Donador aceptor

Jesús Gracia Mora

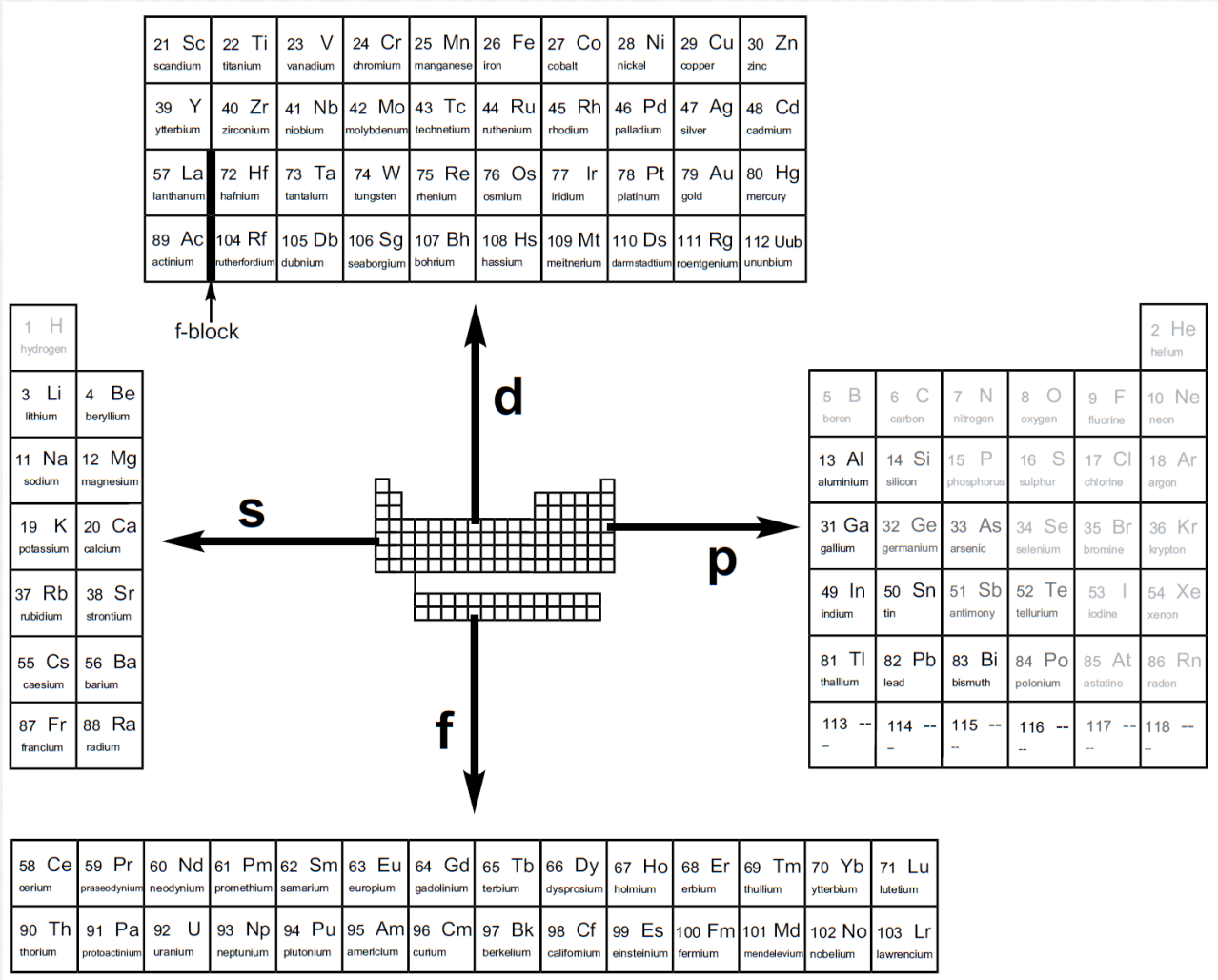
La clave está en……

- A + :D → A : D
- Base de Lewis más ácido de Lewis
- Es decir donador de pares electrónicos más aceptor de pares electrónicos

También la podemos escribir.

- A←:D ó A←D
- $Ag^+ + 2\ :NH_3 \rightarrow H_3N\text{-}Ag^+\text{-}NH_3$

¿Quién es el aceptor?



El átomo central

Sc scandium	Ti titanium	V vanadium	Cr chromium	Mn manganese	Fe iron	Co cobalt	Ni nickel	Cu copper	Zn 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

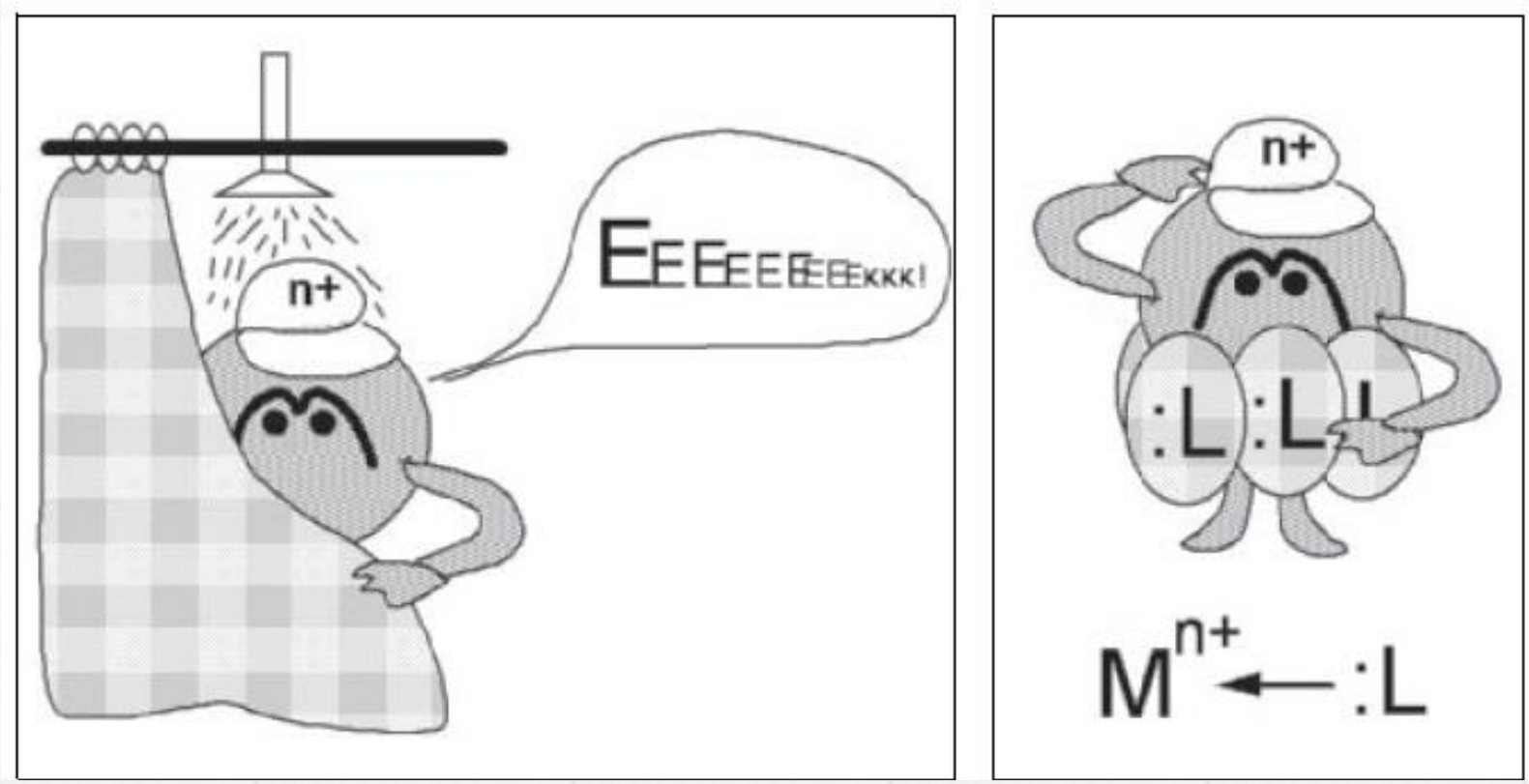
Recapitulando algunos conceptos

- 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
- Un enlace covalente coordinado se caracteriza porque un ligante con una átomo que dona un par de electrones (par libre) a un orbital vacío de un átomo central, ácido de Lewis (aceptor de pares electrónicos)

