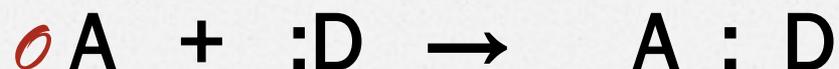


Donador aceptor

Jesús Gracia Mora

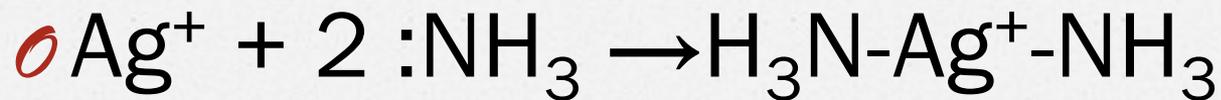
La clave está en.....



o Base de Lewis más ácido de Lewis

o Es decir donador de pares
electrónicos más aceptor de pares
electrónicos

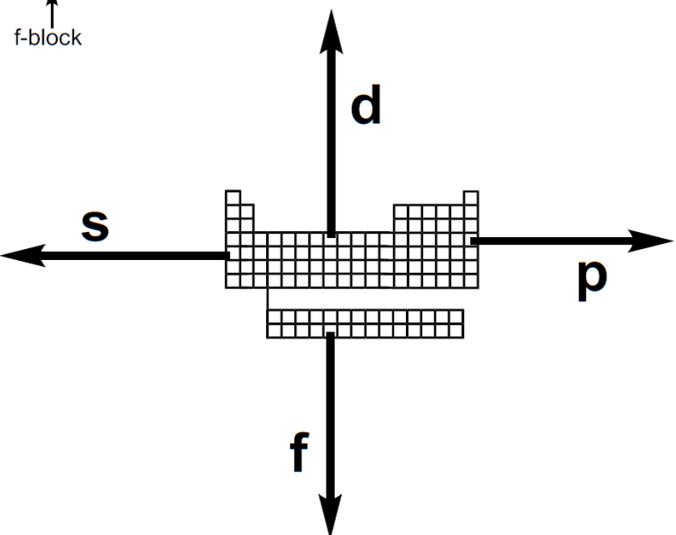
También la podemos escribir.



¿Quién es el aceptor?

21 Sc scandium	22 Ti titanium	23 V vanadium	24 Cr chromium	25 Mn manganese	26 Fe iron	27 Co cobalt	28 Ni nickel	29 Cu copper	30 Zn zinc
39 Y ytterbium	40 Zr zirconium	41 Nb niobium	42 Mo molybdenum	43 Tc technetium	44 Ru ruthenium	45 Rh rhodium	46 Pd palladium	47 Ag silver	48 Cd cadmium
57 La lanthanum	72 Hf hafnium	73 Ta tantalum	74 W tungsten	75 Re rhenium	76 Os osmium	77 Ir iridium	78 Pt platinum	79 Au gold	80 Hg mercury
89 Ac actinium	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Uub ununbium

1 H hydrogen	
3 Li lithium	4 Be beryllium
11 Na sodium	12 Mg magnesium
19 K potassium	20 Ca calcium
37 Rb rubidium	38 Sr strontium
55 Cs caesium	56 Ba barium
87 Fr francium	88 Ra radium



					2 He helium
5 B boron	6 C carbon	7 N nitrogen	8 O oxygen	9 F fluorine	10 Ne neon
13 Al aluminium	14 Si silicon	15 P phosphorus	16 S sulphur	17 Cl chlorine	18 Ar argon
31 Ga gallium	32 Ge germanium	33 As arsenic	34 Se selenium	35 Br bromine	36 Kr krypton
49 In indium	50 Sn tin	51 Sb antimony	52 Te tellurium	53 I iodine	54 Xe xenon
81 Tl thallium	82 Pb lead	83 Bi bismuth	84 Po polonium	85 At astatine	86 Rn radon
113 -- -	114 -- -	115 -- -	116 -- -	117 -- -	118 -- -

58 Ce cerium	59 Pr praseodymium	60 Nd neodymium	61 Pm promethium	62 Sm samarium	63 Eu europium	64 Gd gadolinium	65 Tb terbium	66 Dy dysprosium	67 Ho holmium	68 Er erbium	69 Tm thulium	70 Yb ytterbium	71 Lu lutetium
90 Th thorium	91 Pa protactinium	92 U uranium	93 Np neptunium	94 Pu plutonium	95 Am americium	96 Cm curium	97 Bk berkelium	98 Cf californium	99 Es einsteinium	100 Fm fermium	101 Md mendelevium	102 No nobelium	103 Lr lawrencium

El átomo central

Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc
		0 d ⁵	0 d ⁶	0 d ⁷	0 d ⁸	0 d ⁹	0 d ¹⁰		
		1 d ⁴	1 d ⁵	1 d ⁶	1 d ⁷	1 d ⁸	1 d ⁹	1 d ¹⁰	
	2 d ²	2 d ³	2 d ⁴	2 d ⁵	2 d ⁶	2 d ⁷	2 d ⁸	2 d ⁹	2 d ¹⁰
3 d ⁰	3 d ¹	3 d ²	3 d ³	3 d ⁴	3 d ⁵	3 d ⁶	3 d ⁷	3 d ⁸	
	4 d ⁰	4 d ¹	4 d ²	4 d ³	4 d ⁴	4 d ⁵	4 d ⁶		
		5 d ⁰	5 d ¹	5 d ²	5 d ³	5 d ⁴			
			6 d ⁰	6 d ¹	6 d ²				
				7 d ⁰					

La abundancia

Metal	Earth's crust	Oceans	Plants (ryegrass)	Animals (human blood)
Na	23 000	10 500	1 000	2 000
K	21 000	1 620	28 000	1 600
Mg	23 000	1 200	2 500	40
Ca	41 000	390	12 500	60
Al	82 000	0.000 5	50	0.3
Sc	16	0.000 000 6	>0.01	0.008
Ti	5 600	0.000 48	2.0	0.055
V	160	0.001	0.07	<0.000 2
Cr	100	0.000 18	0.8	0.008
Mn	950	0.000 11	130	0.005
Fe	41 000	0.000 1	240	450
Co	20	0.000 001	0.6	0.01
Ni	80	0.000 1	6.5	0.03
Cu	50	0.000 08	9.0	1.0
Zn	75	0.000 05	31	7.0
Mo	1.5	0.01	1.1	0.001
Cd	0.11	0.000 001 1	0.07	0.0052
Pb	14	0.000 02	2.0	0.21
Sn	2.2	0.000 002 3	<0.01	0.38
Ce	68	0.000 002	<0.01	<0.001

