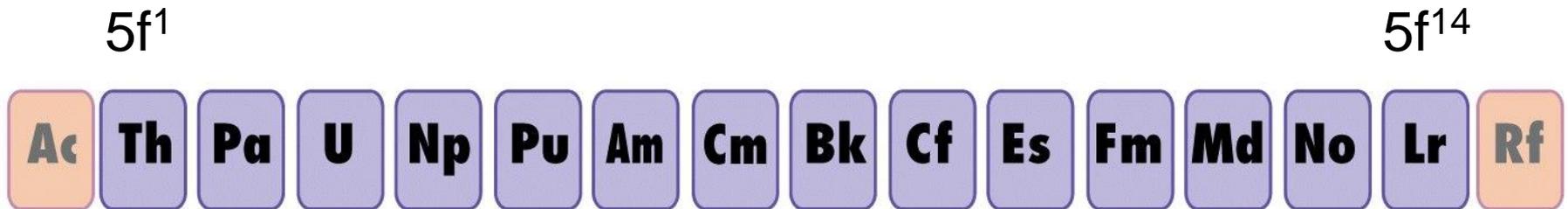


Attinidi



Attinide generico = An, 5fⁿ6d¹7s²

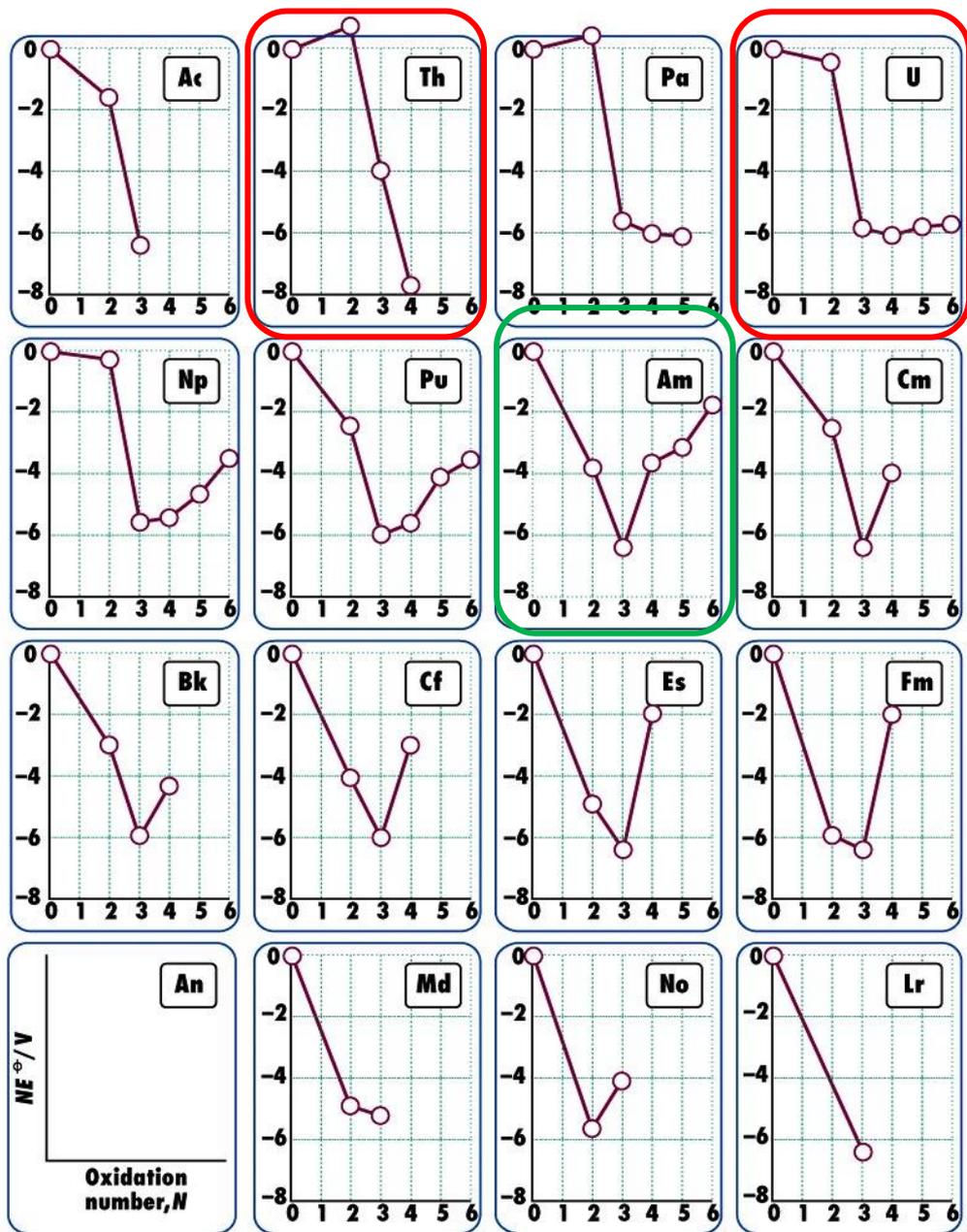
Table 22.1 Half-lives of the most stable actinoid isotopes

