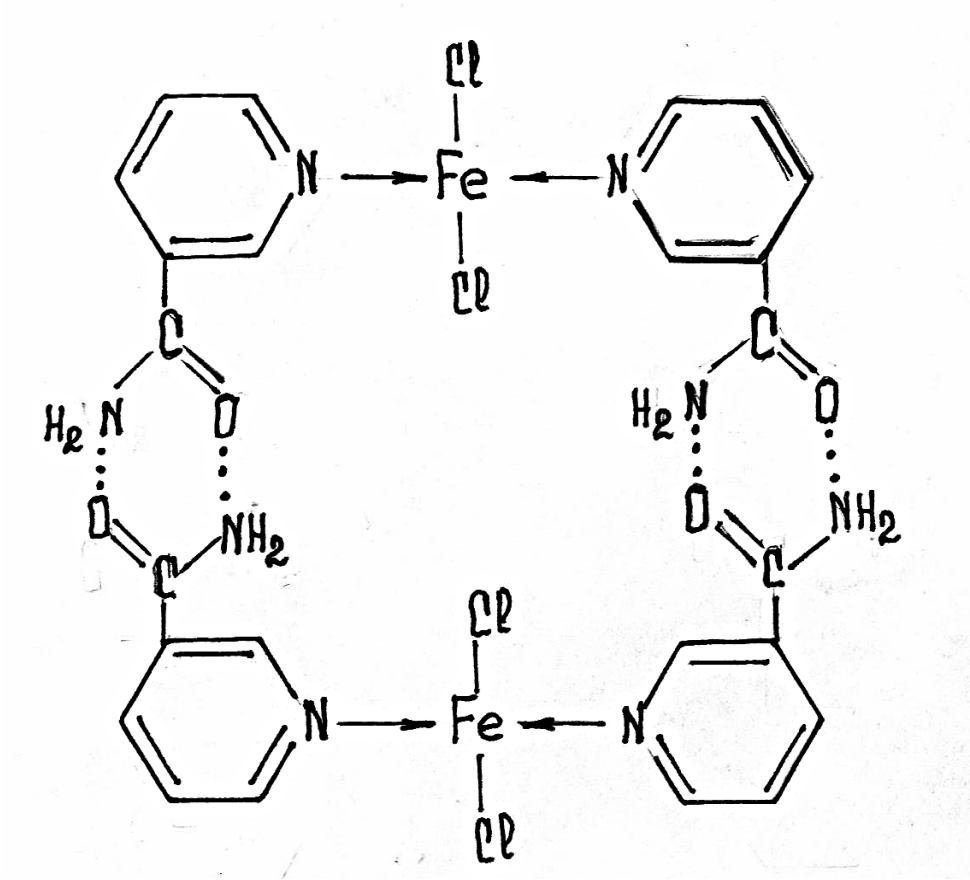
Kompleks birikmalar kimyosi fanini O’zbekistonda shakllanishida katta hissa qo’shgan olimlar

- M.A.Azizov- k.f.d., professor
- O’zbekistonda xizmat ko’rsatgan fan arbobi

- N.A.Parpiyev- k.f.d., professor
- O’zFA akademigi

Feramid - Fe va nikotin kislotasi amidining KB Toshfarmida **M.A.Azizov** rahbarligida ishlab chiqilgan.

- Fe kamqonlik kasalligi boshlanadi, odamning madori qurib, o’zini behush sezadi, kayfiyati buziladi.

