Attinidi

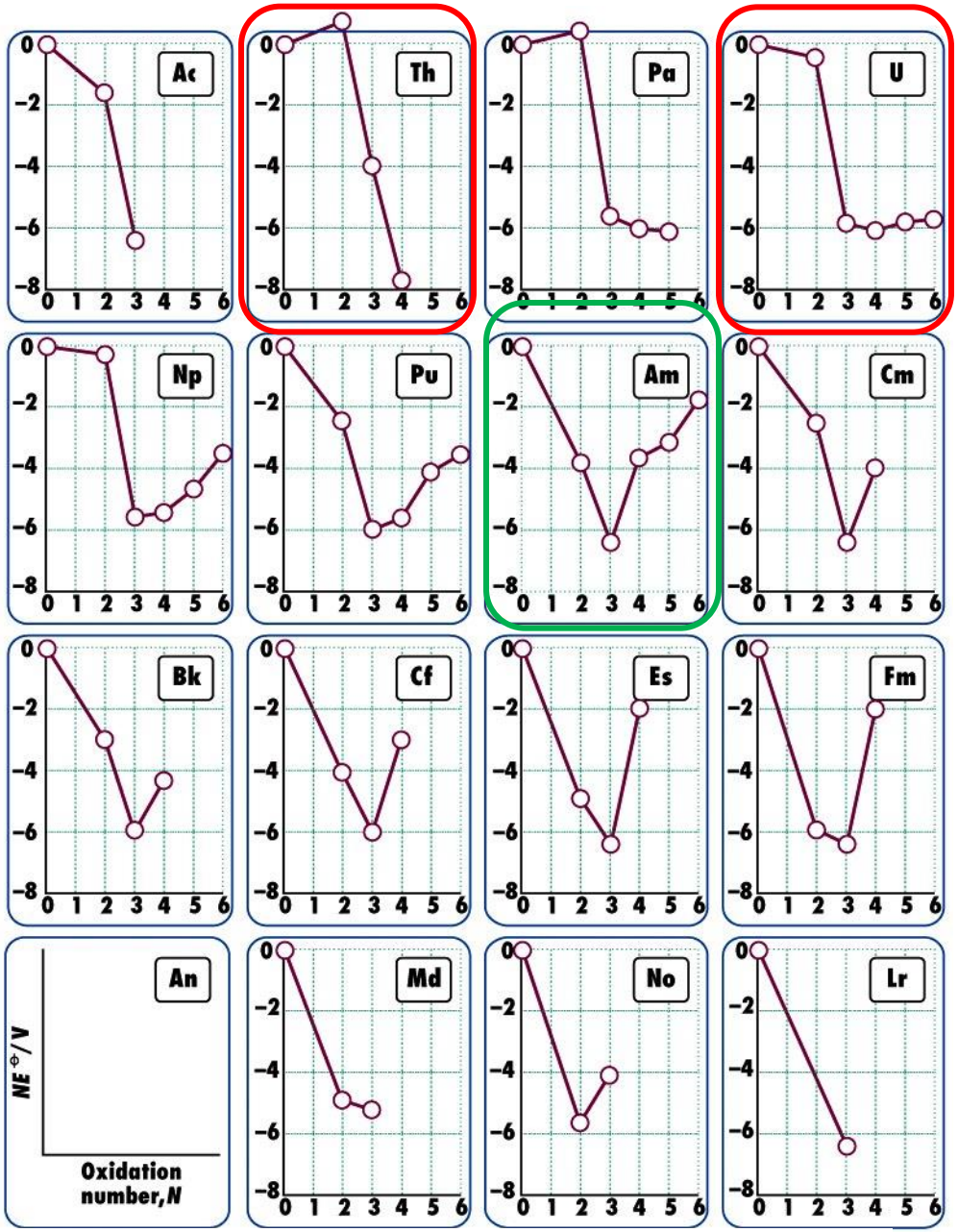
$5f^1$ $5f^{14}$

Attinide generico = An, $5f^n6d^17s^2$

Table 22.1 Half-lives of the most stable actinoid isotopes

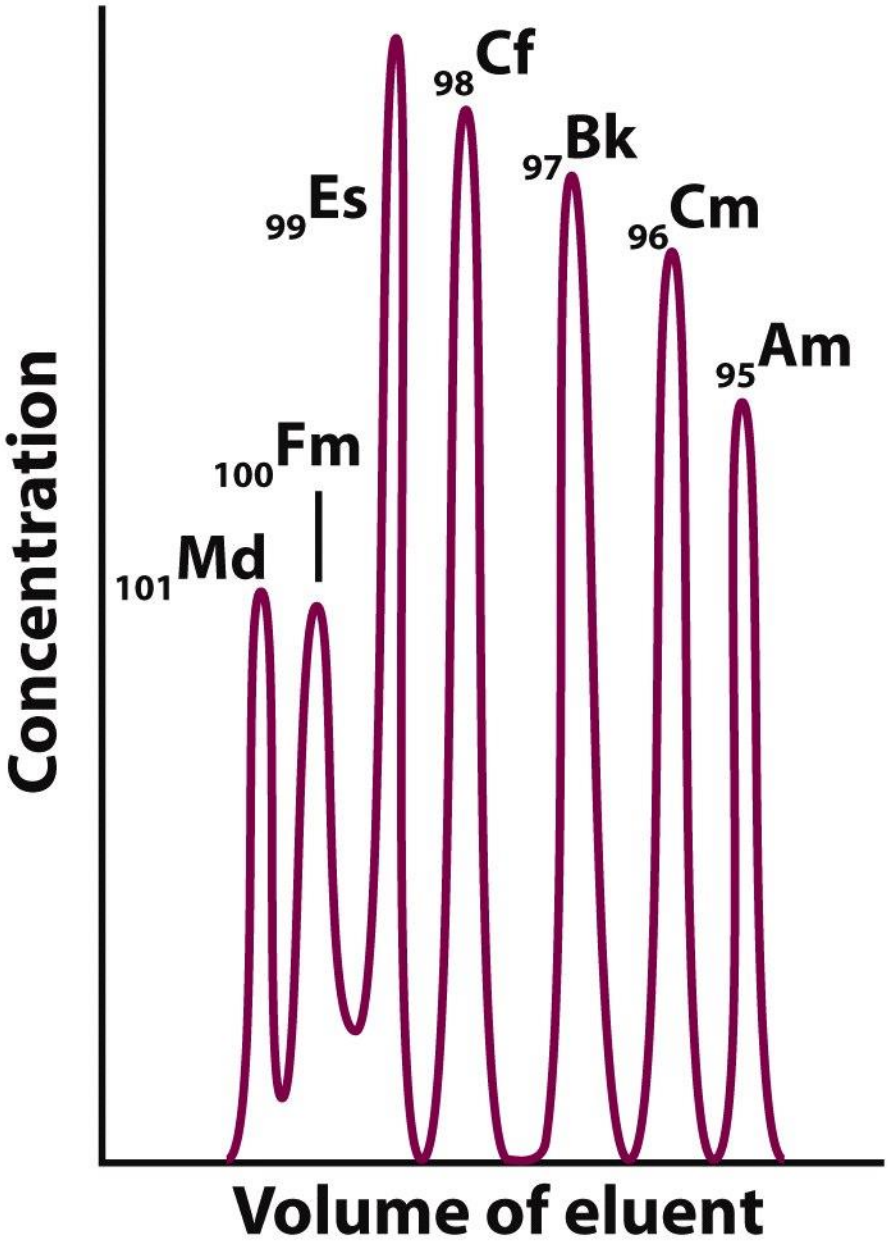
Z	Name	Symbol	Mass number	$t_{\frac{1}{2}}$
89	Actinium	Ac	227	21.8 years
90	Thorium	Th	232	1.41×10^{10} years
91	Protactinium	Pa	231	3.28×10^{4} years
92	Uranium	U	238	4.47×10^{9} years
93	Neptunium	Np	237	2.14×10^{6} years
94	Plutonium	Pu	244	8.1×10^{7} years
95	Americium	Am	243	7.38×10^{3} years
96	Curium	Cm	247	1.6×10^{7} years
97	Berkelium	Bk	247	1.38×10^{3} years