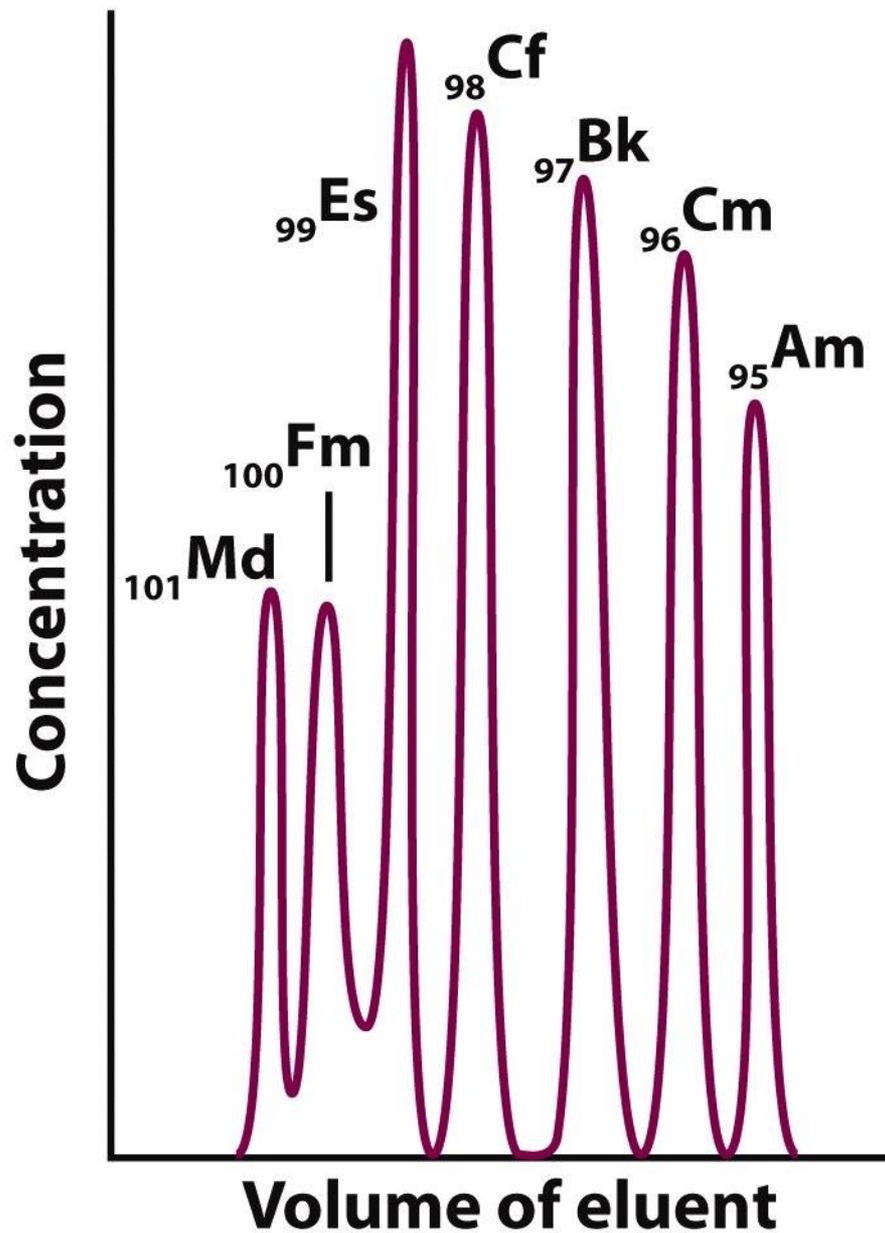
| Z | Name | Symbol | Mass number | $t_{\frac{1}{2}}$ |
|-----|--------------|--------|-------------|-----------------------------|
| 89 | Actinium | Ac | 227 | 21.8 years |
| 90 | Thorium | Th | 232 | 1.41×10^{10} years |
| 91 | Protactinium | Pa | 231 | 3.28×10^4 years |
| 92 | Uranium | U | 238 | 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*