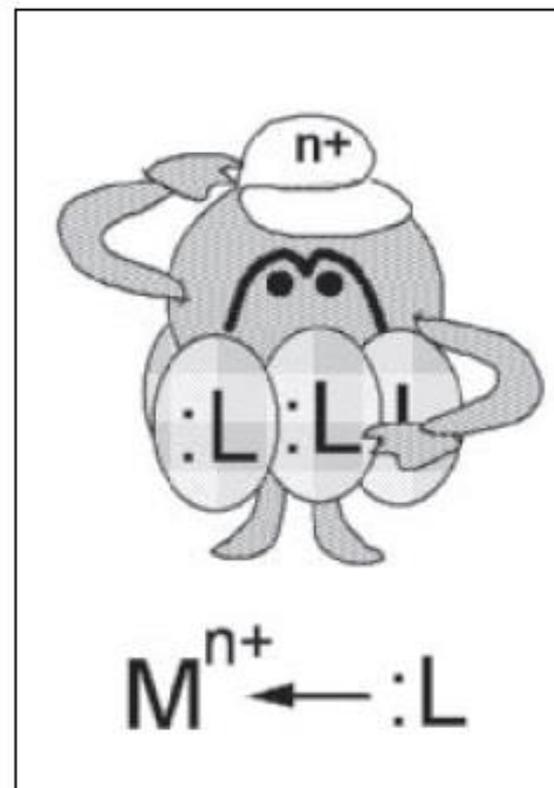
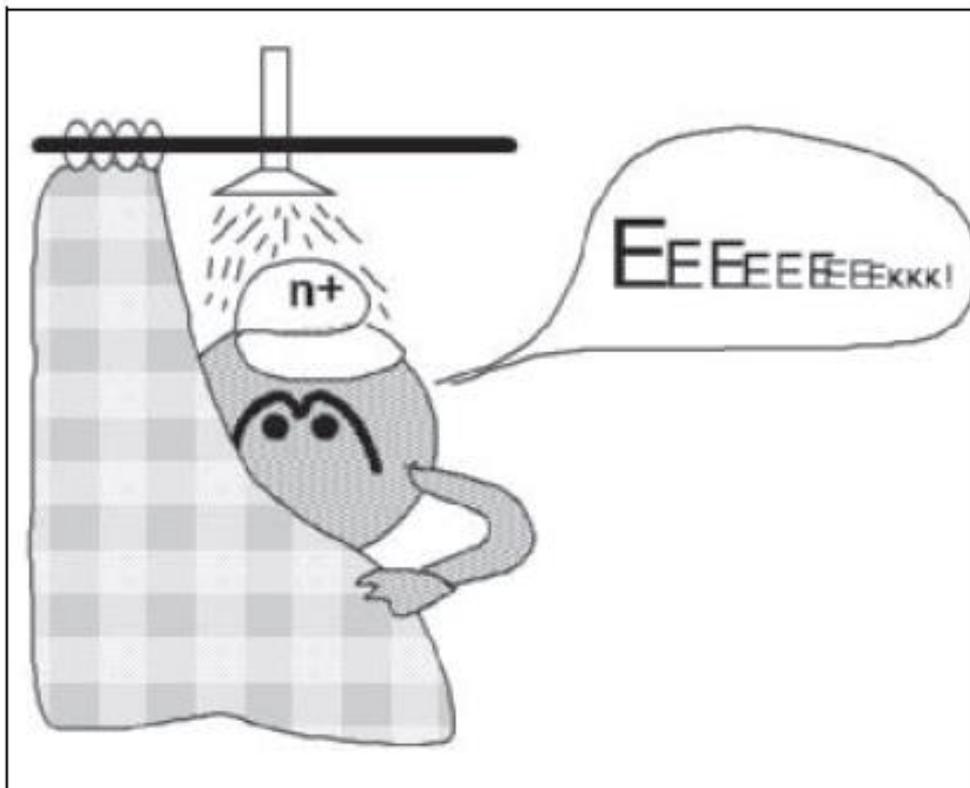
Recapitulando algunos conceptos

- o Un compuesto de coordinación consiste de un átomo central, usualmente un ion metálico enlazado a un grupo de ligantes a través de enlaces de coordinación
- o Un enlace covalente coordinado se caracteriza porque un ligante con un átomo que dona un par de electrones (par libre) a un orbital vacío de un átomo central, ácido de Lewis (aceptor de pares electrónicos)

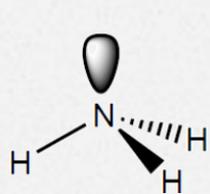
Recapitulando algunos conceptos

- o Los iones metálicos pueden existir y formar complejos con diferentes estados de oxidación; esto es usual principalmente en los elementos del bloque «d».
- o Los metales de la primera serie de transición de bloque «d» muestran estados de oxidación II y III de forma más común. Los estados de oxidación mayores suelen ser más comunes en elementos más pesados.

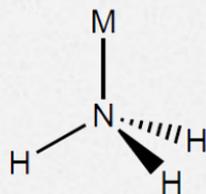
Es muy difícil encontrar a un ion metálico «desnudo»



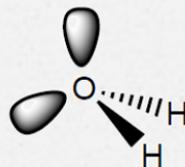
Algunos ligantes comunes y simples



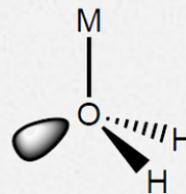
free



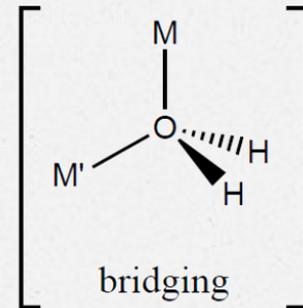
coordinated



free



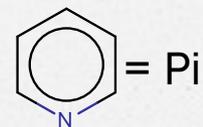
coordinated



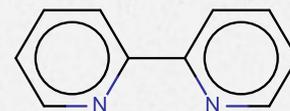
bridging

Algunos ligantes comunes y simples

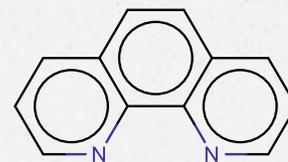
Ligando	Nombre	Tipo
F^-	fluoro	Aniónico
Cl^-	cloro	Aniónico
Br^-	bromo	Aniónico
I^-	yodo	Aniónico
O_2^-	oxo	Aniónico
OH^-	hidroxo	Aniónico
O_2^{2-}	peroxo	Aniónico
HS^-	mercapto	Aniónico
S_2^-	tio	Aniónico
H_2O	Aqua	Neutro
NH_3	Ammina	Neutro
NO	Nitrosilo	Neutro
CO	Cabonilo	Neutro



Piridina



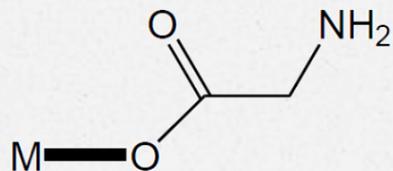
2, 2' bipyridina= bipi



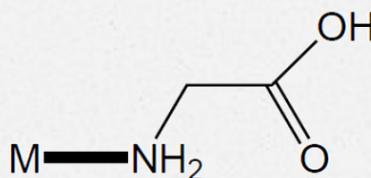
1, 10-fenantrolina

Los ligantes

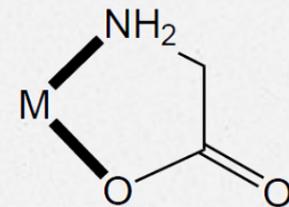
R_3N	R_2O	F^-
R_3P	R_2S	Cl^-
R_3As	R_2Se	Br^-
R_3Sb	R_2Te	I^-