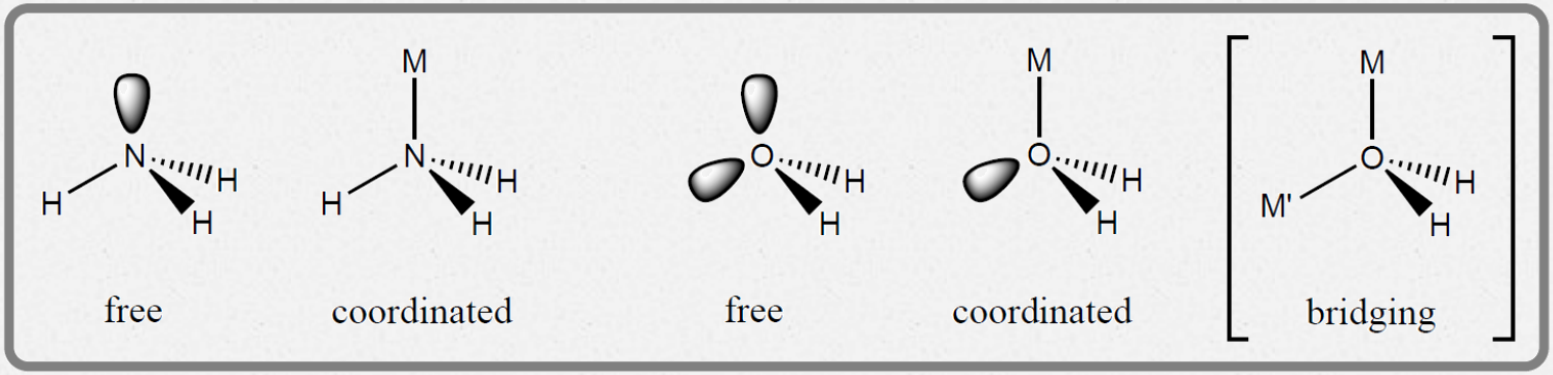
Recapitulando algunos conceptos

- Los iones metálicos pueden existir y formar complejos con diferentes estados de oxidación; esto es usual principalmente en los elementos del bloque «d».
- 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»