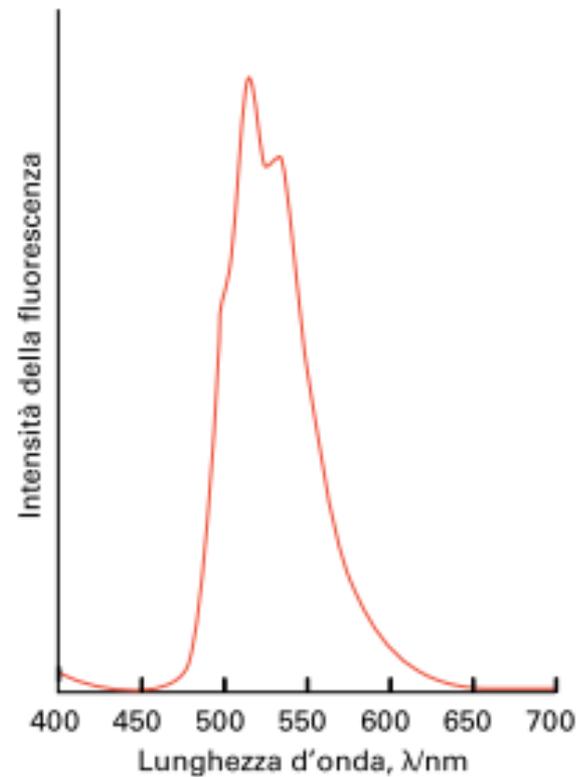
U_3O_8 *pechblenda*



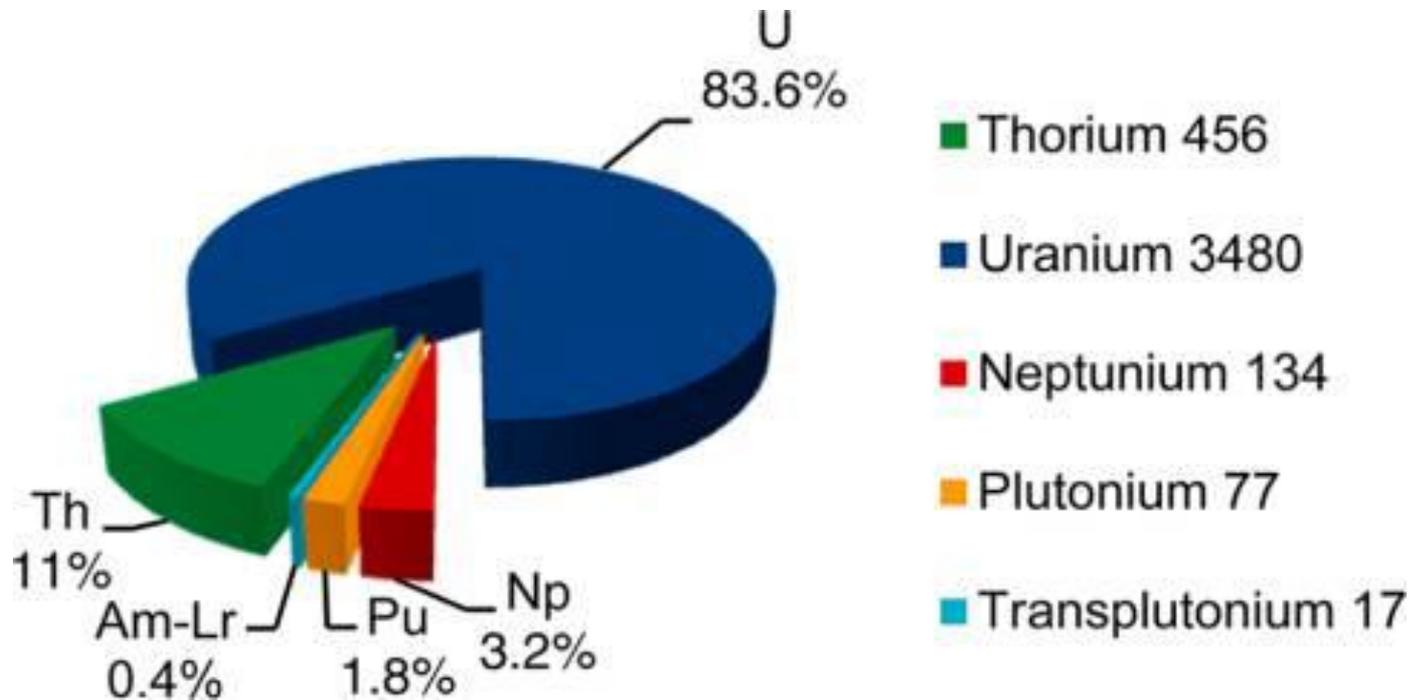


Eluizione degli ioni più pesanti degli attinidi da una colonna a scambio di cationi usando 2-idrossiisobutirrato di ammonio come eluente.

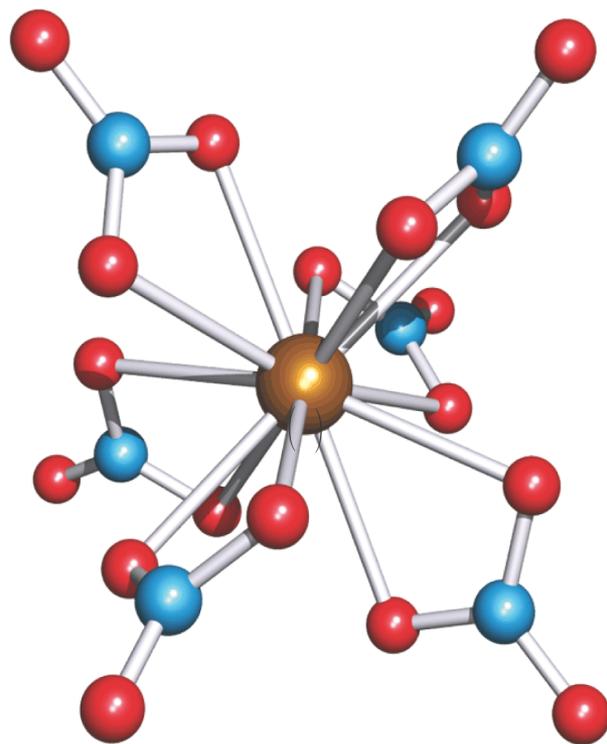
Spettro di fluorescenza dello ione uranile, UO_2^{2+} in acqua



Numerosità delle strutture note di complessi con attinidi (2012)



Cfr. Fe > 33.300, Cu > 41.600



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

| Longest-lived isotope | Half-life | Decay mode | Longest-lived isotope | Half-life | Decay mode |
|-----------------------|-------------------------|------------------|-----------------------|----------------------|------------------|
| ²²⁷ Ac | 21.8 yr | β^- | ²⁴⁷ Bk | 1.4×10^3 yr | α, γ |
| ²³² Th | 1.4×10^{10} yr | α, γ | ²⁵¹ Cf | 9.0×10^2 yr | α, γ |
| ²³¹ Pa | 3.3×10^4 yr | α, γ | ²⁵² Es | 1.3 yr | α |
| ²³⁸ U | 4.5×10^9 yr | α, γ | ²⁵⁷ Fm | 100 d | α, γ |
| ²³⁷ Np | 2.1×10^6 yr | α, γ | ²⁵⁸ Md | 52 d | α |
| ²⁴⁴ Pu | 8.2×10^7 yr | α, γ | ²⁵⁹ No | 58 min | α |
| ²⁴⁵ Am | 7.4×10^5 yr | α, γ | ²⁶² Lr | 3 min | α |
| ²⁴⁷ Cm | 1.6×10^7 yr | α, γ | | | |

Un reattore da 1GW produce ogni anno ca.30 tonnellate di combustibile nucleare esausto: ²³⁸U + ²³⁵U + ²³⁹Pu (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)