O-monodentate

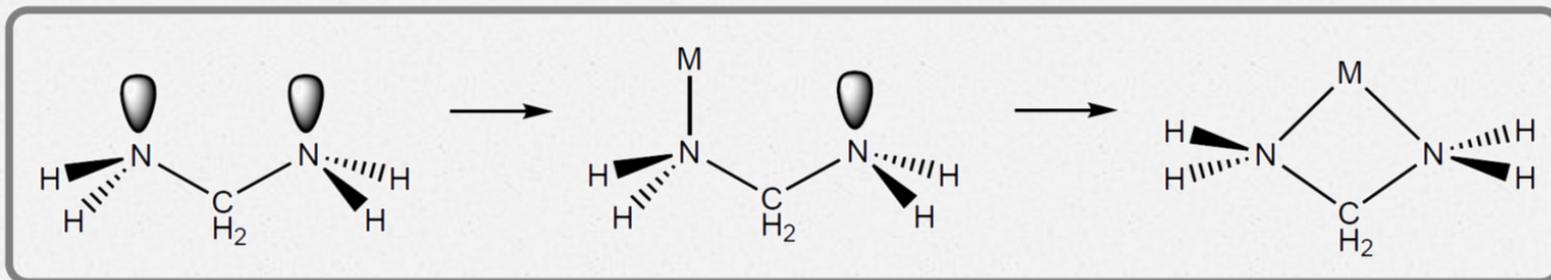


N-monodentate

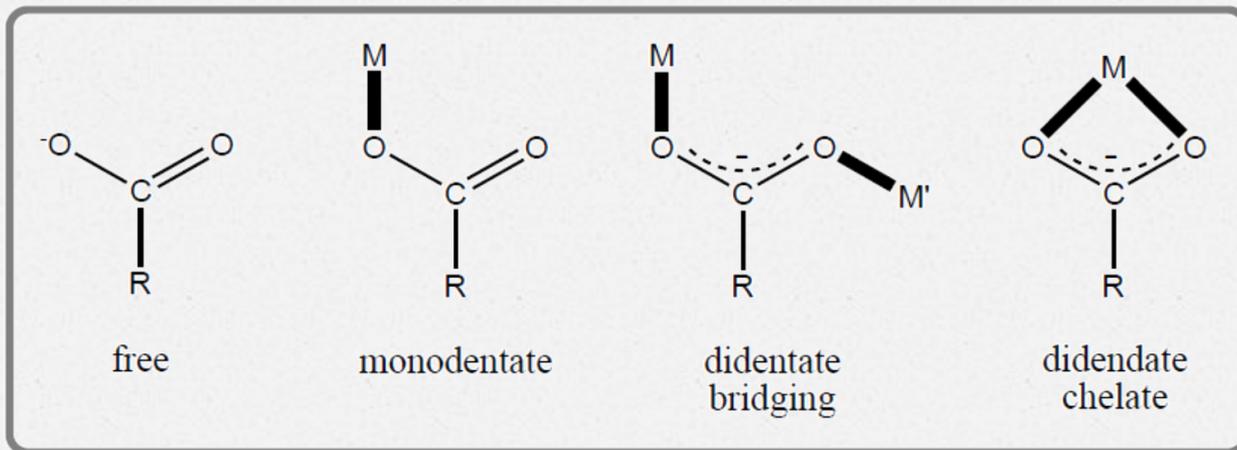


N,O-didentate

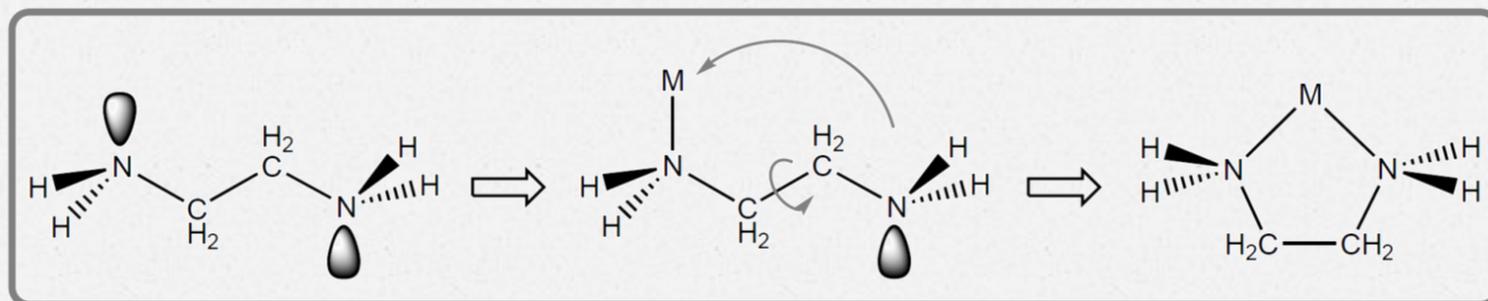
Algunos ligandos comunes y simples



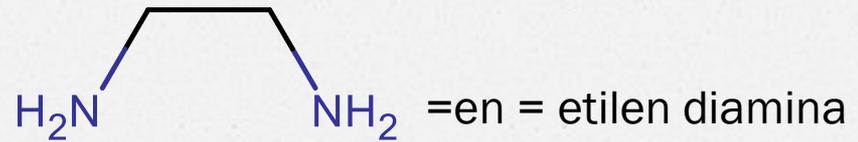
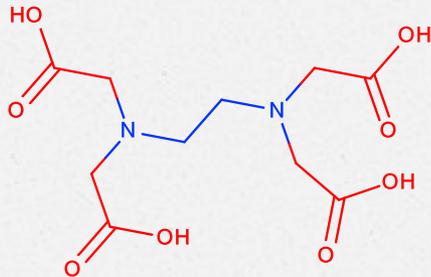
Los carboxilatos