98	Californium	Cf	251	900 years
99	Einsteinium	Es	252	460 days
100	Fermium	Fm	257	100 days
101	Mendelevium	Md	258	55 days
102	Nobelium	No	259	1.0 h
103	Lawrencium	Lr	260	3 min

$ThSiO_4$ *torite* UO_2 *uranite* U_3O_8 *pechblenda*


Ac
Th
Pa
U
Np
Pu
Am
Cm
Bk
Cf
Es
Fm
An
Md
No
Lr
0
−2
−4
−6
−8
0 1 2 3 4 5 6
NE° / V
Oxidation number, N

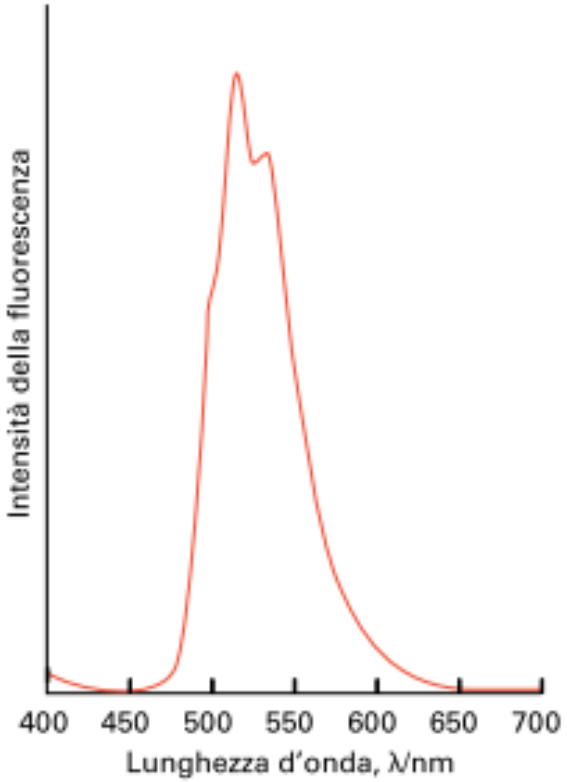
$5f^3 6d^1 7s^2$

Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
						2			2	2	2	2	2	
3			3	3	3	3	3	3	3	3	3	3	3	3
	4	4	4	4	4	4	4	4	4					
		5	5	5	5	5								
			6	6	6	6								
				7	7									