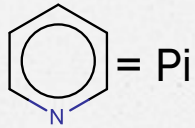


Algunos ligantes comunes y simples



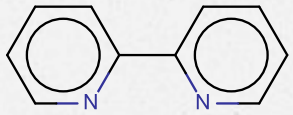
Algunos ligantes comunes y simples

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

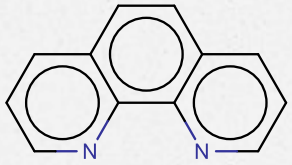


= Pi

Piridina



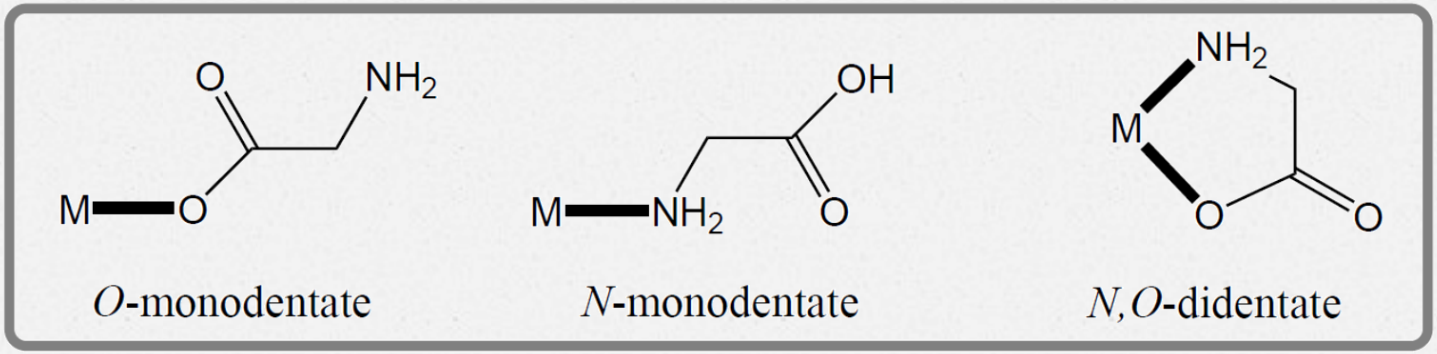
2, 2’ bipiridina= bipi



1, 10-fenantrolina

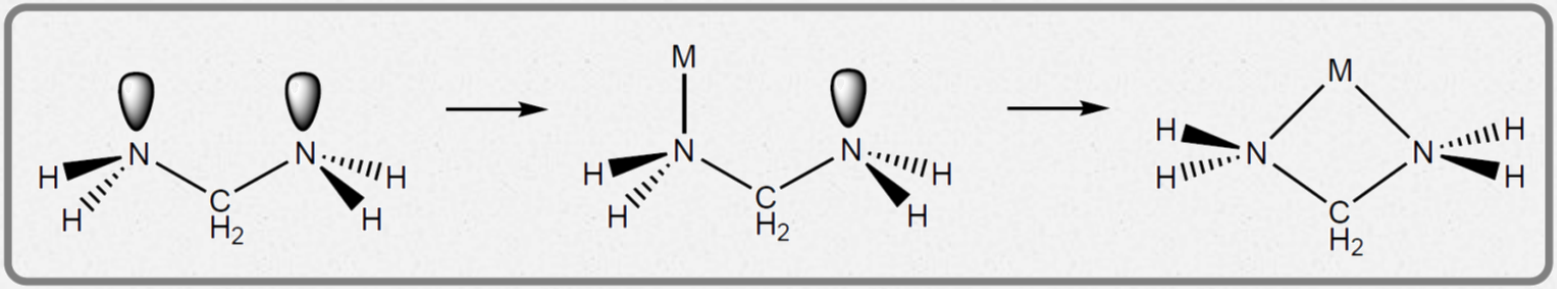
Los ligantes

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

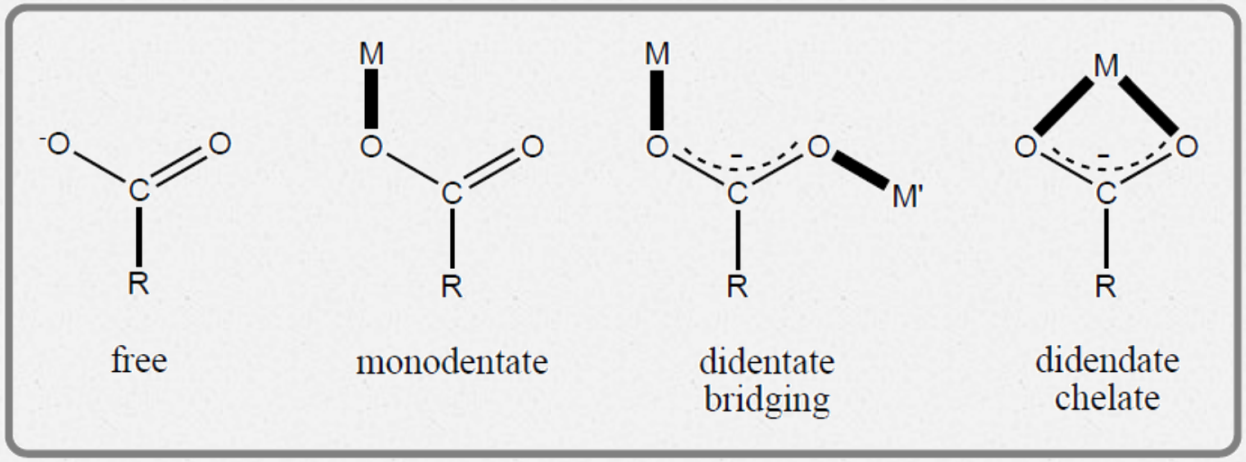


O-monodentate *N*-monodentate *N,O*-didentate

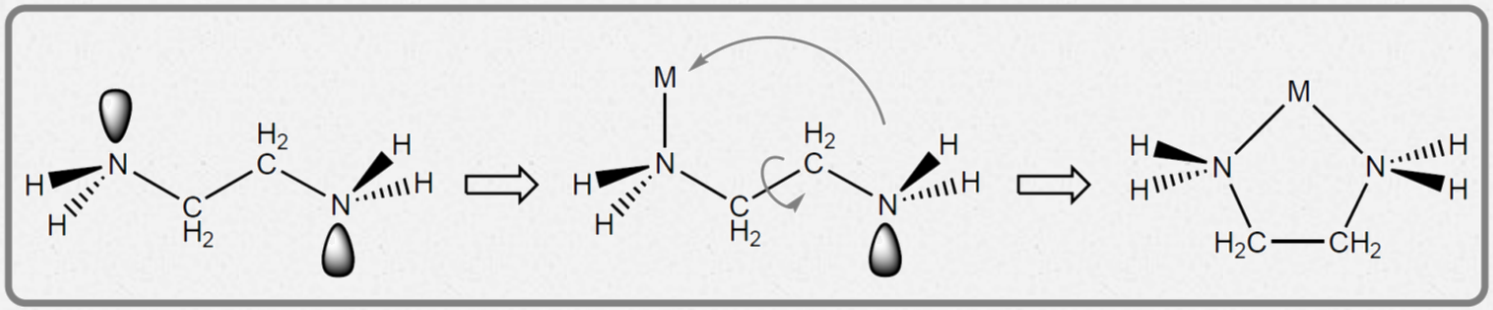
Algunos ligantes comunes y simples



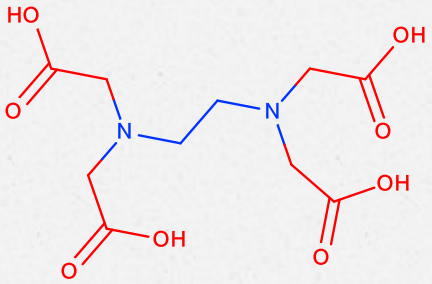
Los carboxilatos

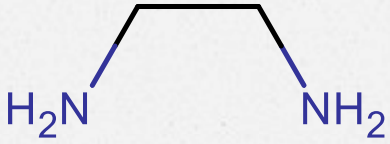


Bidentados; caso de la etilendiamina



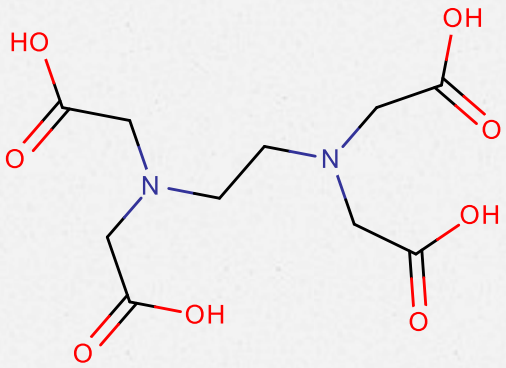
Muy Comunes

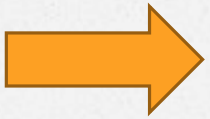


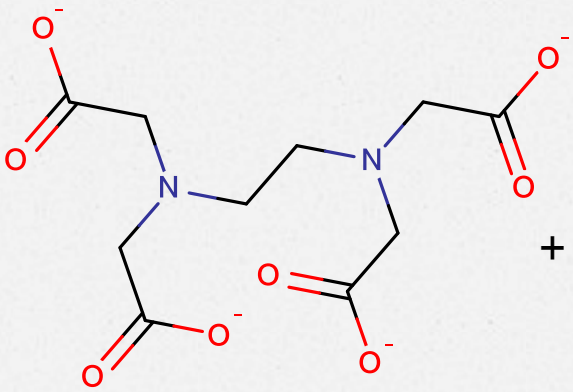


=en = etilen diamina

EDTA= ácido etilen diamin tetraacético

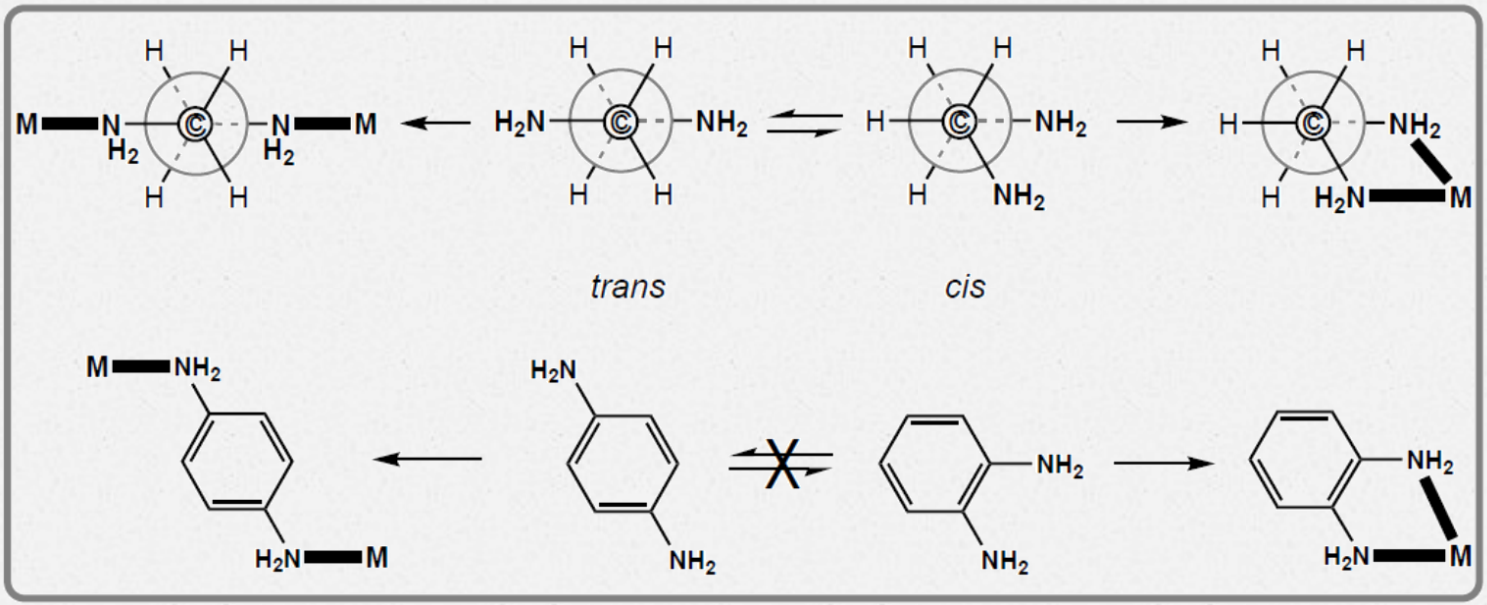




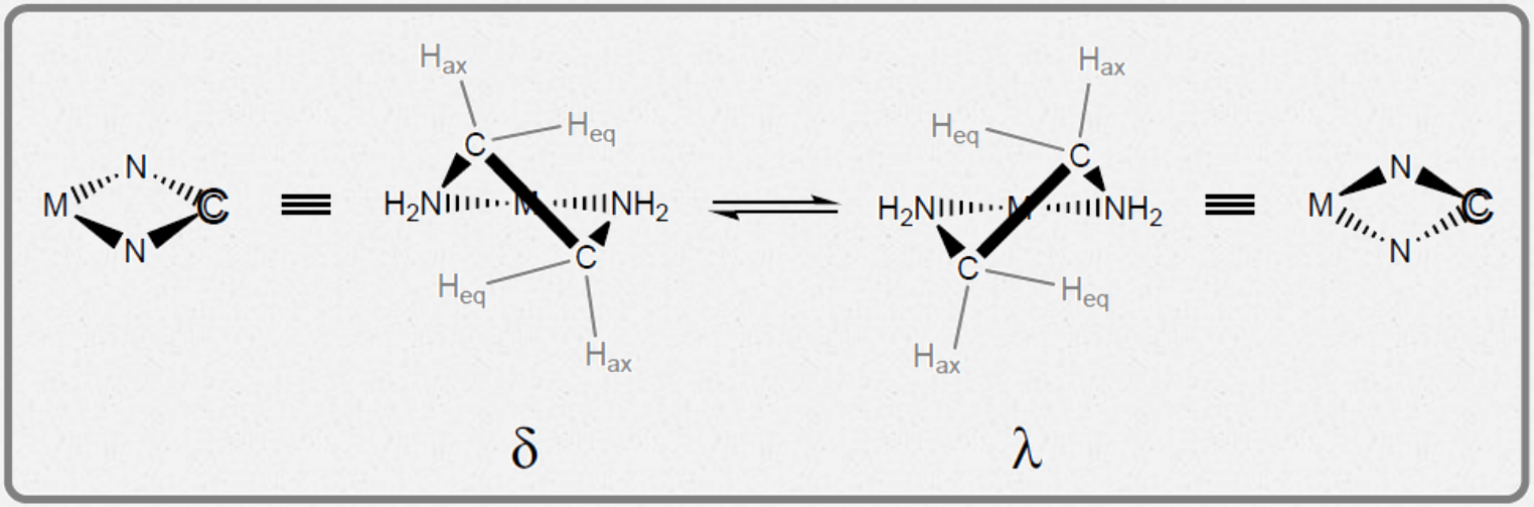


+ $4H^+$

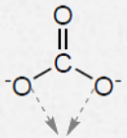
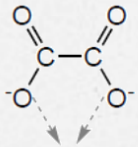
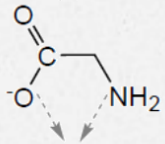
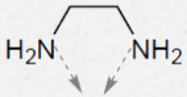
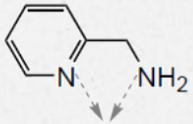
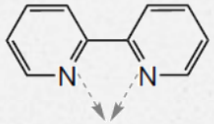
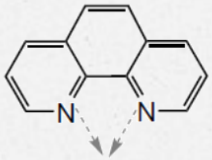
La orientación es importante

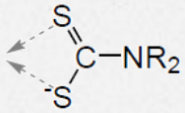
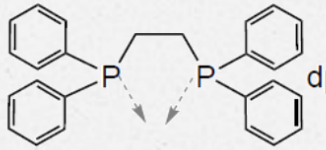
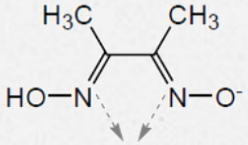
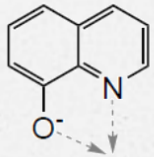
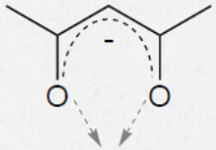
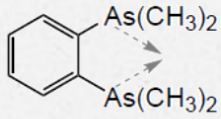