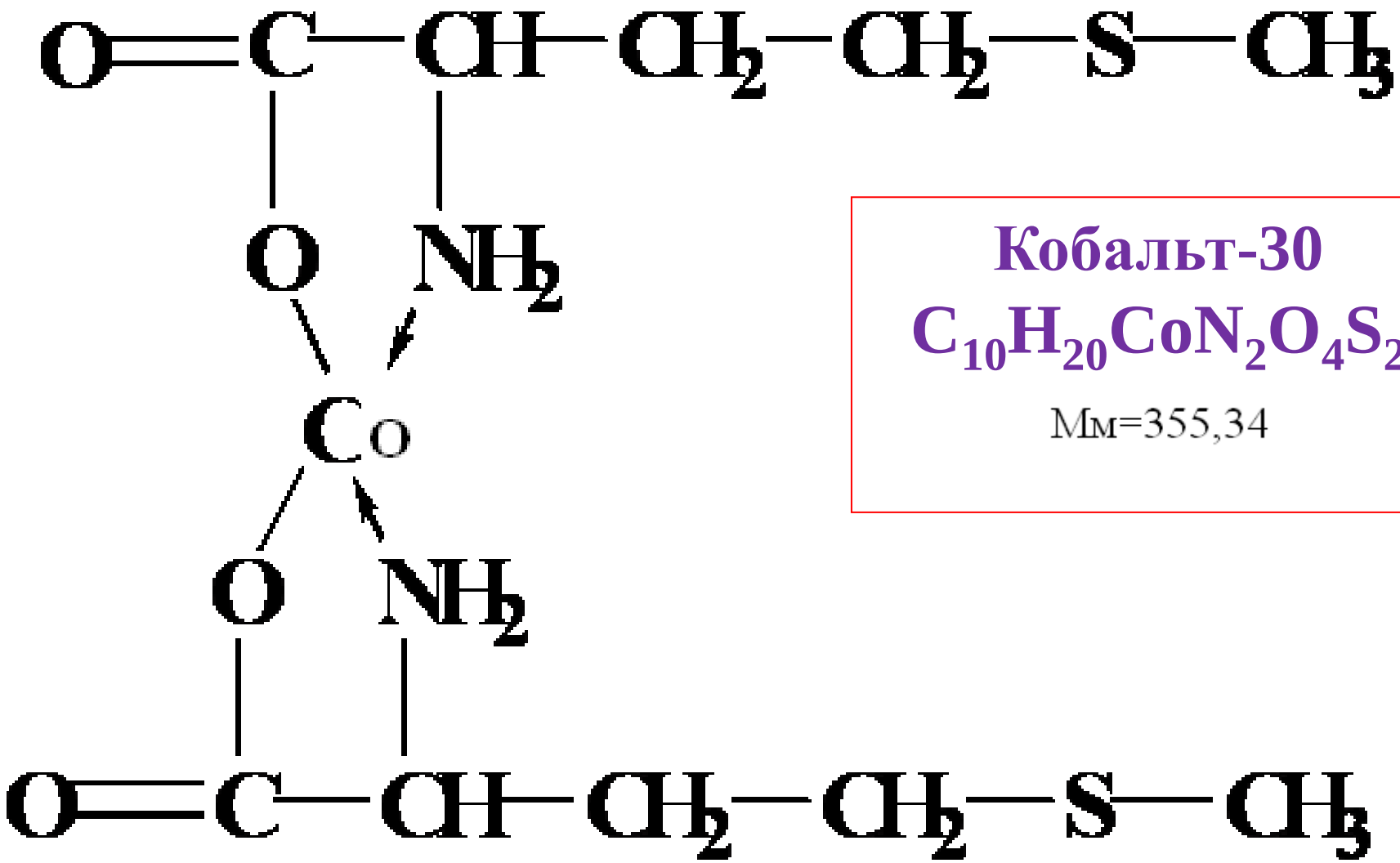


Ферамид

$(C_6H_6N_2O)_2*FeCl_2$

MM = 371,01

Kobalt-30 - Co va metioninning KB Toshfarmida M.A.Azizov rahbarligida ishlab chiqilgan.