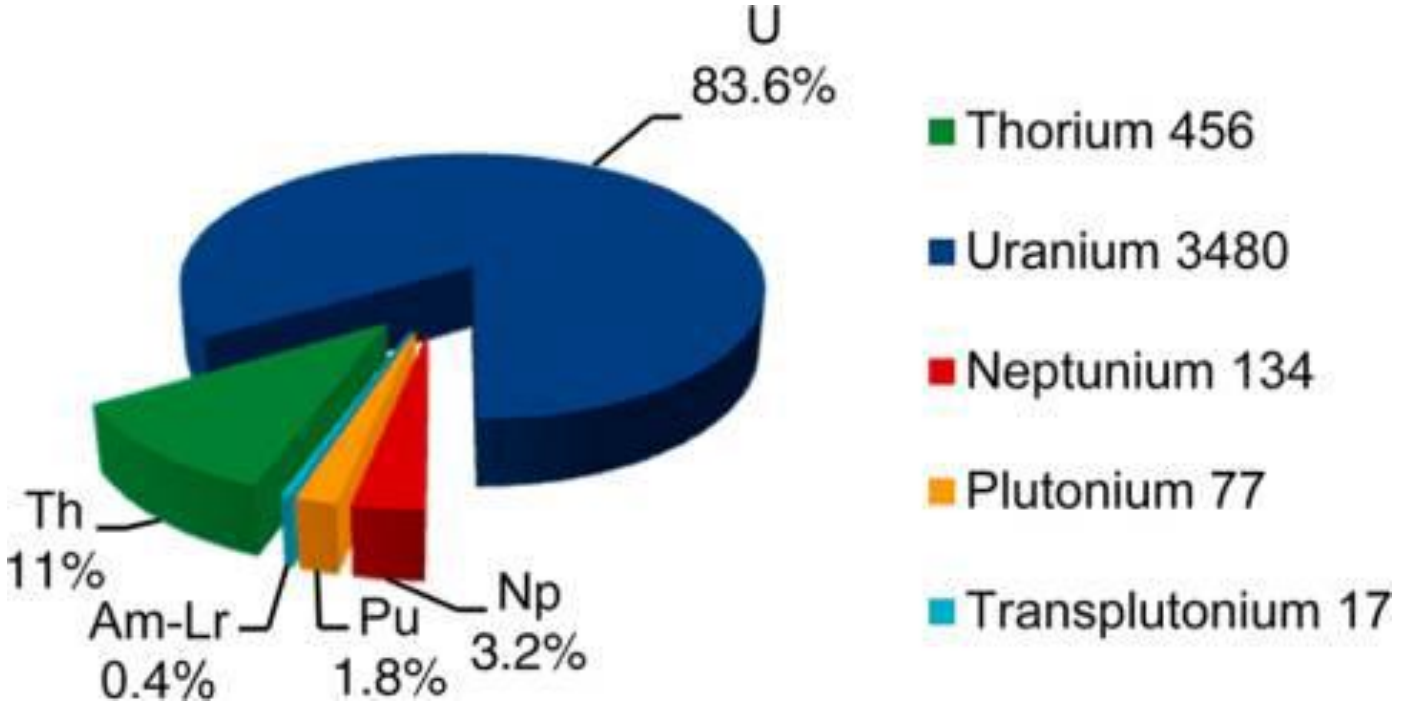


Eluizione degli ioni più pesanti degli attinidi da una colonna a scambio di cationi usando 2-idrossiisobutirrato di ammonio come eluente.

Spettro di fluorescenza dello ione uranile, UO_2^{2+} in acqua

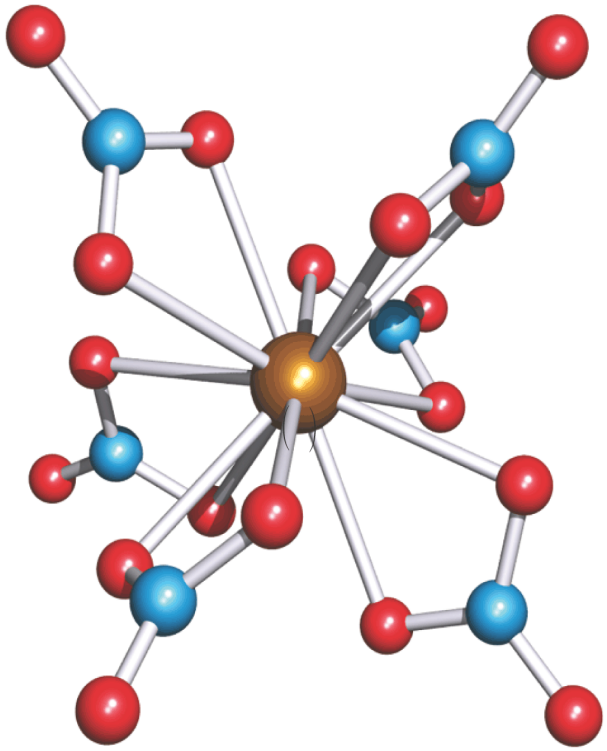


Numerosità delle strutture note di complessi con attinidi (2012)



Cfr. Fe > 33.300, Cu > 41.600

$[Th(NO_3)_6]^{2-}$



Separazione dei radionuclidi trans-plutonici da uranio, plutonio e lantanidi di fissione