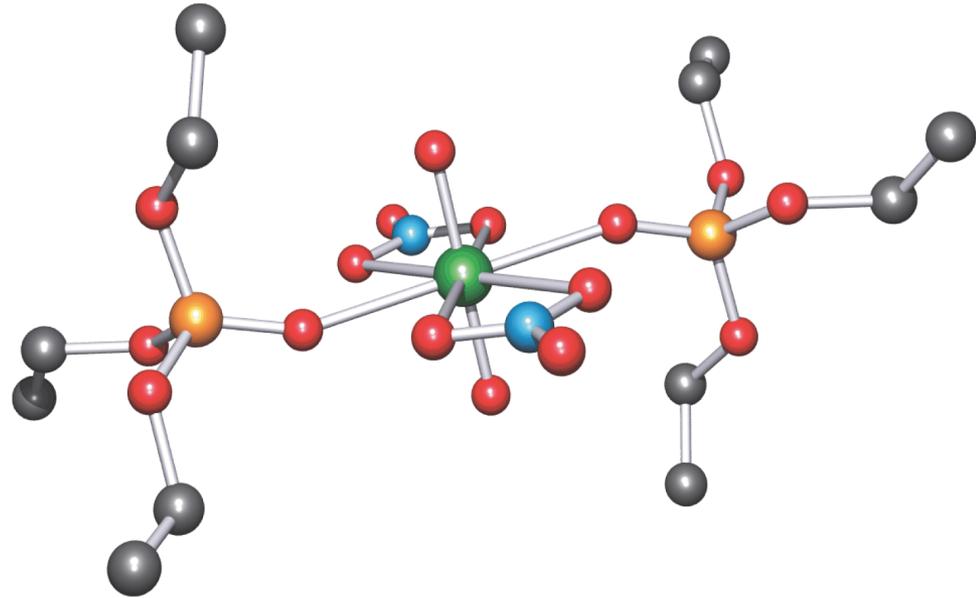
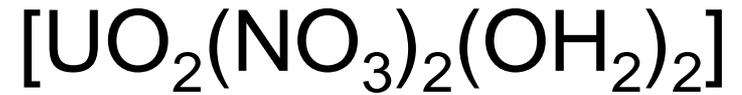
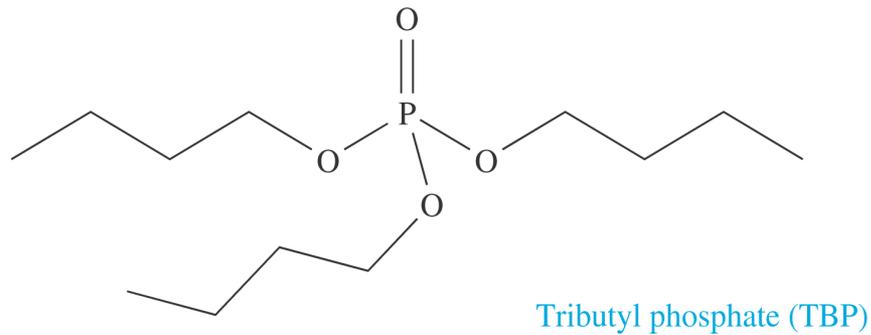
TRUEX (TRansUranic elements EXtraction)

Am(III) + Cm(III) + lantanidi di fissione

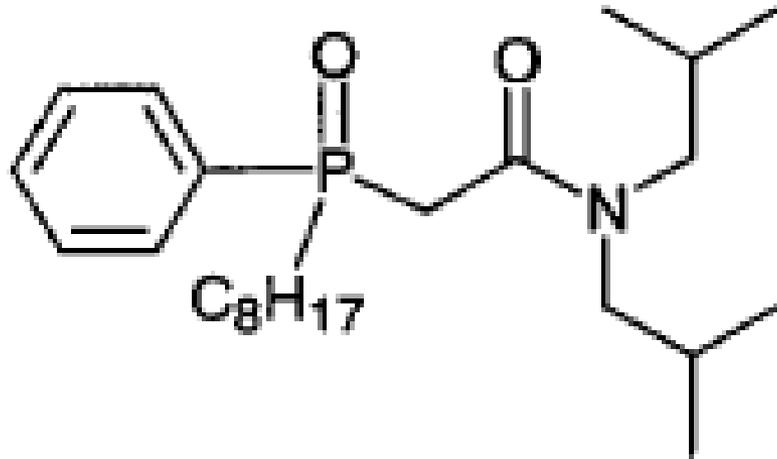
SANEX (Selective ActiNide EXtraction)