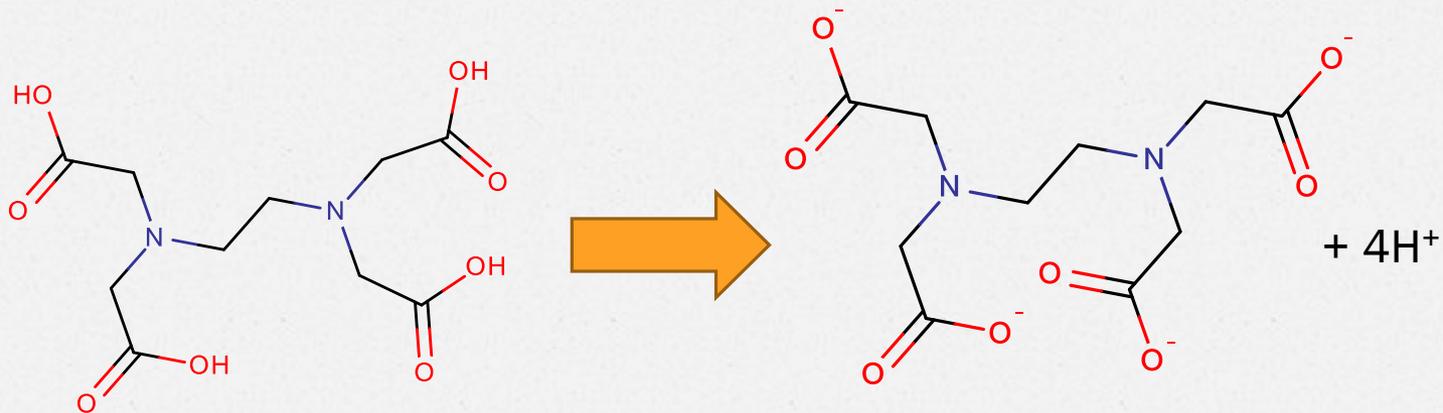
Bidentados; caso de la etilendiamina



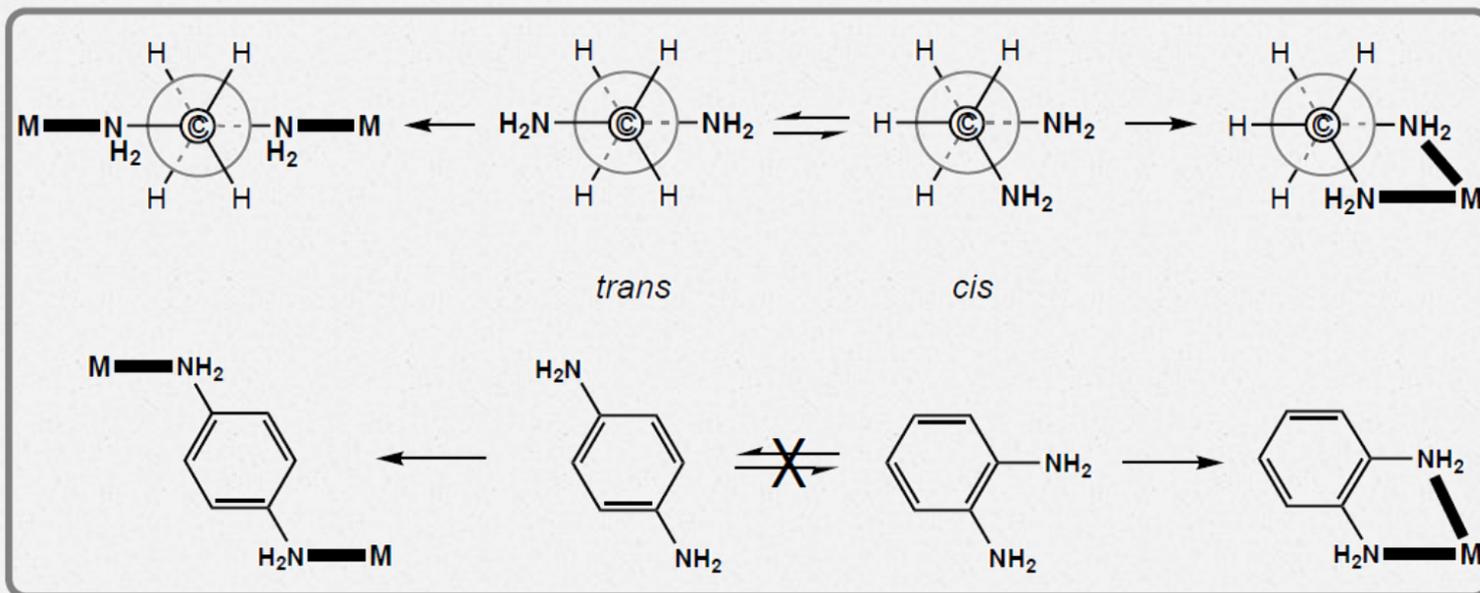
Muy Comunes



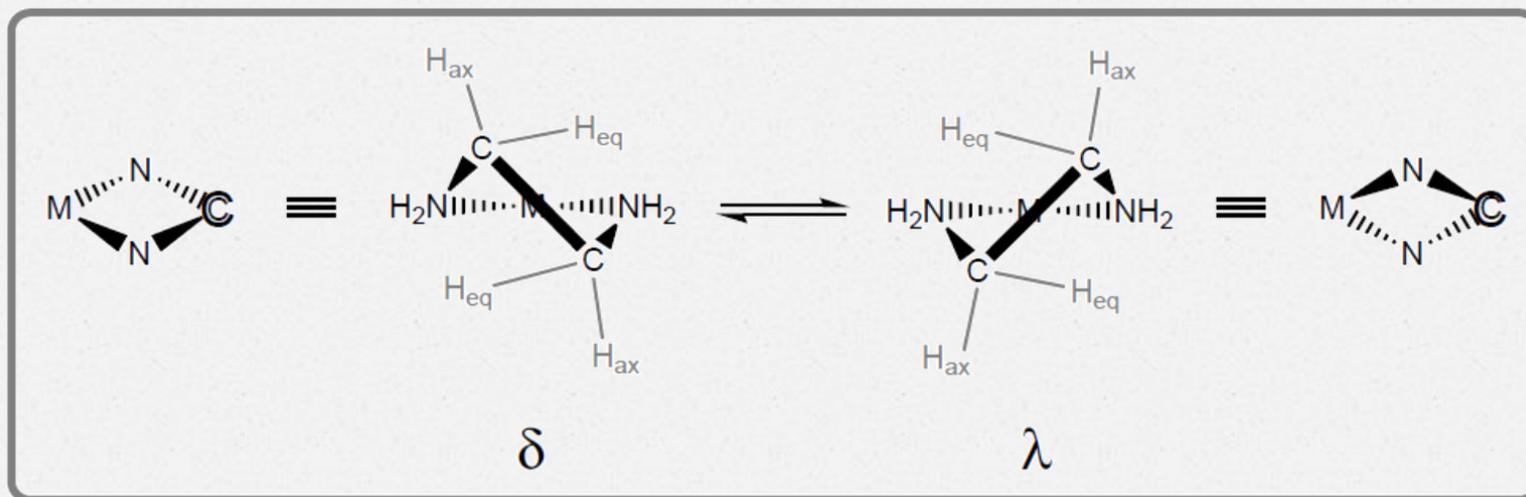
EDTA= ácido etilen diamin tetraacético



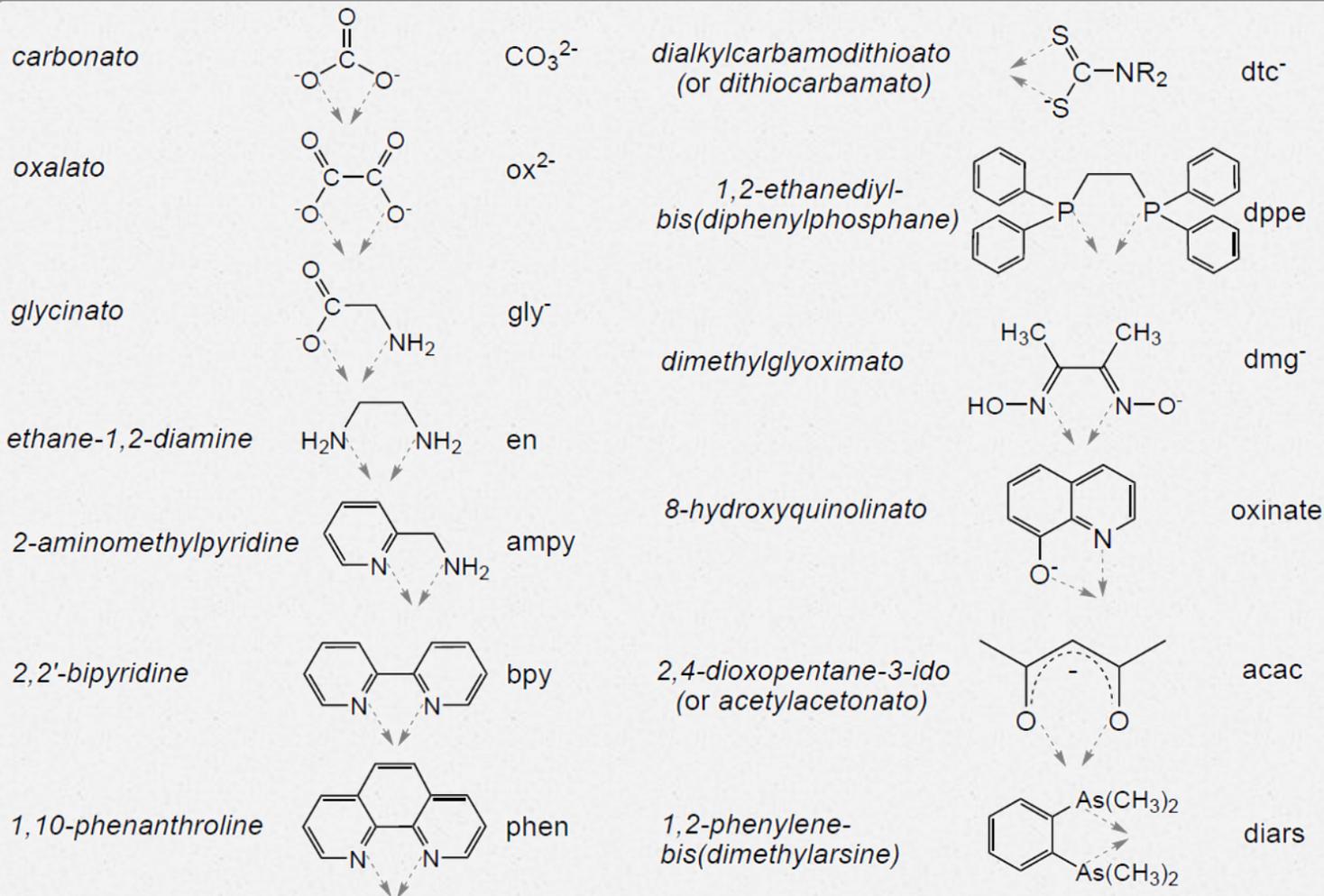
La orientación es importante



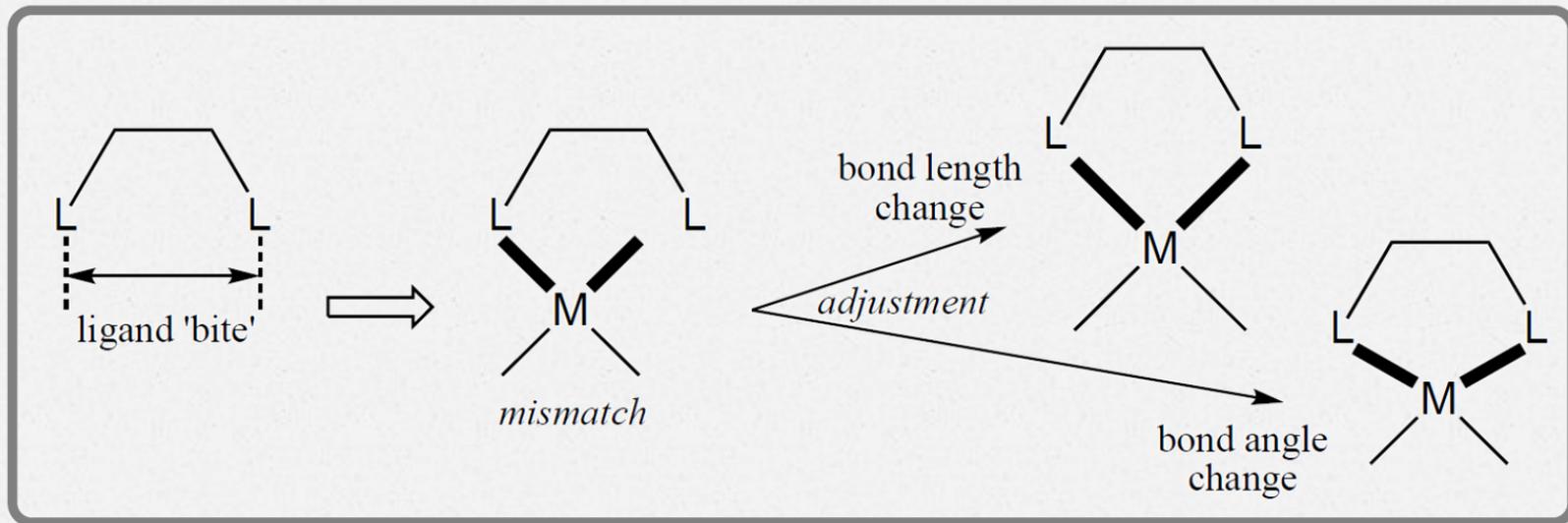
La formación de anillos



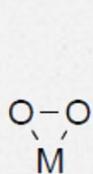
Algunos bidentados comunes



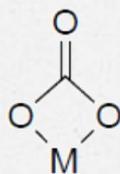
Para que un ligante bidentado actúe como tal se deben de cumplir algunos requisitos