Longest-lived isotope	Half-life	Decay mode
^{227}Ac	21.8 yr	β^-
^{232}Th	1.4×10^{10} yr	α, γ
^{231}Pa	3.3×10^{4} yr	α, γ
^{238}U	4.5×10^{9} yr	α, γ
^{237}Np	2.1×10^{6} yr	α, γ
^{244}Pu	8.2×10^{7} yr	α, γ
^{243}Am	7.4×10^{3} yr	α, γ
^{247}Cm	1.6×10^{7} yr	α, γ

Longest-lived isotope	Half-life	Decay mode
^{247}Bk	1.4×10^{3} yr	α, γ
^{251}Cf	9.0×10^{2} yr	α, γ
^{252}Es	1.3 yr	α
^{257}Fm	100 d	α, γ
^{258}Md	52 d	α
^{259}No	58 min	α
^{262}Lr	3 min	α

Un reattore da 1GW produce ogni anno ca.30 tonnellate di combustibile nucleare esausto: ^{238}U + ^{235}U + ^{239}Pu (0.2 t) + Np, Am, Cm (0.02 t) + lantanidi di fissione + …..

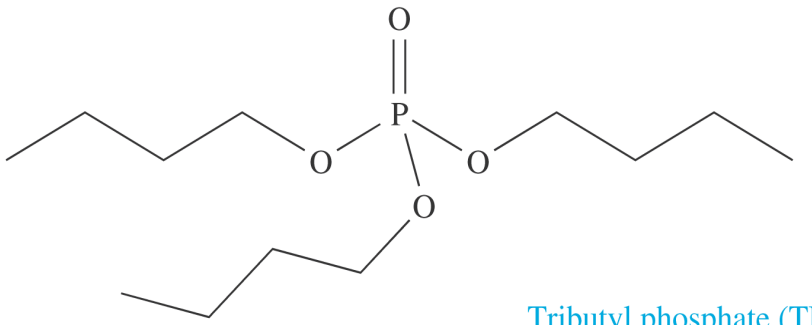
Separazione dei radionuclidi trans-plutonici da uranio, plutonio e lantanidi di fissione

PUREX (Plutonium/URanium EXtraction)
U(VI) + Pu(IV)

TRUEX (TRansUranic elements EXtraction)
Am(III) + Cm(III) + lantanidi di fissione

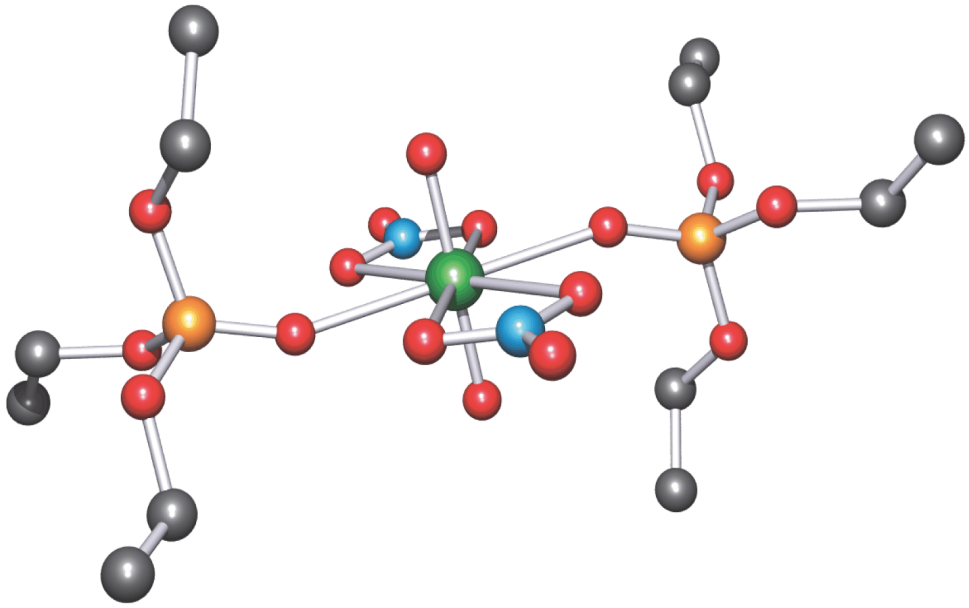
SANEX (Selective ActiNide EXtraction)
Am(III) + Cm(III)

TPB (processi PUREX e TRUEX)

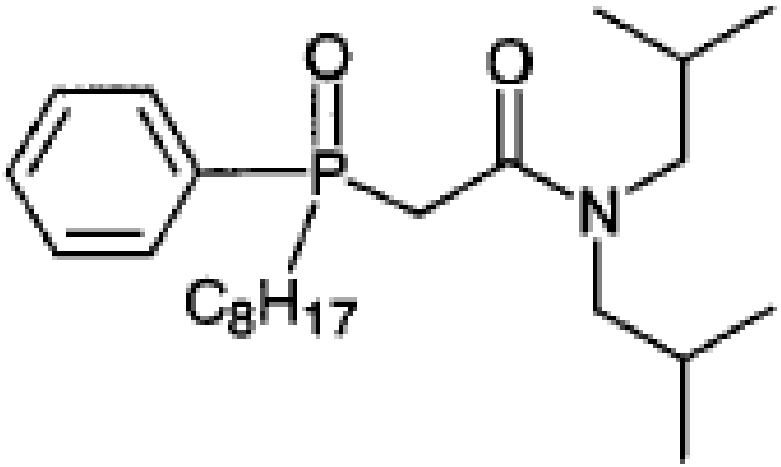


Tributyl phosphate (TBP)