La formación de anillos

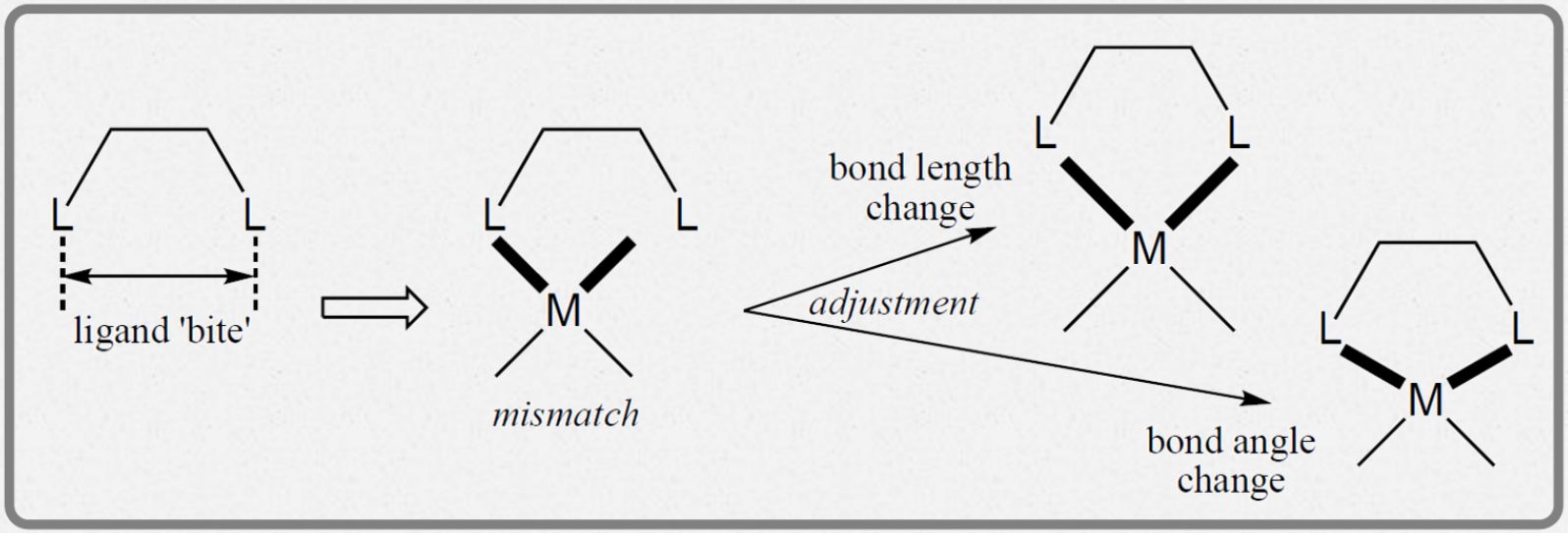


Algunos bidentados comunes

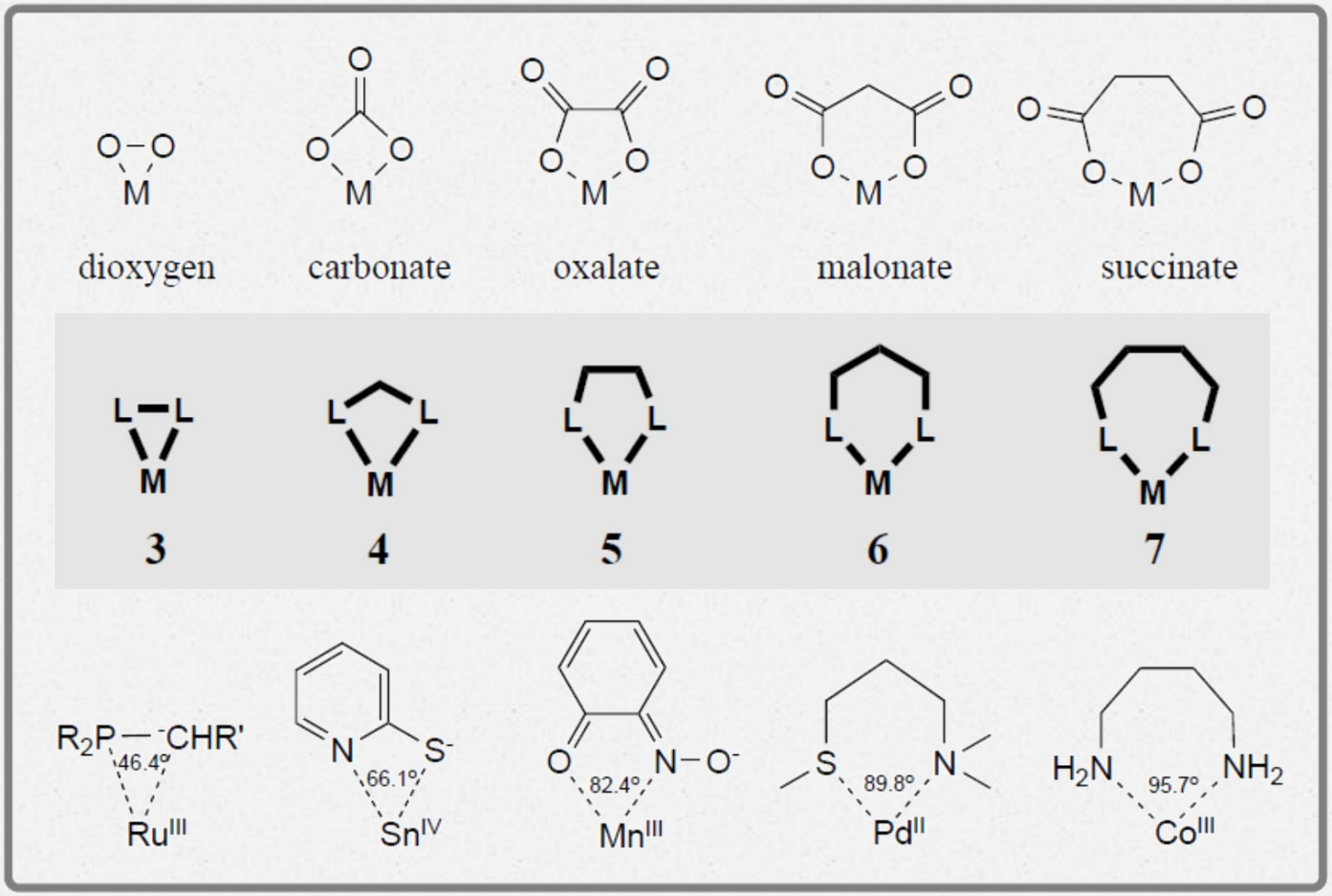
carbonato		CO_3^{2-}
oxalato		ox^{2-}
glycinato		gly^-
ethane-1,2-diamine		en
2-aminomethylpyridine		ampy
2,2'-bipyridine		bpy
1,10-phenanthroline		phen

dialkylcarbamodithioato (or dithiocarbamato)		dtc^-
1,2-ethanediyl-bis(diphenylphosphane)		dppe
dimethylglyoximato		dmg^-
8-hydroxyquinolinato		oxinate
2,4-dioxopentane-3-ido (or acetylacetonato)		acac
1,2-phenylene-bis(dimethylarsine)		diars

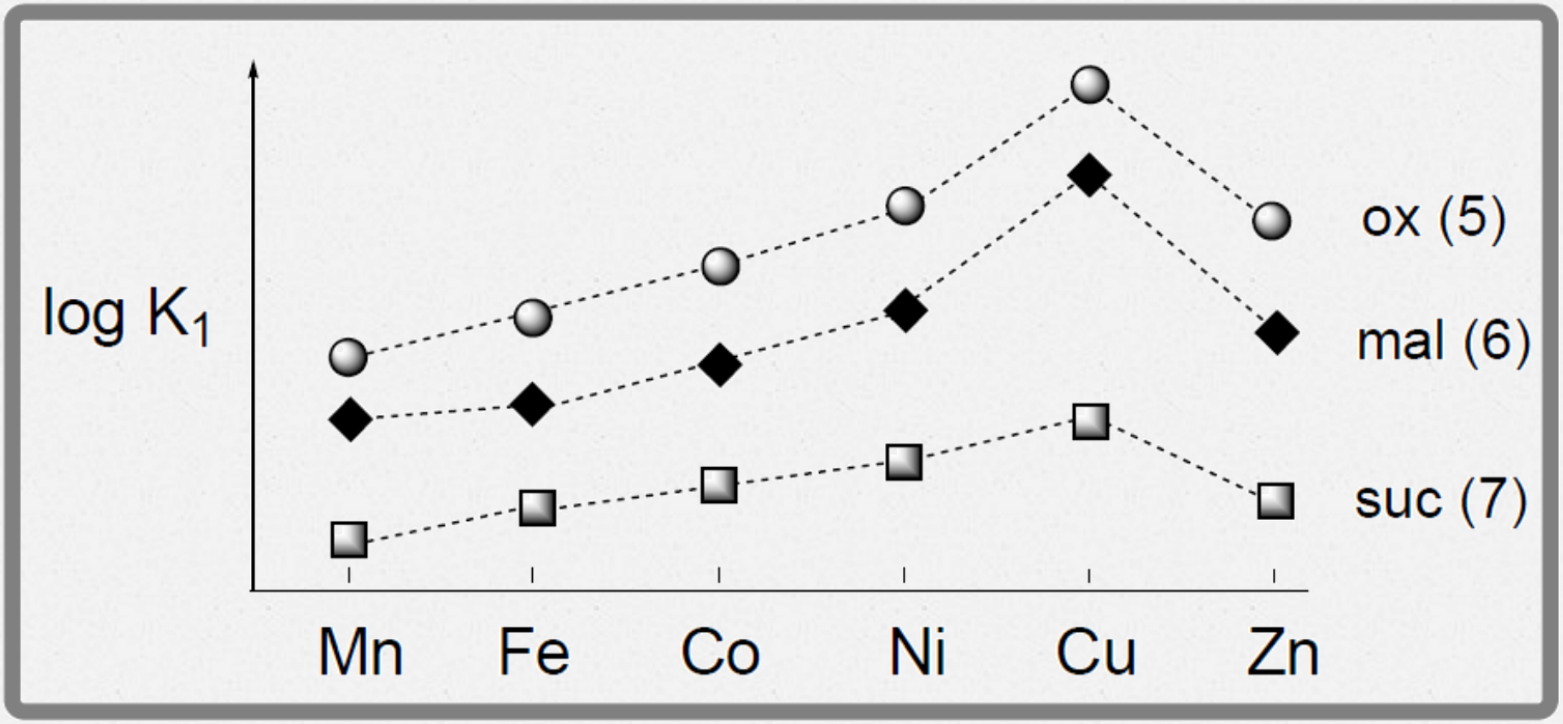
Para que un ligante bidentado actúe como tal se deben de cumplir algunos requisitos