Кобальт-30

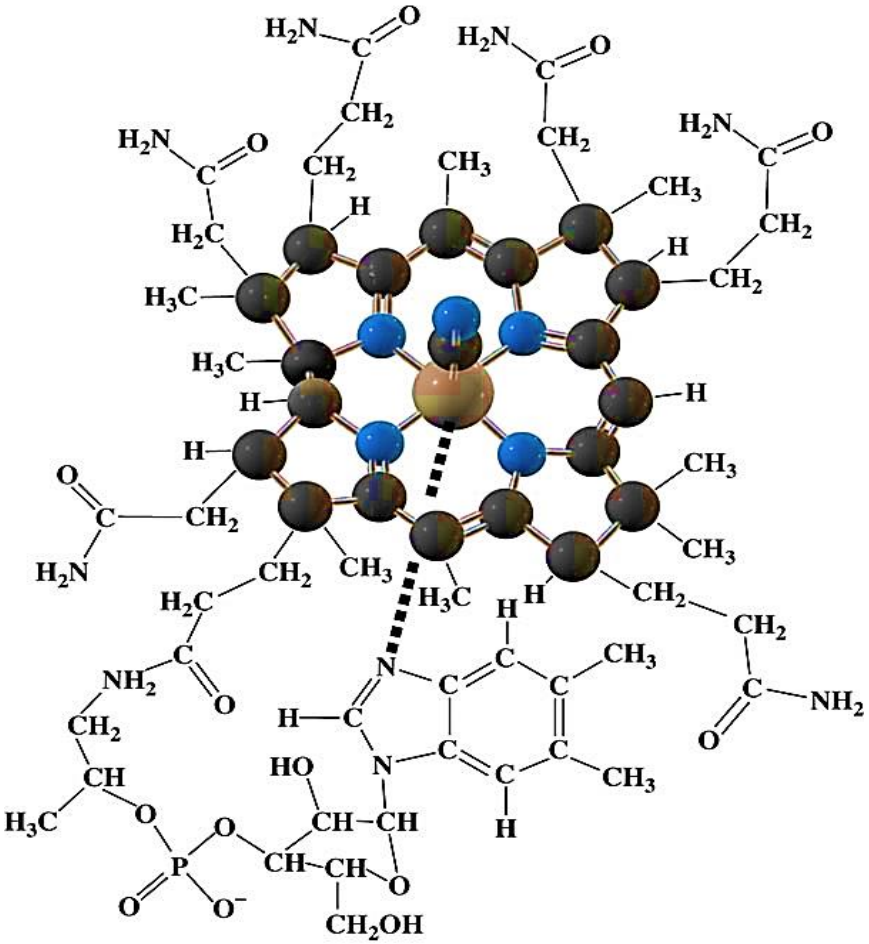
$C_{10}H_{20}CoN_2O_4S_2$

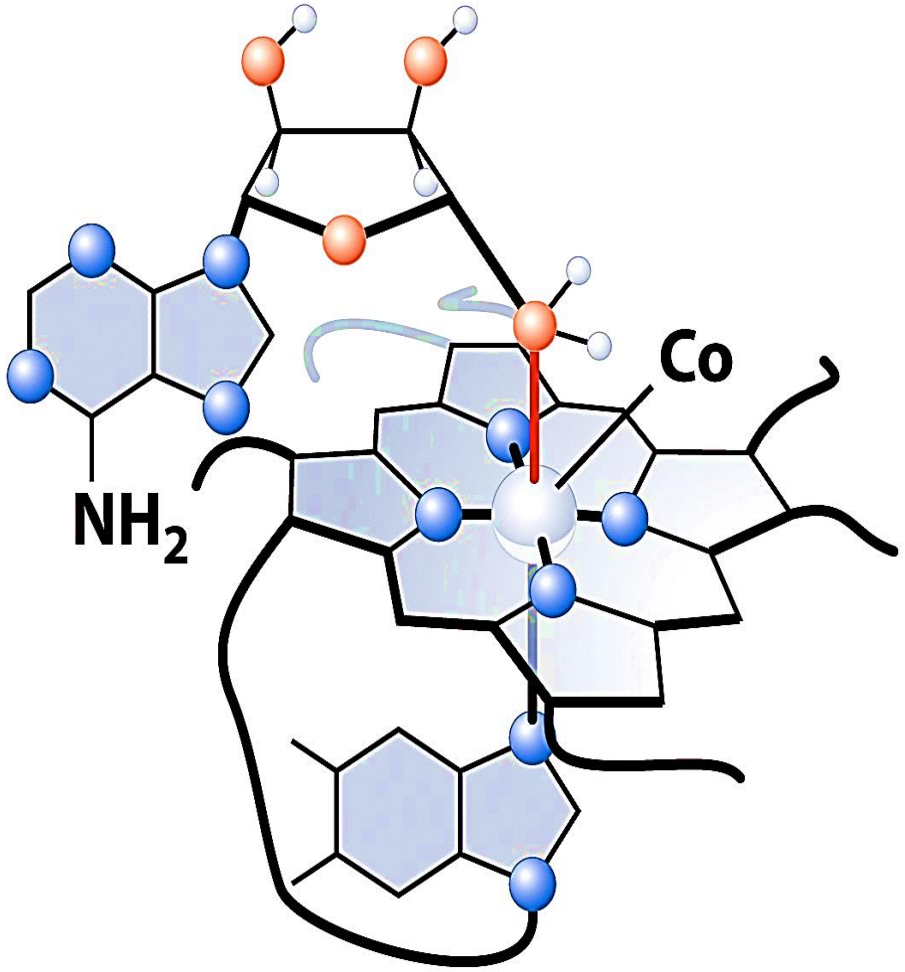
Мм=355,34

KB farmatsiyadagi ahamiyati

- ✓ **Organizmida 3% atrofida metallar bor. Ular inson hayot faoliyatini to’la ta’minlaydi.**
- ✓ **K, Na, Ca, Mg akva ionlar hoatida uchraydi. Ular qon, limfa, to’qimalardagi suyuqliklarda nerv impulslari harakatini ta’minlaydi.**
- ✓ **Organizmida 100 mg siankobalamin (yog’da eriydigan vitamin B_{12}) uchraydi. KB da ligand sifatida tetradentant azot tutgan ligand porfin turadi.**
- ✓ **B_{12} vitamini eritrositlarninig shakallanishi va rivojlanishida muhim rol o’ynaydi. B_{12} etishmasligi og’ir kasallik - kamqonlikka olib keladi.**

Qizil qon hujayralarini ishlab chiqarishni o'z ichiga olgan ko'plab muhim biologik jarayonlarda ishtirok etadi