$[UO_2(NO_3)_2(OH_2)_2]$

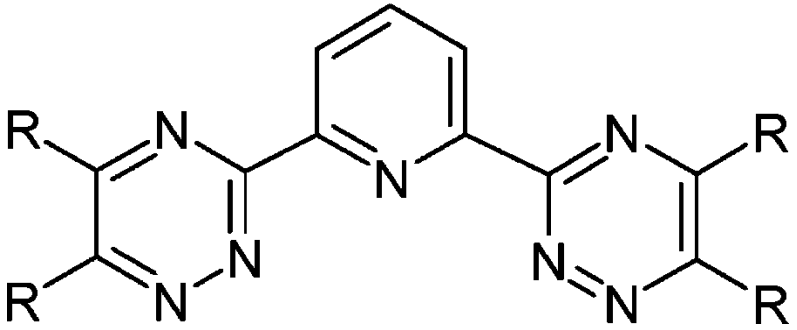


CMPO (processo TRUEX)

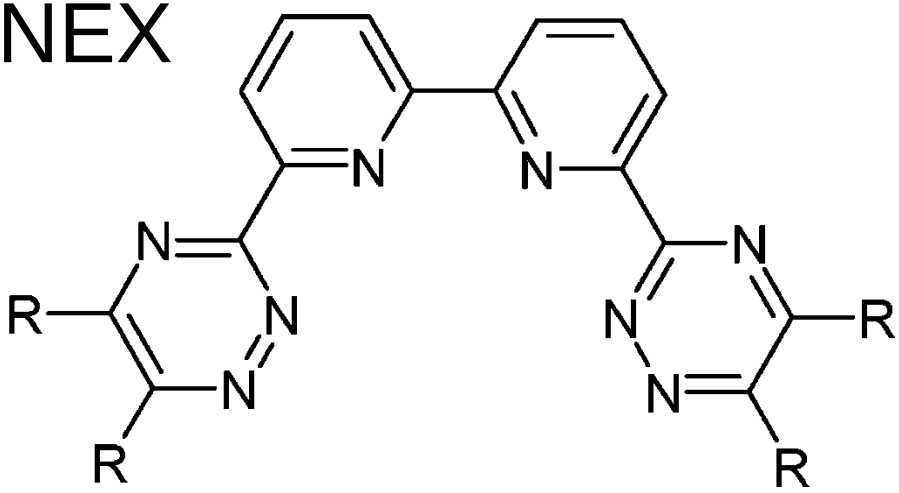


octyl(phenyl)-N,N-diisobutylcarbamoylmethylphosphine oxide