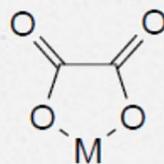
Si se cambia la longitud de la cadena



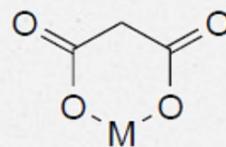
dioxygen



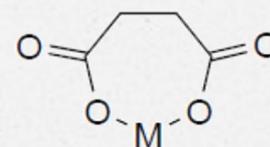
carbonate



oxalate



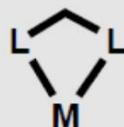
malonate



succinate



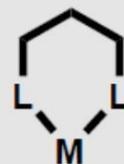
3



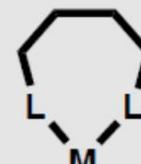
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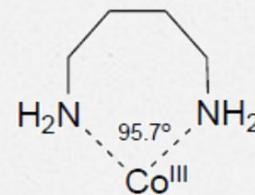
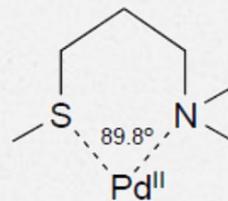
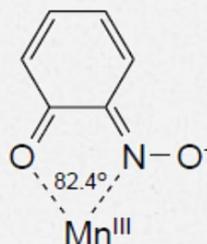
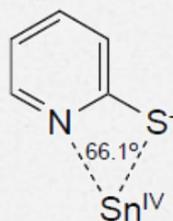
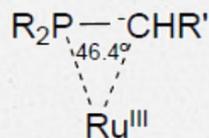
5



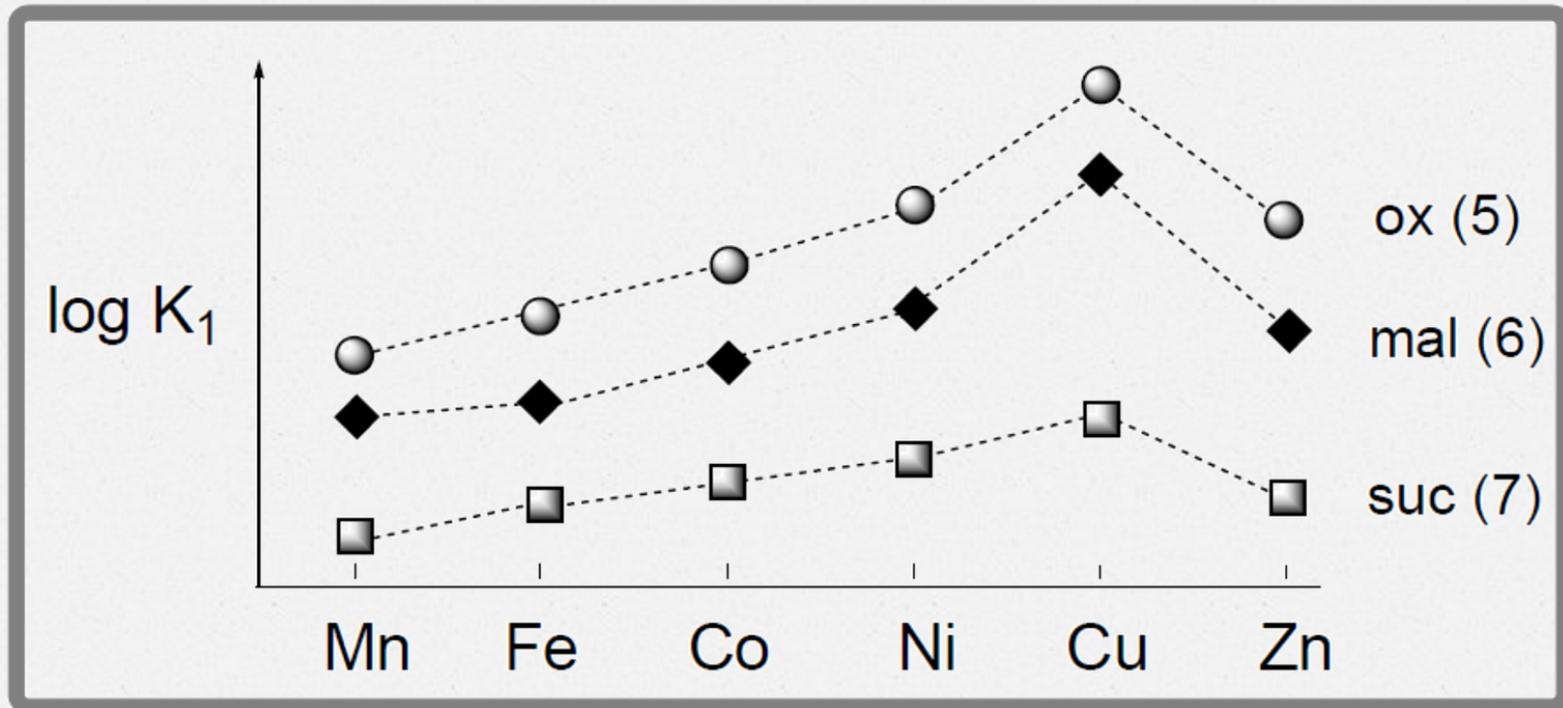
6



7

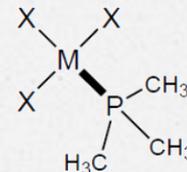
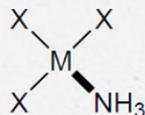


La estabilidad en función de la longitud de la cadena

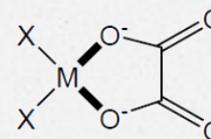
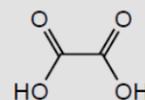
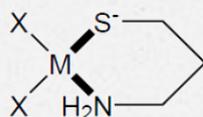
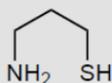


¿y tu cuantos dientes tienes?

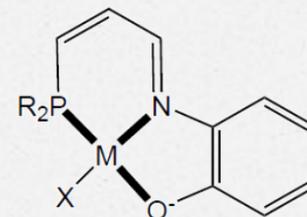
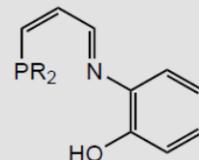
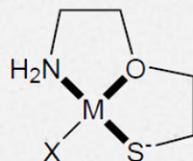
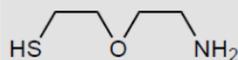
monodentate



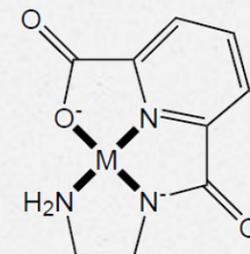
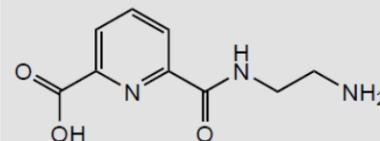
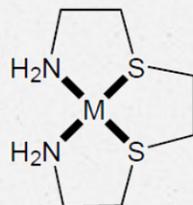
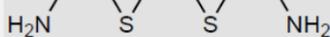
didentate



tridentate

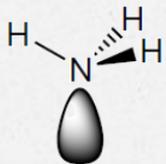


tetradentate

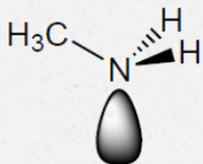


Monodentados

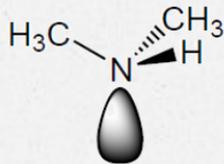
zeroth-order
amine
(ammonia)



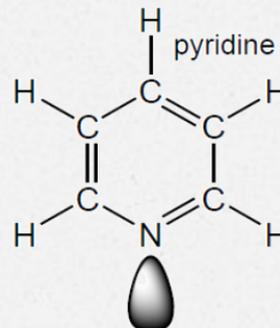
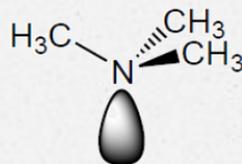
primary
amine