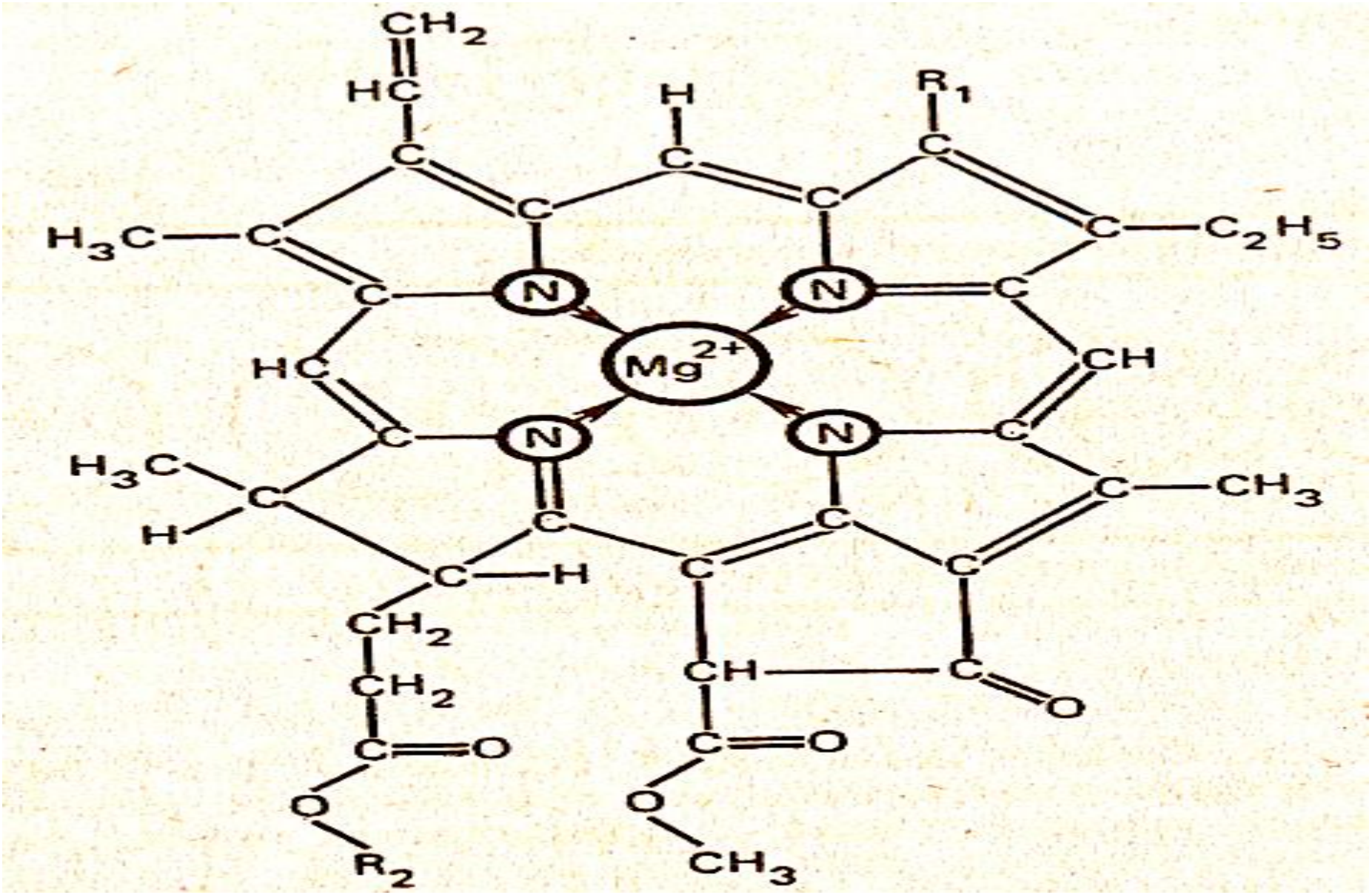




Vitamin B_{12} ($Co[C_{62}H_{88}N_{13}O_{14}P]$)CN

KB farmatsiyadagi ahamiyati

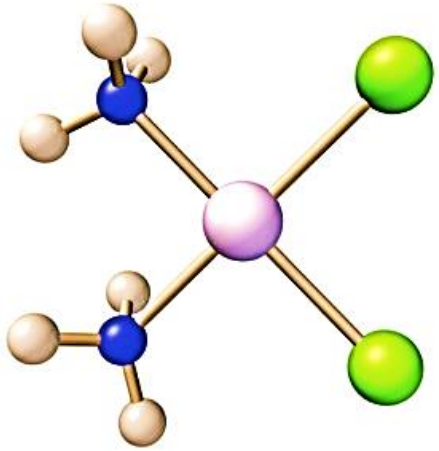
- ✓ **Iridiyning KB $(NH_3)_2[IrCl_6]$ ham saraton kasalligida foyda beradi.**
- ✓ **Au α-tiospirtlar bilan hosil qilgan KB esa sil va moxov kasaligini davolashda qo'llaniladi.**
- ✓ **Vitamin B_{12}, feramid, koamid, krizanol, temir (III) gliserofosfati, temir (II) laktati.**
- ✓ **Temir yetishmaganda (anemiyada) – feramid tavsiya etiladi.**
- ✓ **KB farmatsevtik tahlilda keng qo'llaniladi.**
- ✓ **Nesler reaktivi, vismut hamda temir birikmalarini aniqlashda ishlatiladi.**
- ✓ **KB reaksiyalari yordamida Pt metallari, Au, Ag, Cu, Cr, Ni va Co olinadi va tozalanadi.**
- ✓ **Noyob metallarni ajratishda KB juda qo'l keladi.**