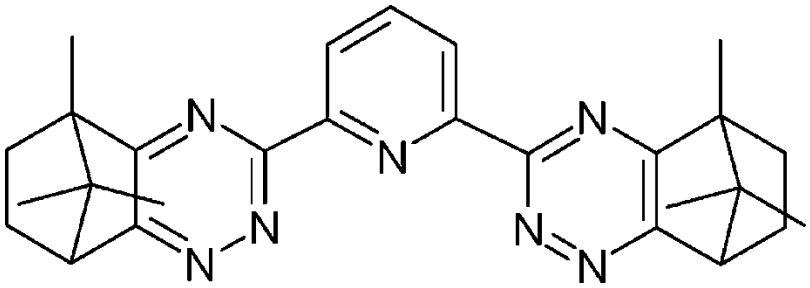
Leganti estrattori per SANEX



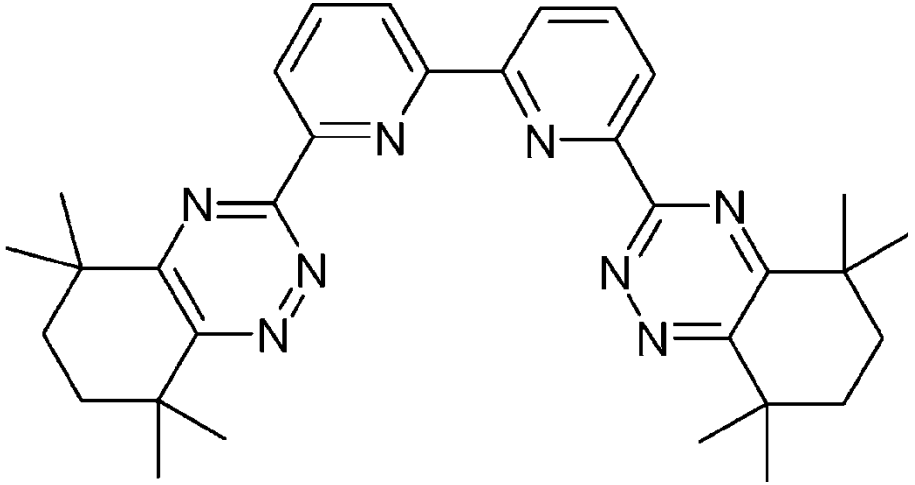
BTP



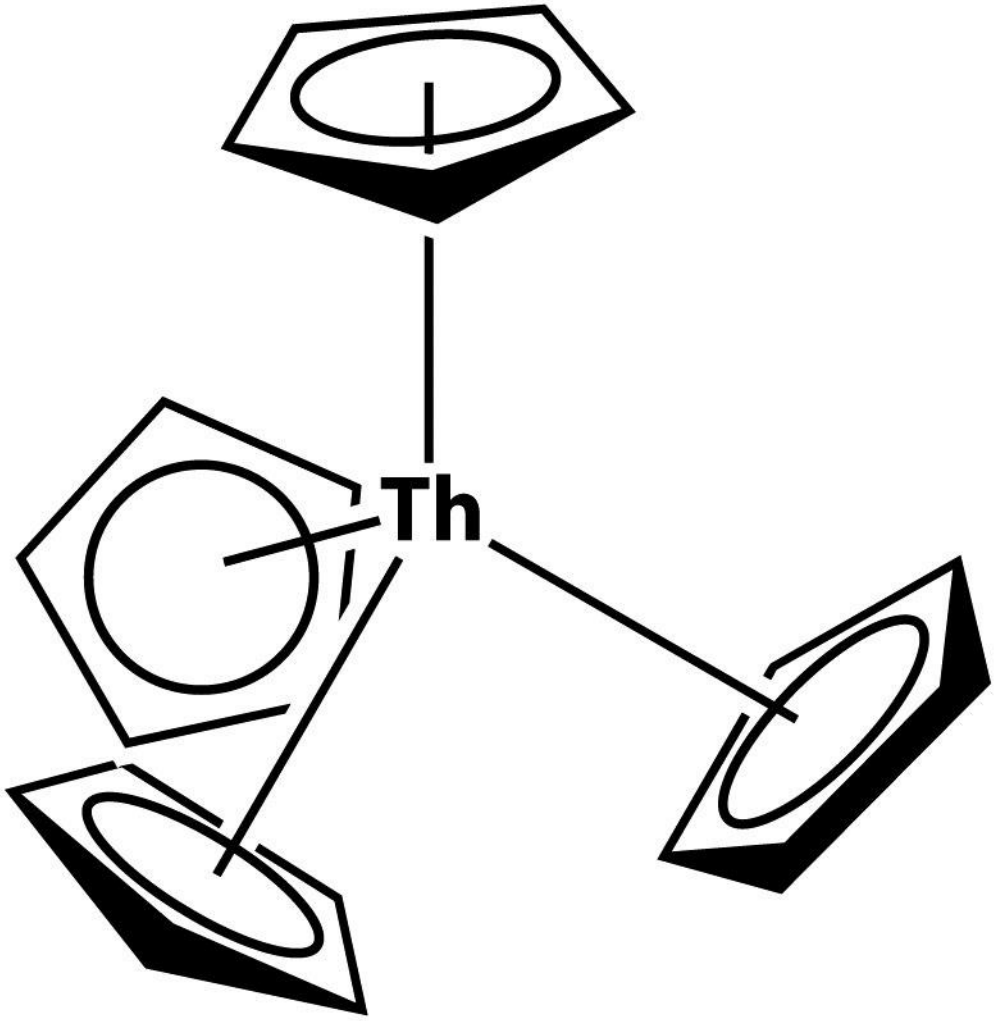