Am(III) + Cm(III)

TPB (processi PUREX e TRUEX)

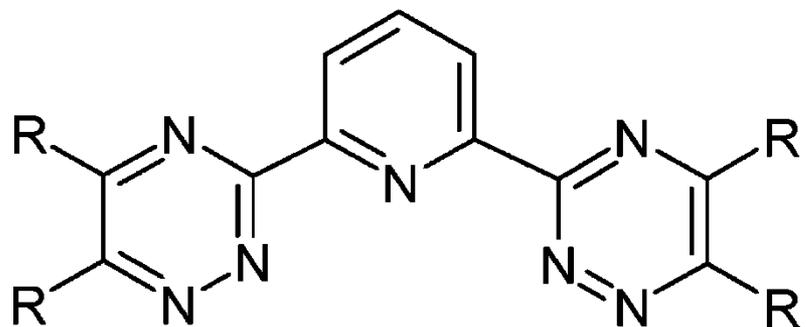


CMPO (processo TRUEX)

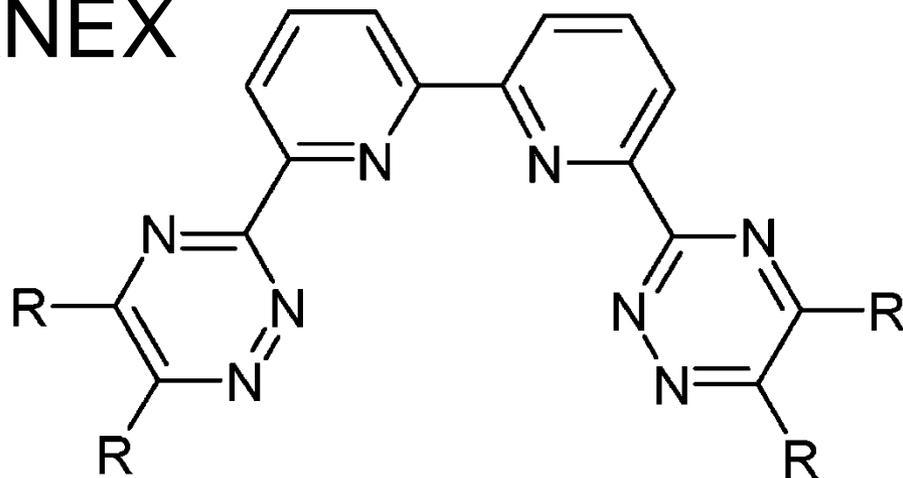


octyl(phenyl)-N,N-diisobutylcarbamoylmethylphosphine oxide