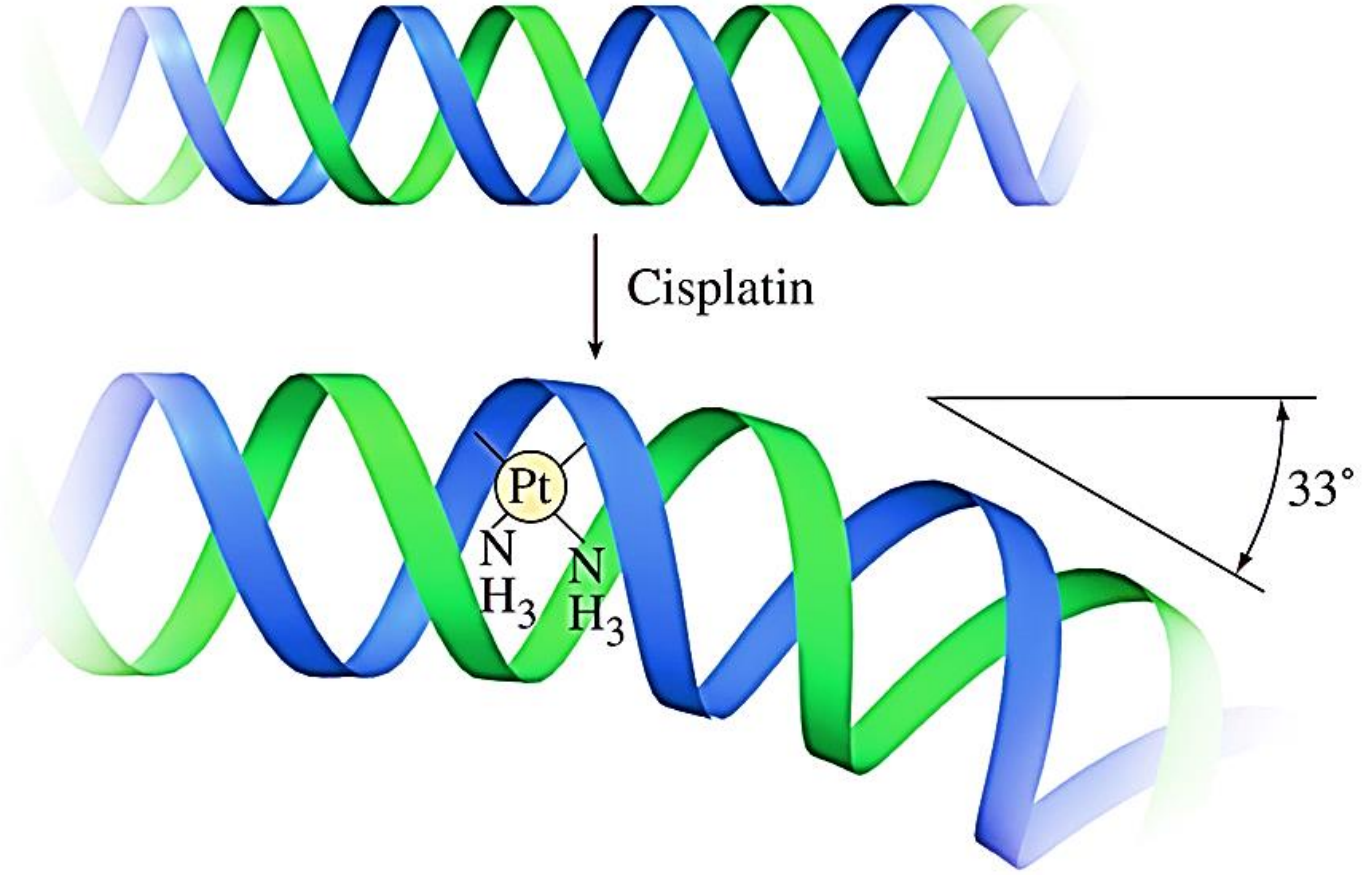


Xlorofilning tuzilishi.

R1-gidrofil radikal; R2-gidrofob radikal;

Cisplatin saraton kasaligi kimyoterapiyasida qo’llaniladi.





E’tiboringiz uchun raxmat!