BTBP



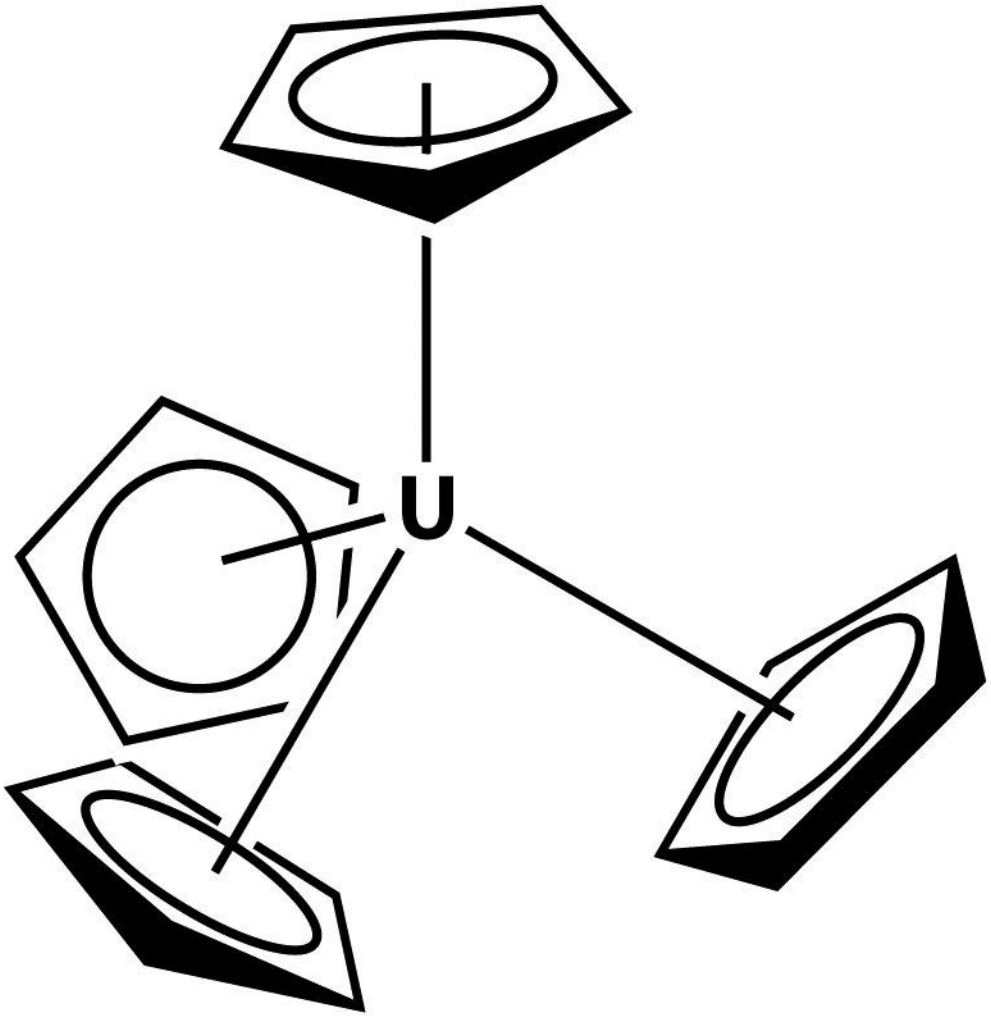
Ca-BTP



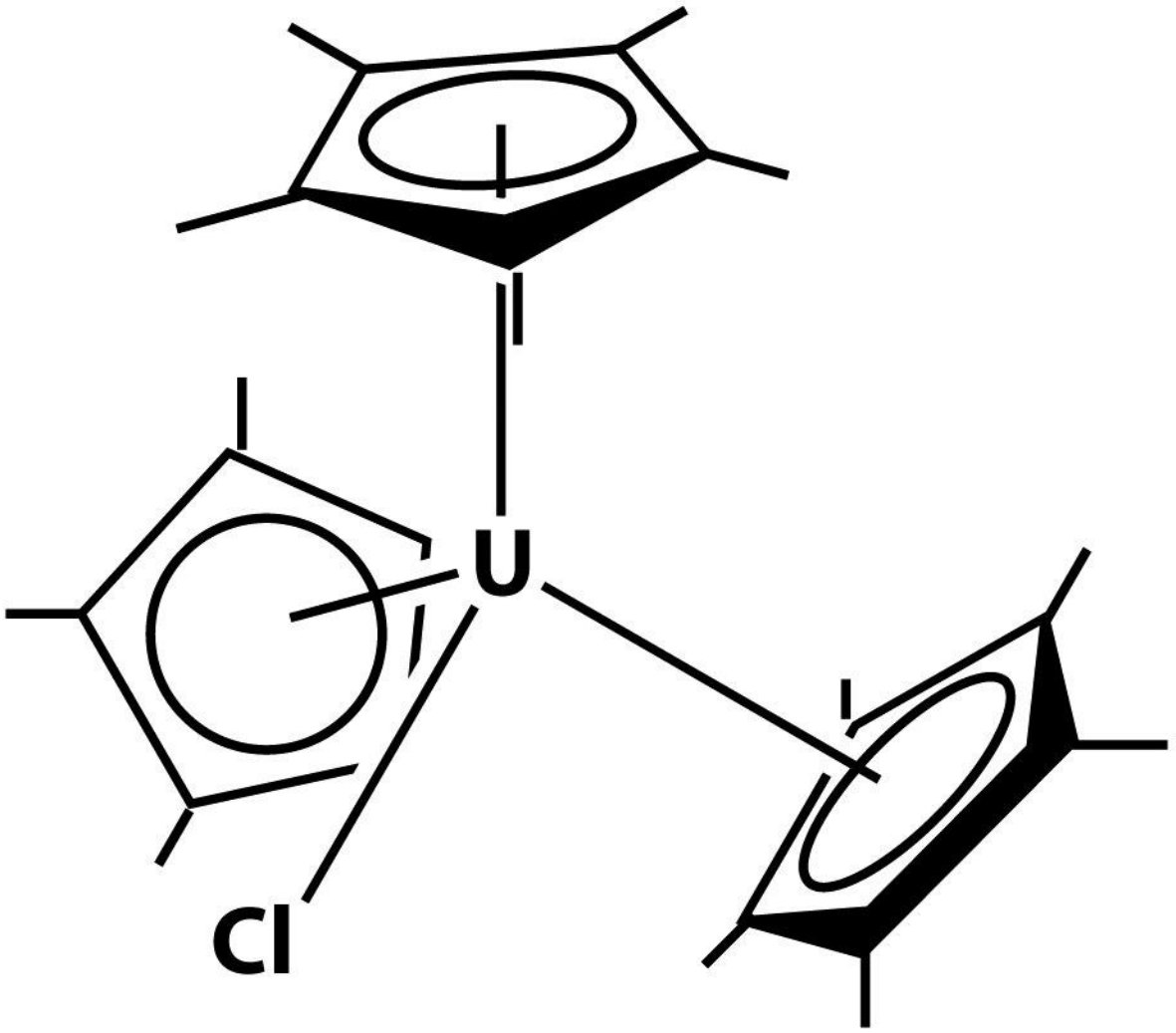
$CyMe_4$-BTBP



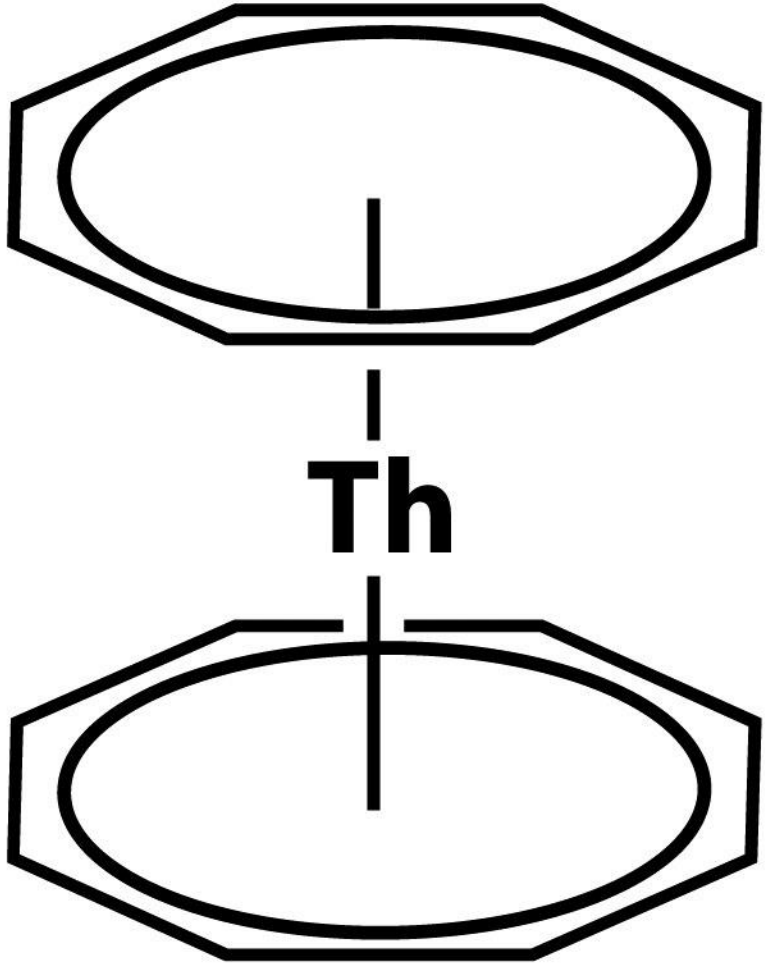