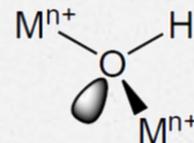
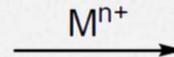
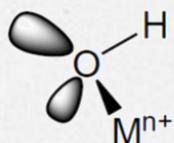
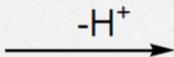
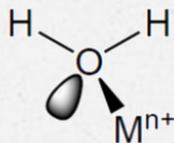
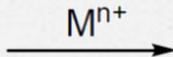
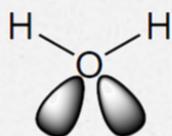
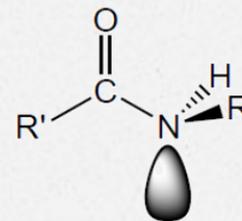
secondary
amine



tertiary
amine

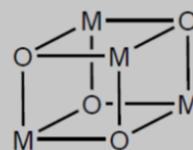
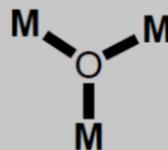
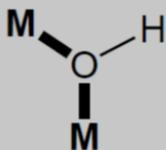
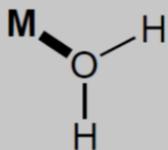


amide

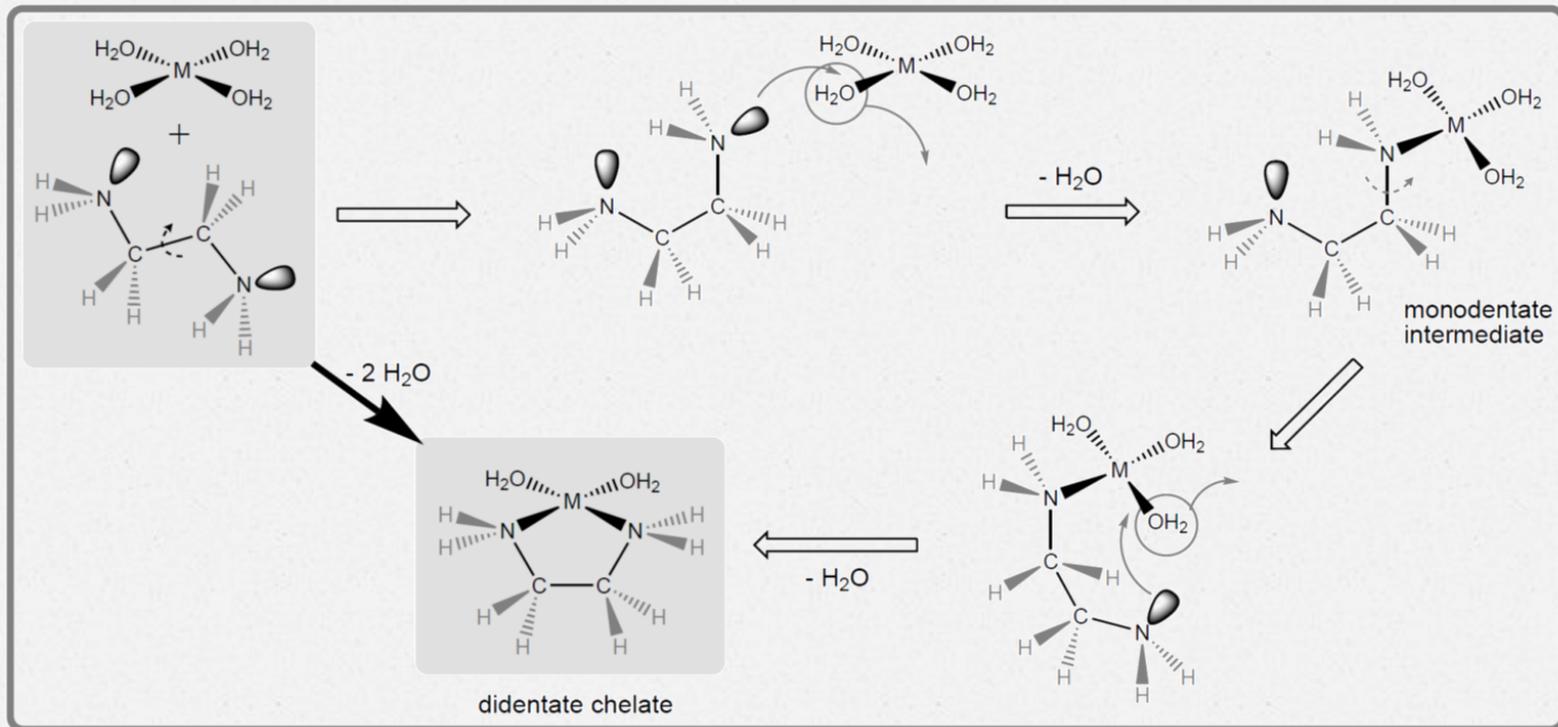


monodentate

bridging

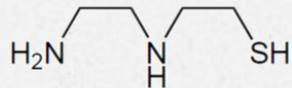


Proceso de quelación

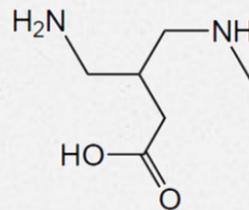


Los polis...

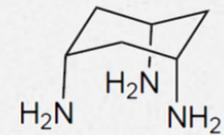
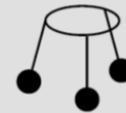
linear



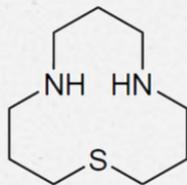
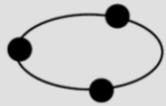
branched



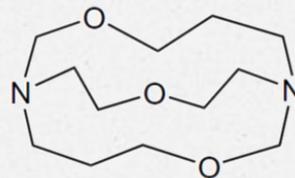
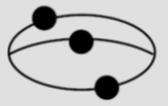
podal