Si se cambia la longitud de la cadena

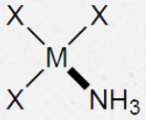


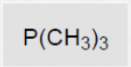
La estabilidad en función de la longitud de la cadena

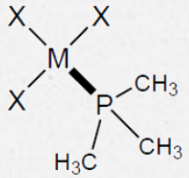


¿y tu cuantos dientes tienes?

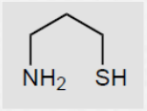
monodentate

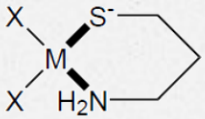


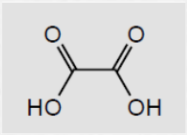


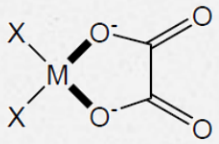


didentate

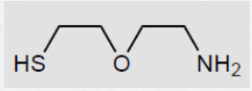


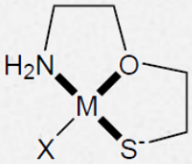


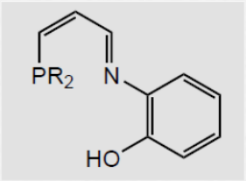


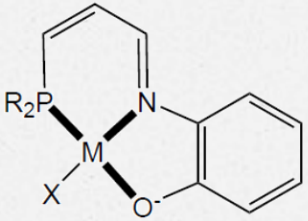


tridentate

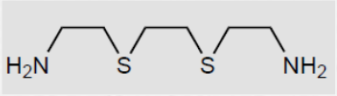


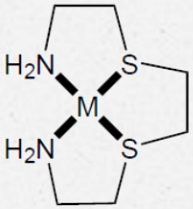


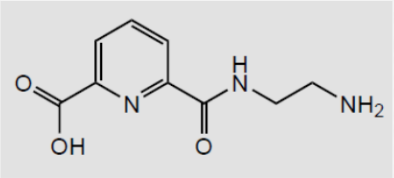


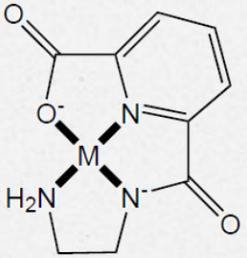


tetradentate

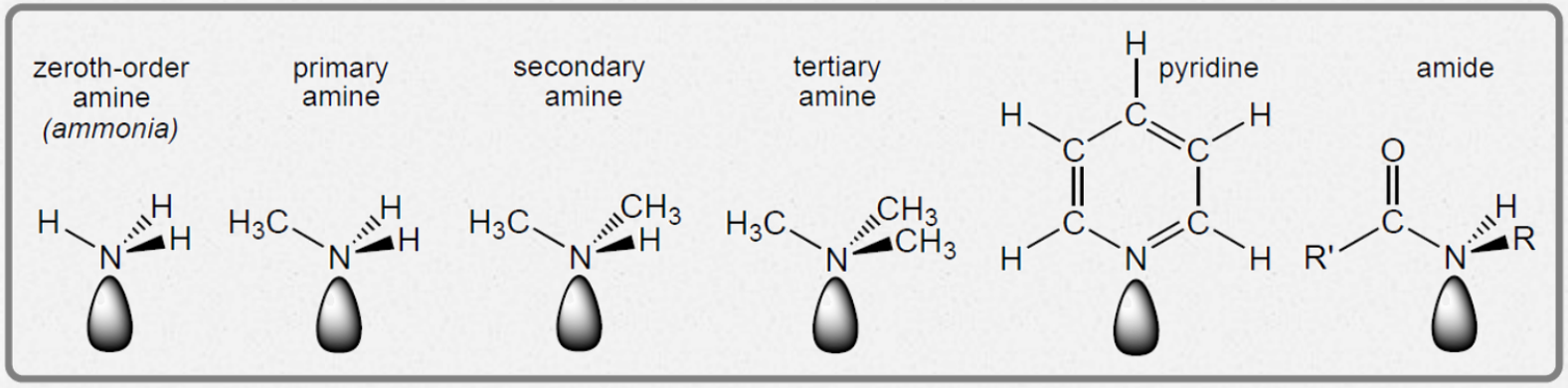


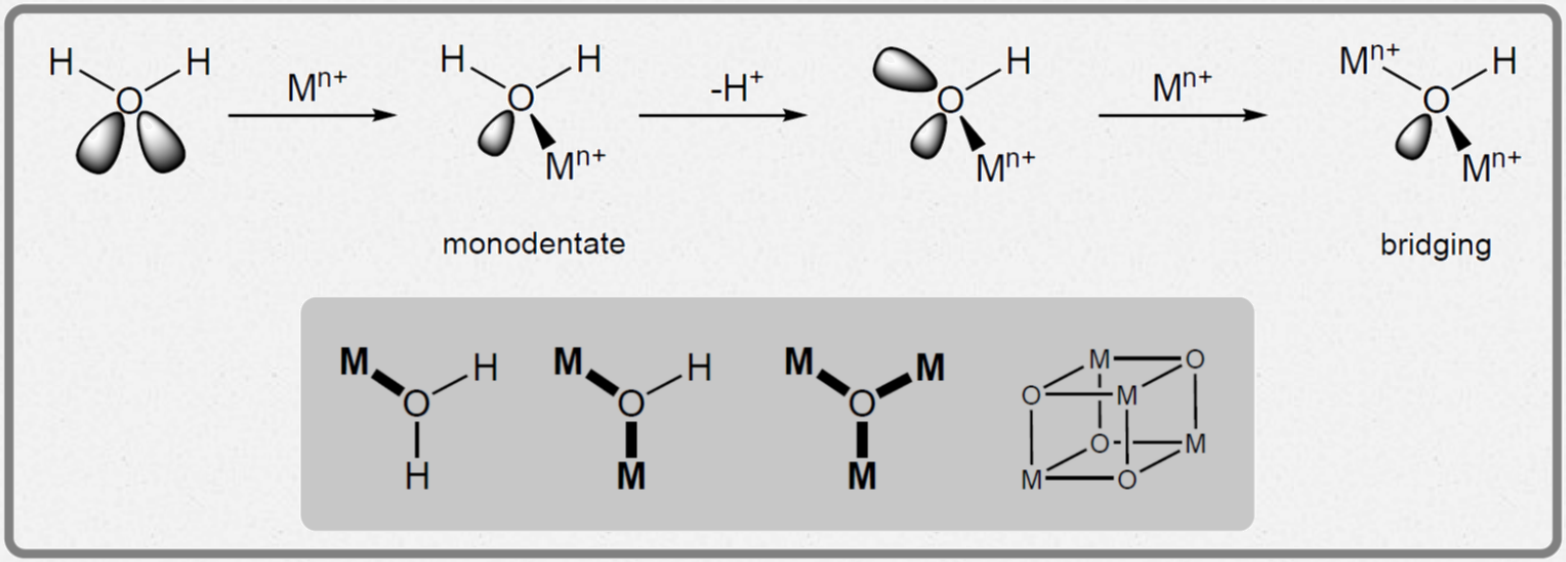