$Th(Cp)_4$



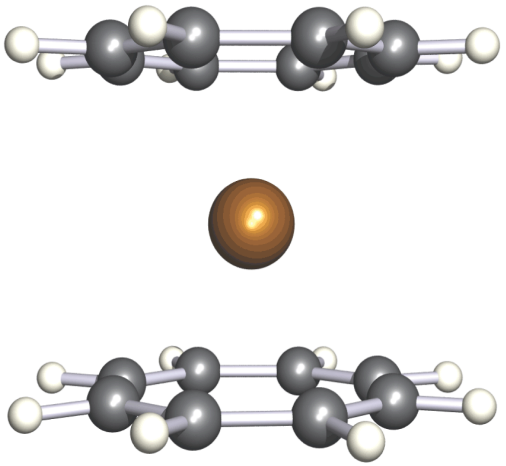
$U(Cp)_4$



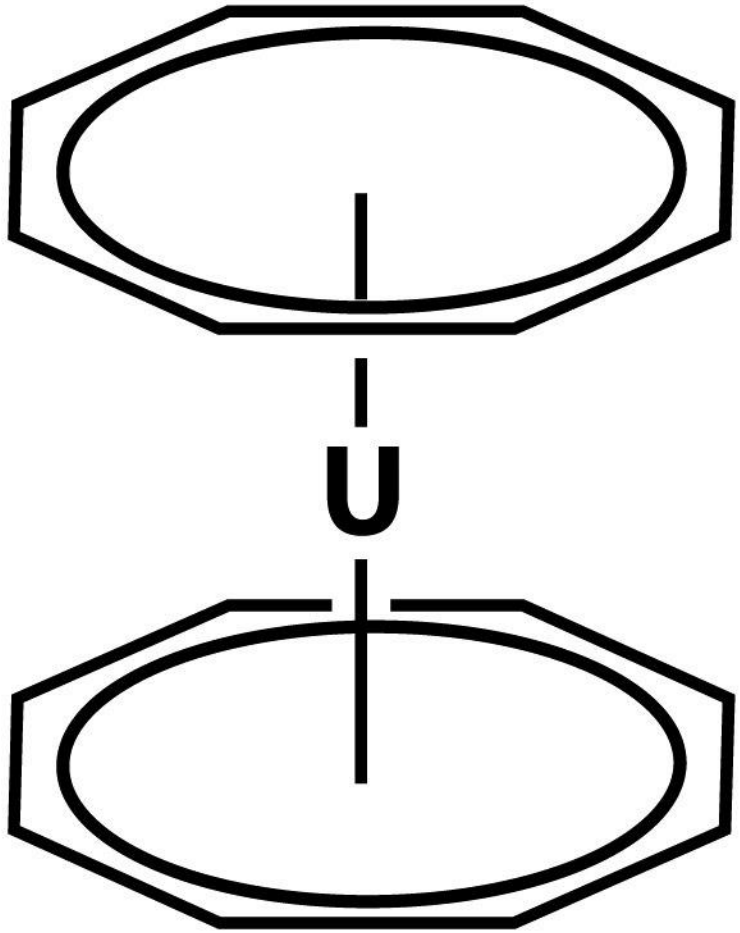
$U(Cp^*)_3Cl$



Torocene



$Th(C_8H_8)_2$



$U(C_8H_8)_2$

Uranocene