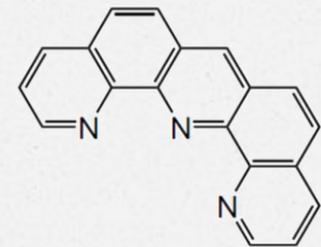
cyclic



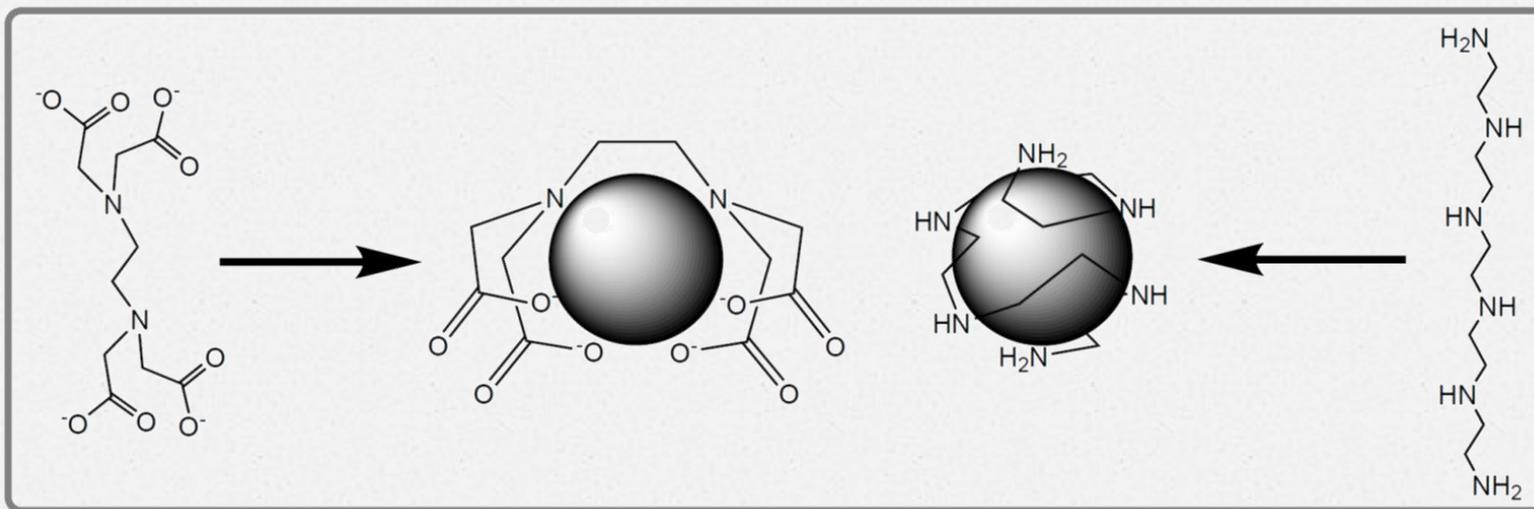
polycyclic



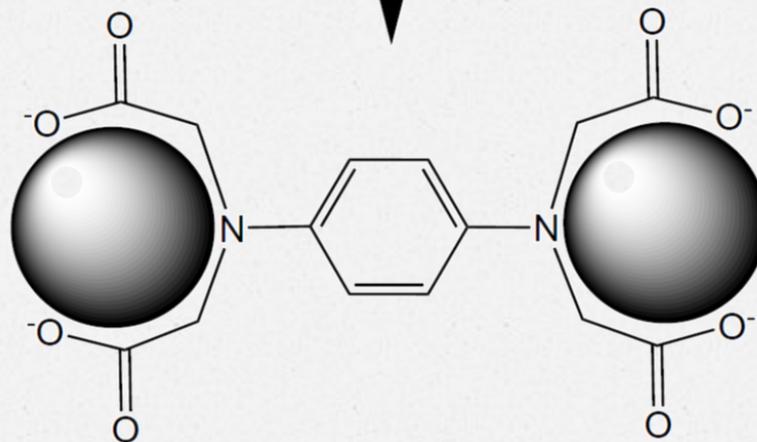
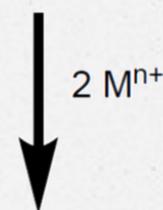
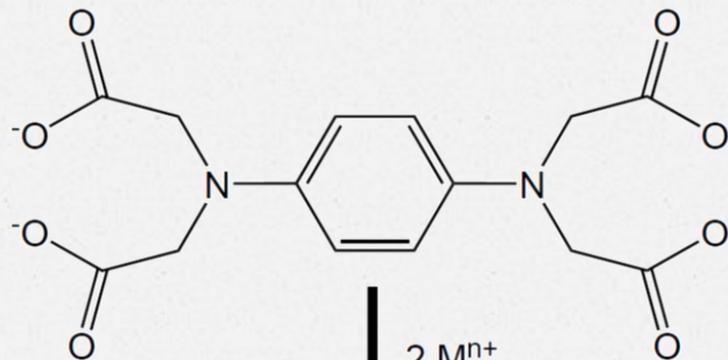
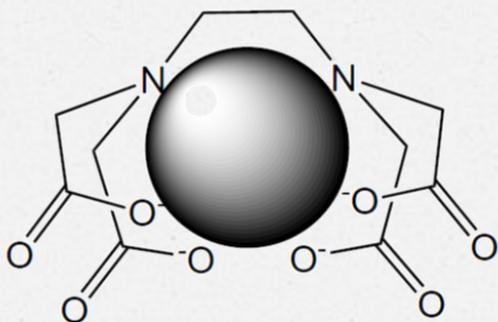
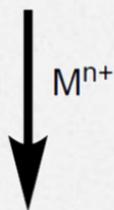
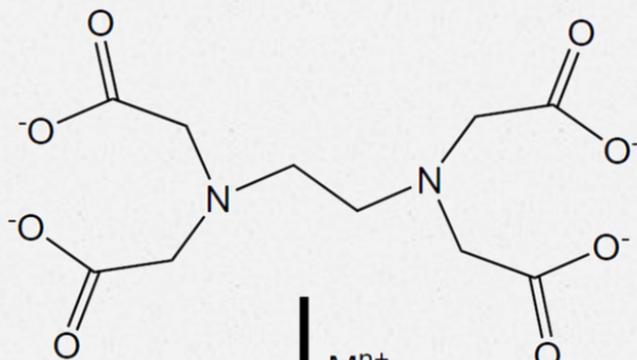
rigid aromatic