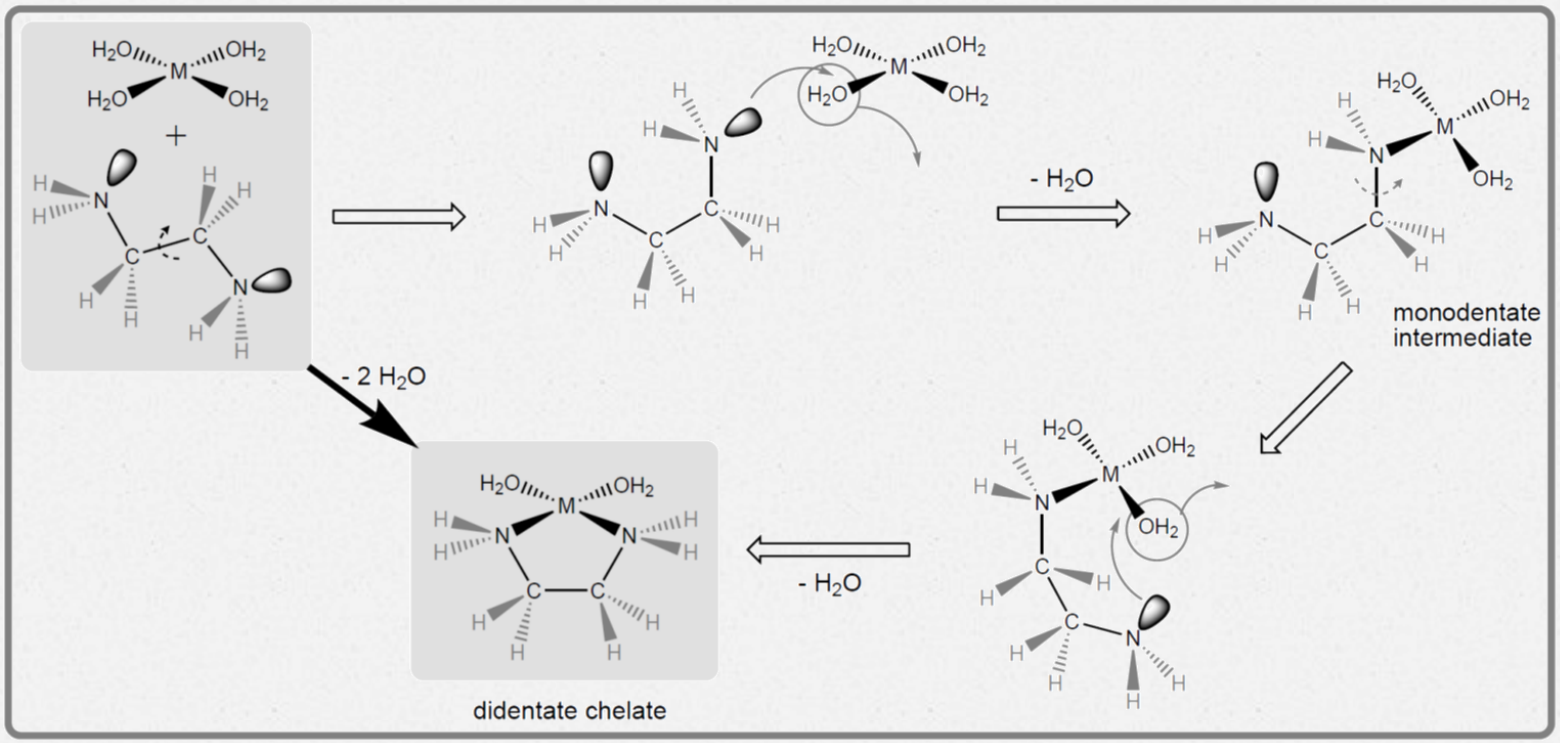


Monodentados

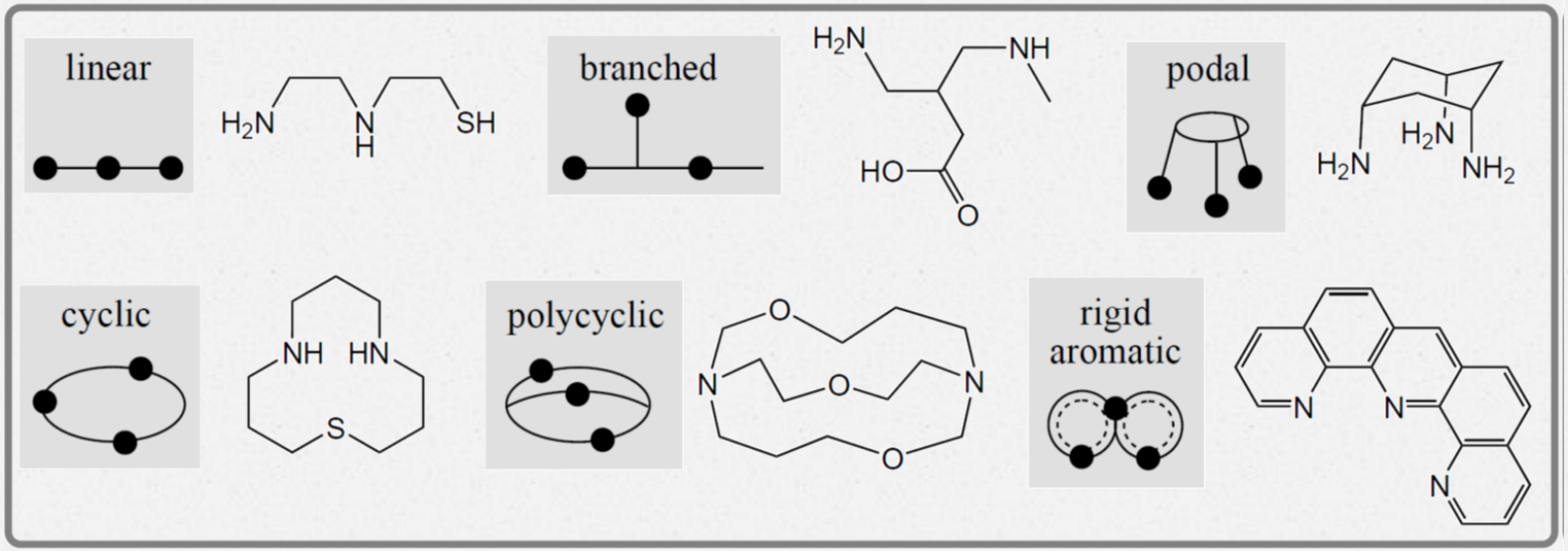




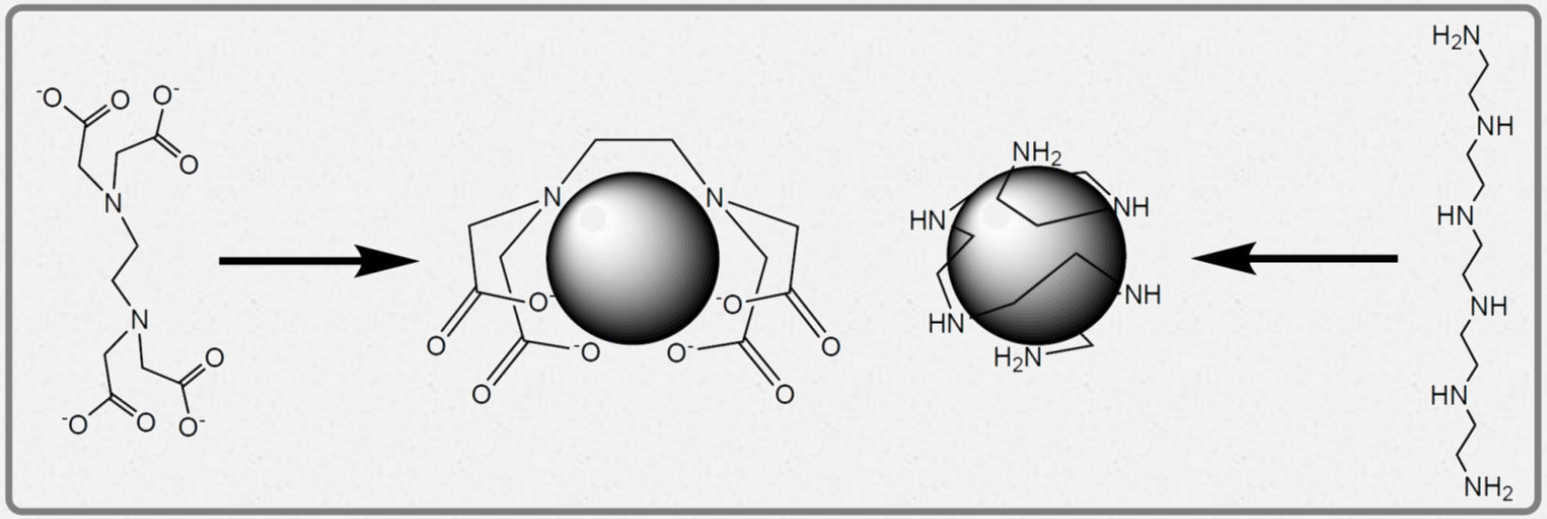
Proceso de quelación



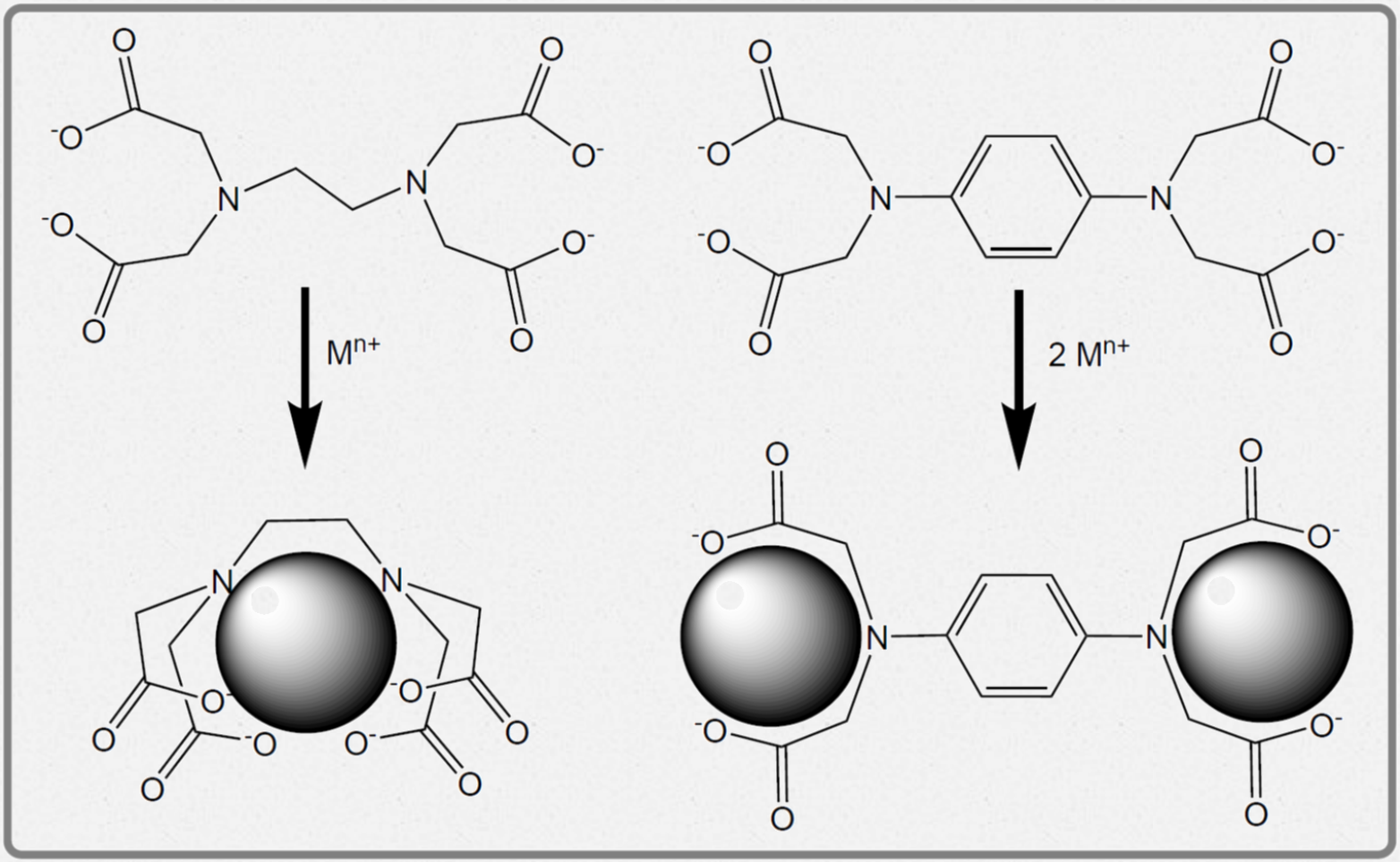
Los polis….


linear
H2N
N
H
SH
branched
H2N
NH
HO
O
podal
H2N
H2N
NH2
cyclic
NH
HN
S
polycyclic
O
N
O
N
O
rigid
aromatic
N
N
N

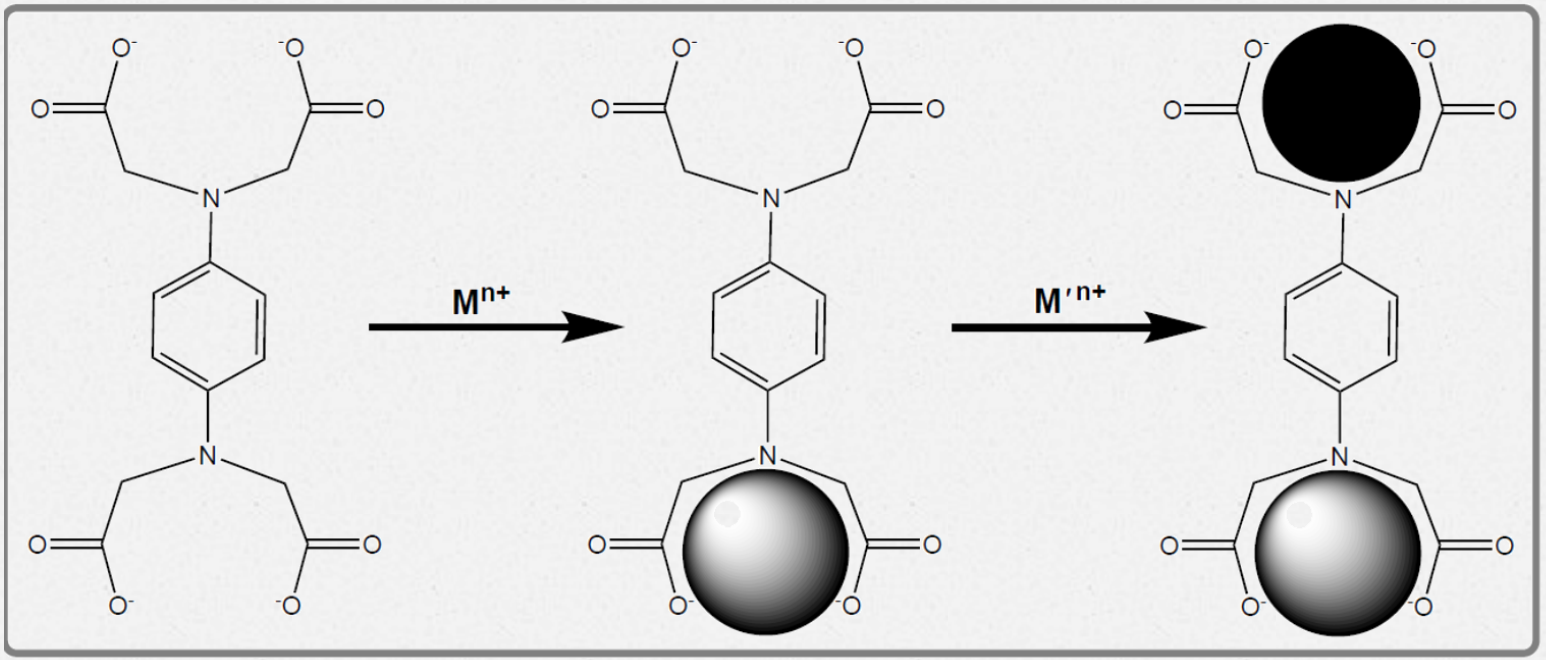
Seguimos con polis

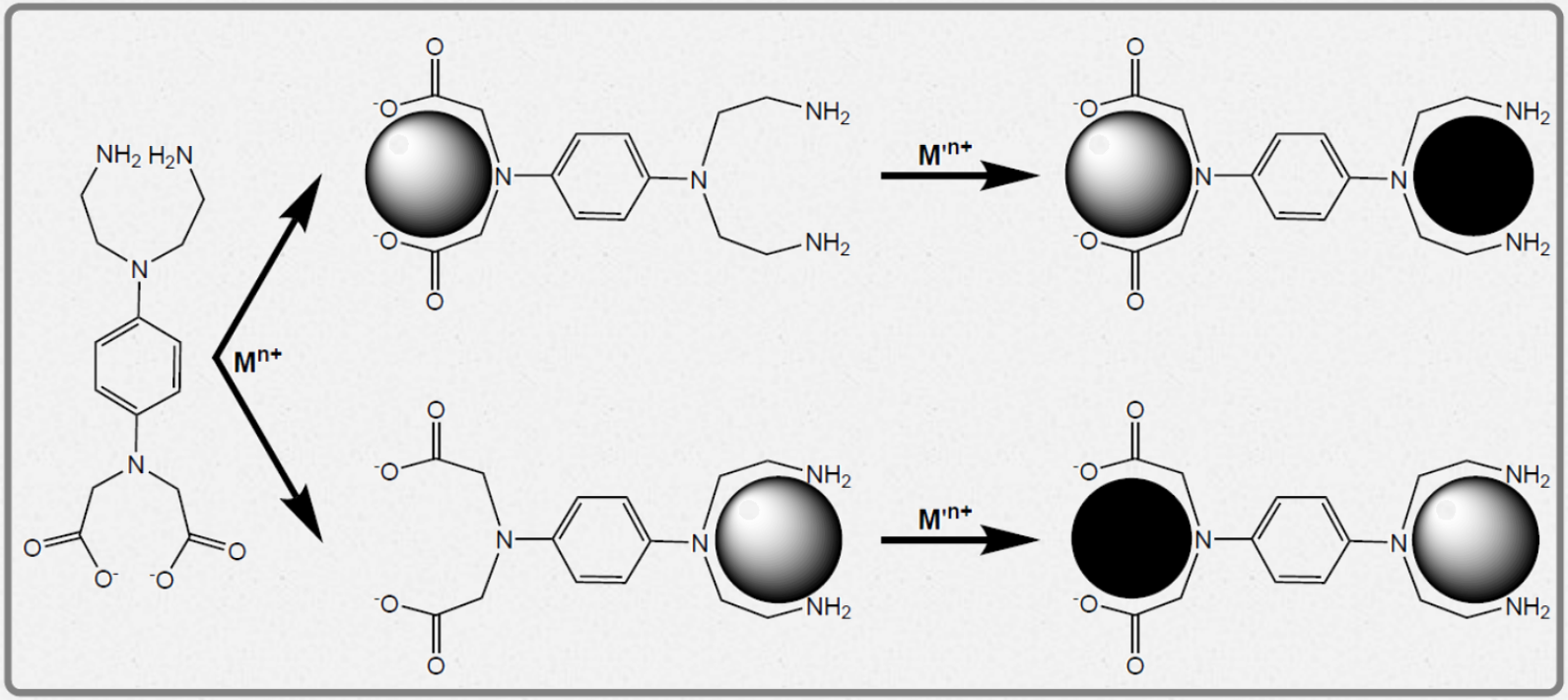


¿Y tu que tan flexible eres?