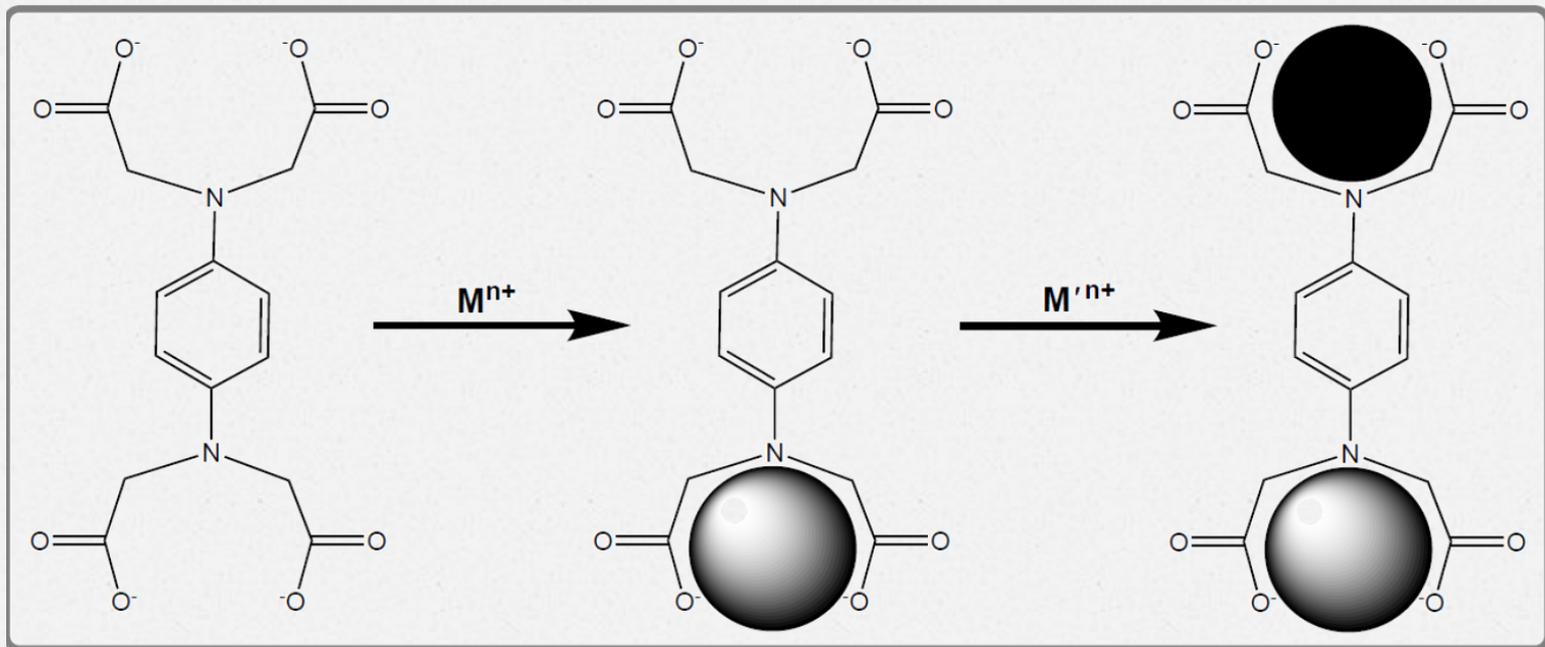
Seguimos con polis

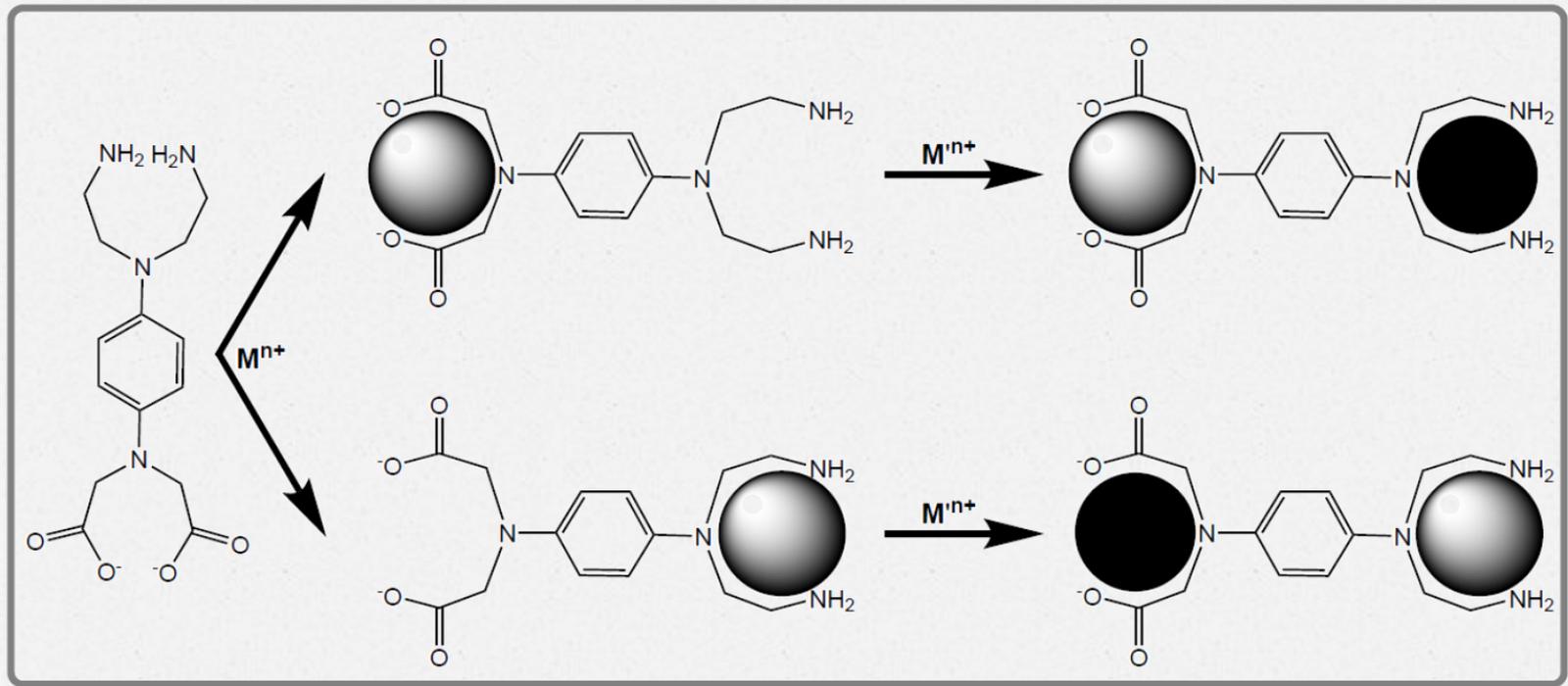


¿Y tu que tan flexible eres?

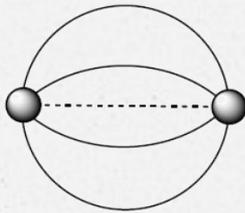


¿se valen las mezclas?

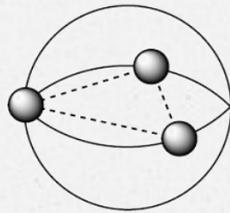




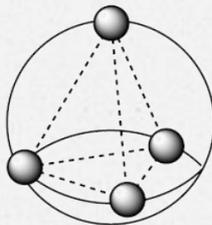
¿Y la geometría alrededor del metal central?



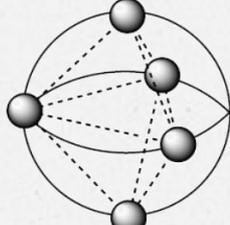
two point charges
linear



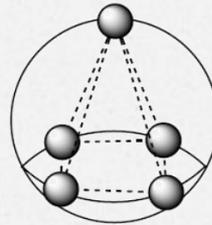
three point charges
trigonal planar



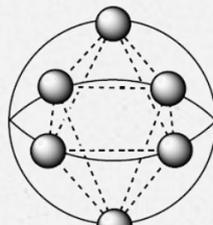
four point charges
tetrahedral



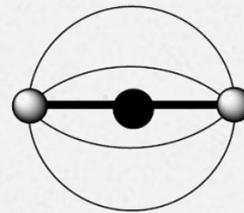
five point charges
trigonal bipyramidal



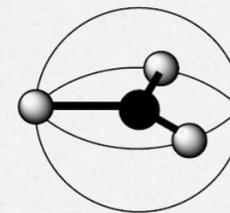
five point charges
square pyramidal



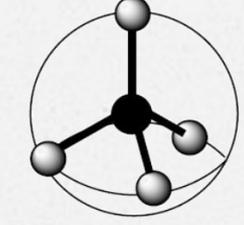
six point charges
octahedral



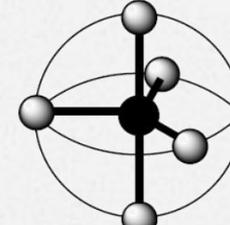
two-coordination
linear



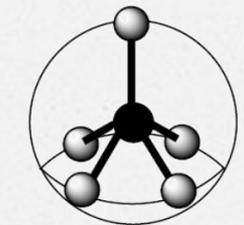
three-coordination
trigonal planar



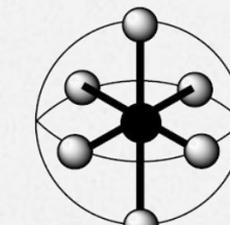
four-coordination
tetrahedral



five-coordination
trigonal bipyramidal

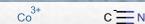
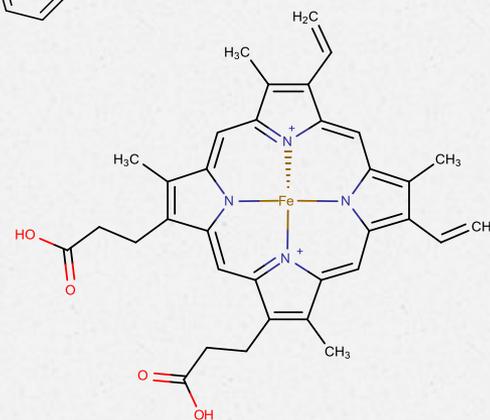
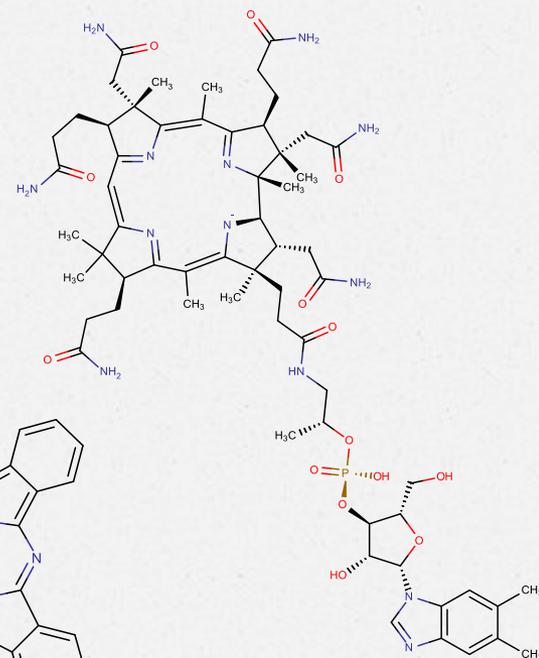
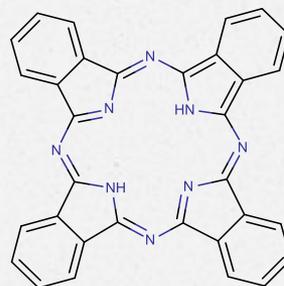
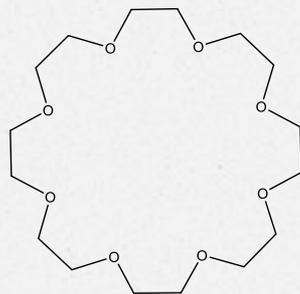
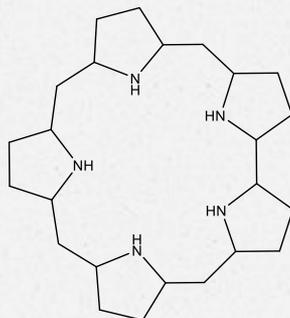
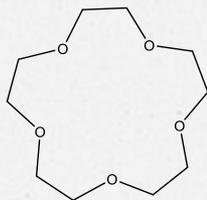
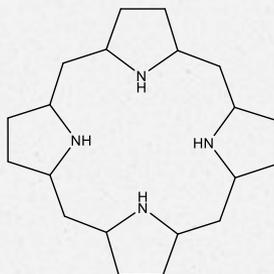
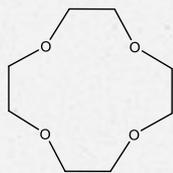


five-coordination
square pyramidal

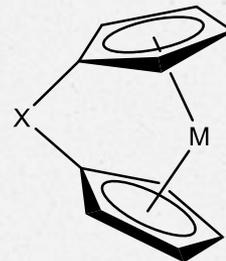
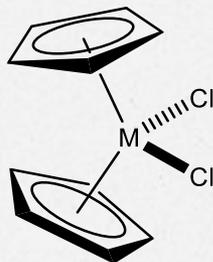
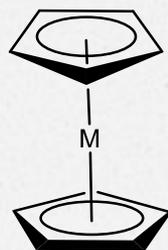
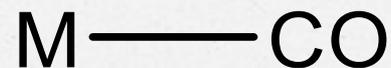


six-coordination
octahedral

Macrociclos



También el carbón actúa como base de Lewis



Pero eso se verá en organometálica.....