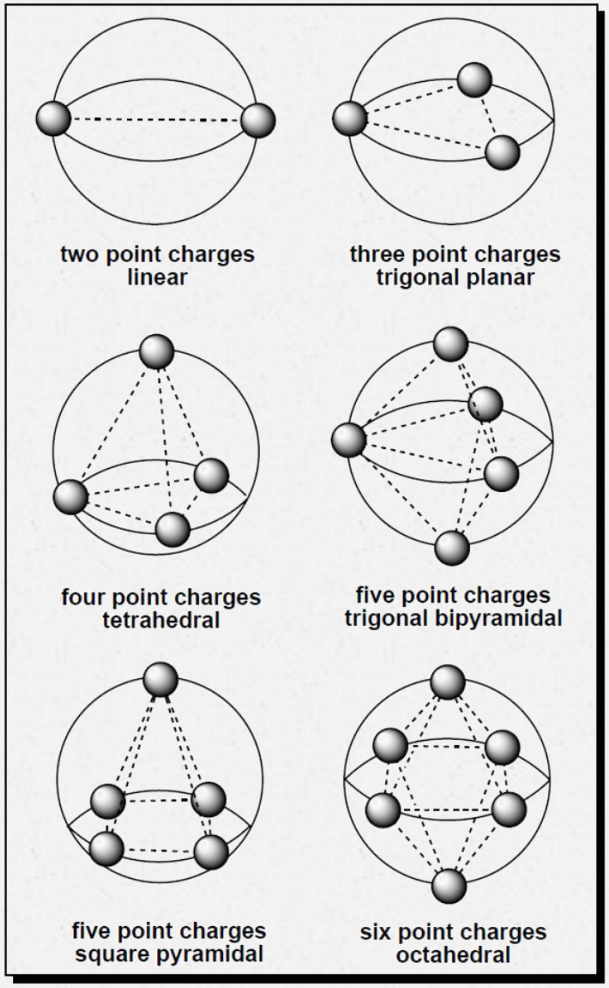


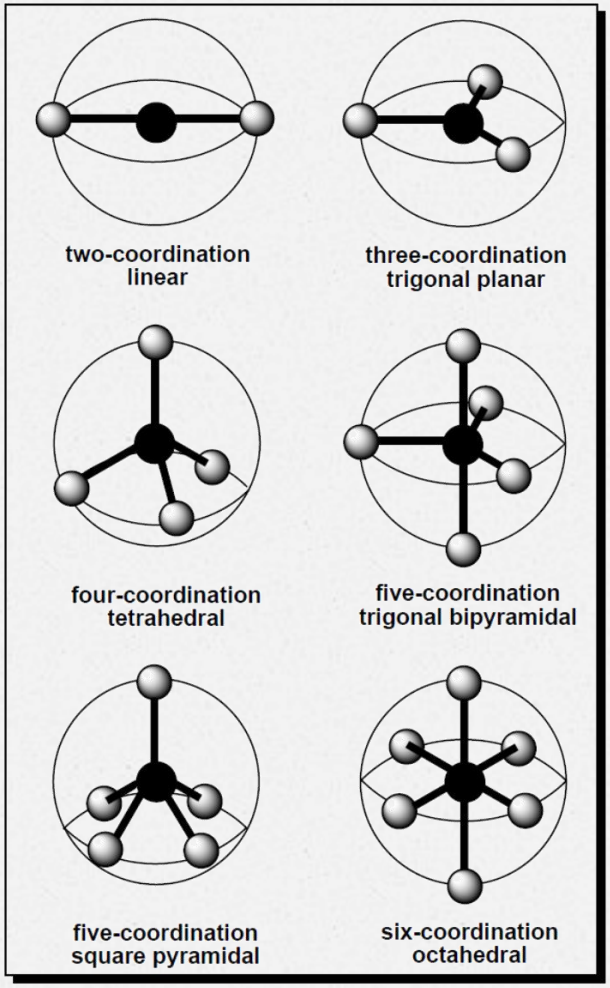
¿se valen las mezclas?



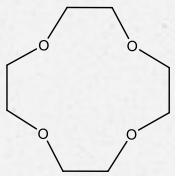

NH2 H2N
N
N
O
O-
O-
O
Mn+
NH2
NH2
M'n+
M'n+

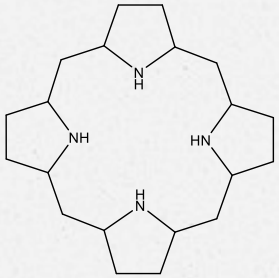
¿Y la geometría alrededor del metal central?

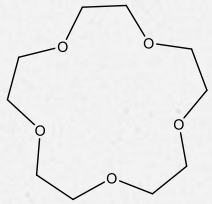


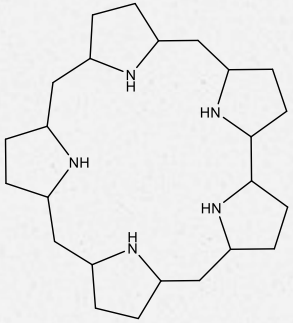


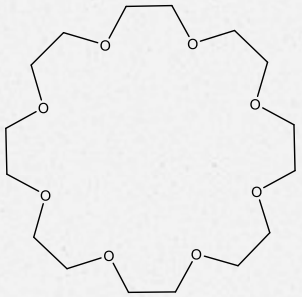
Macrociclos

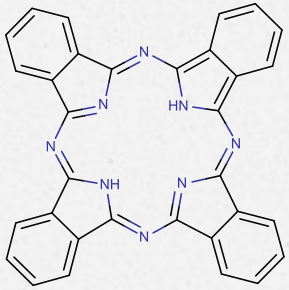


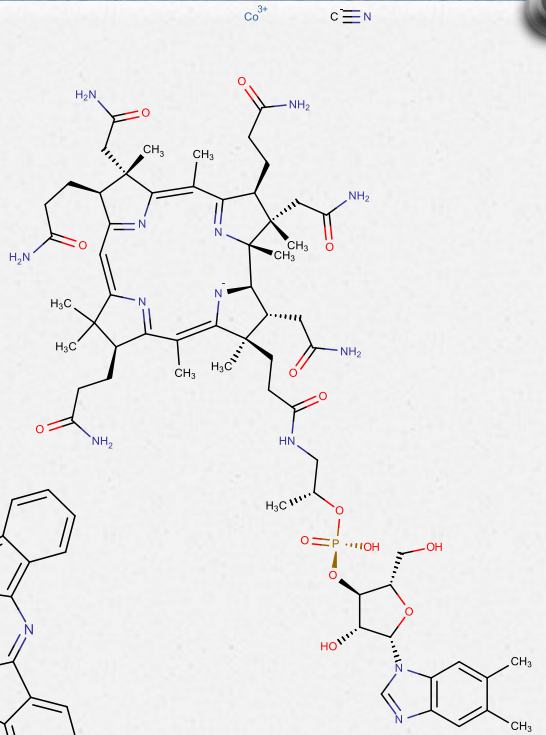


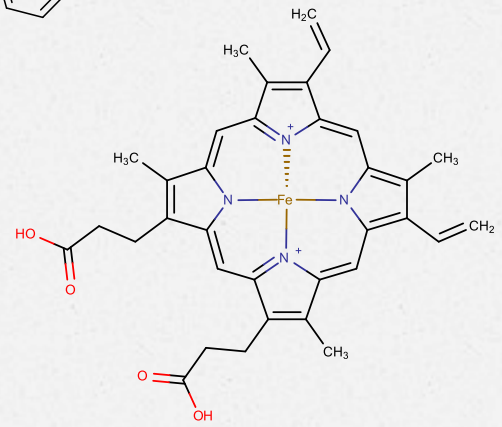






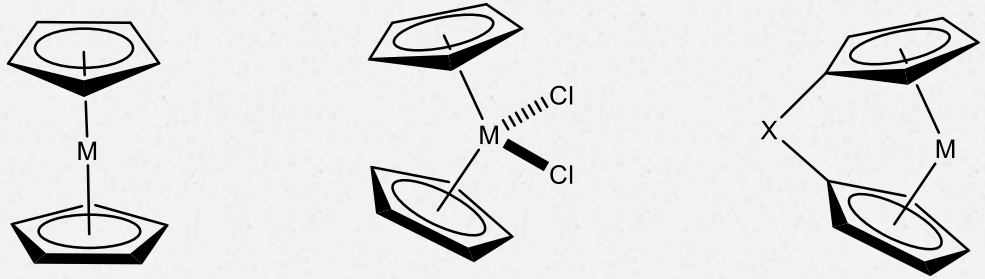






También el carbón actúa como base de Lewis

M——CO



Pero eso se verá en organometálica.....