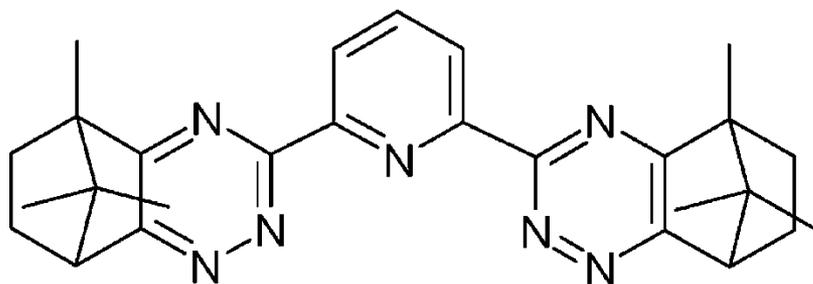
Leganti estrattori per SANEX



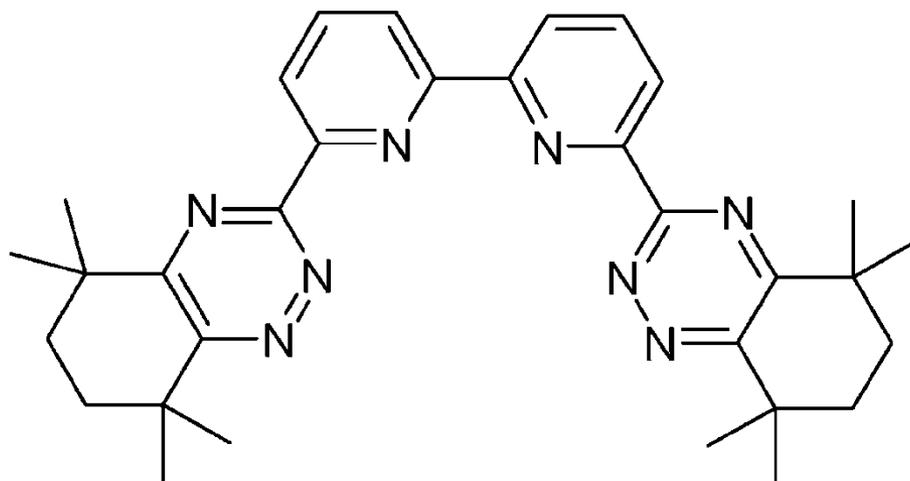
BTP



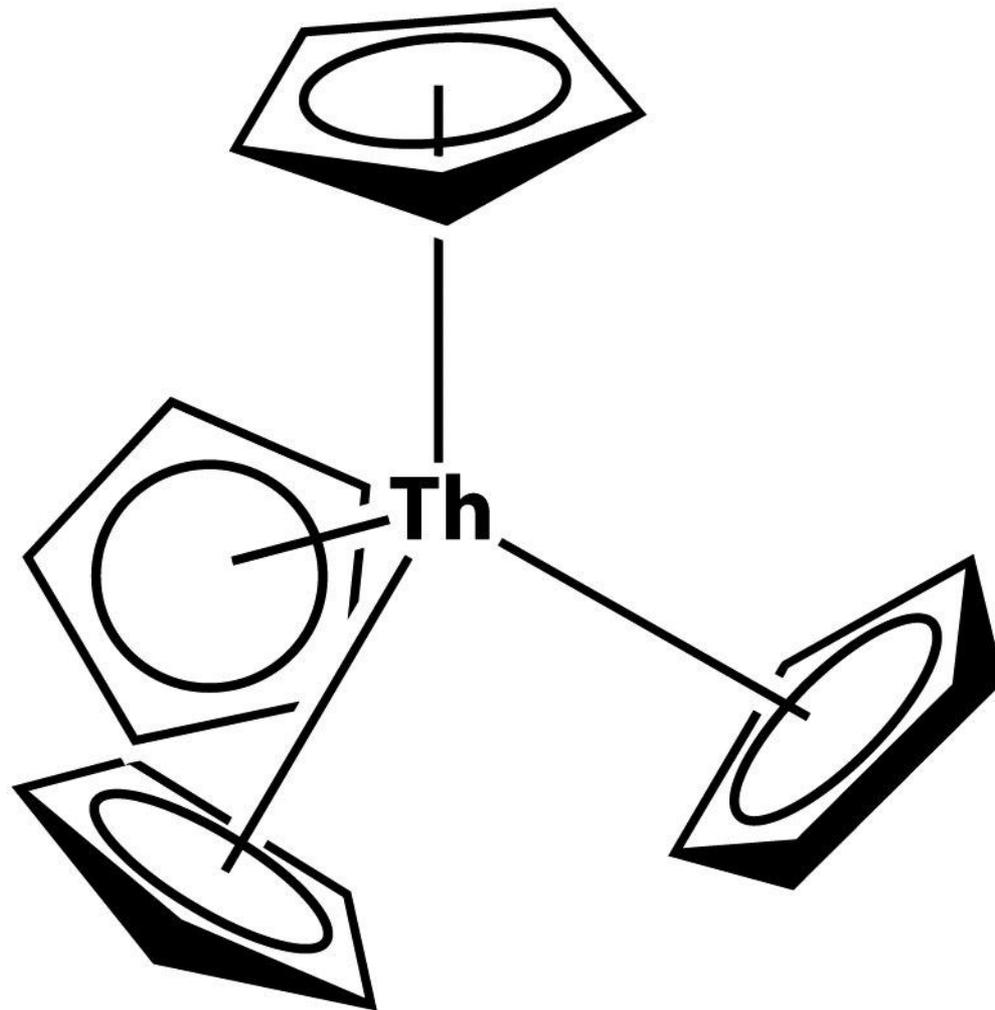
BTBP



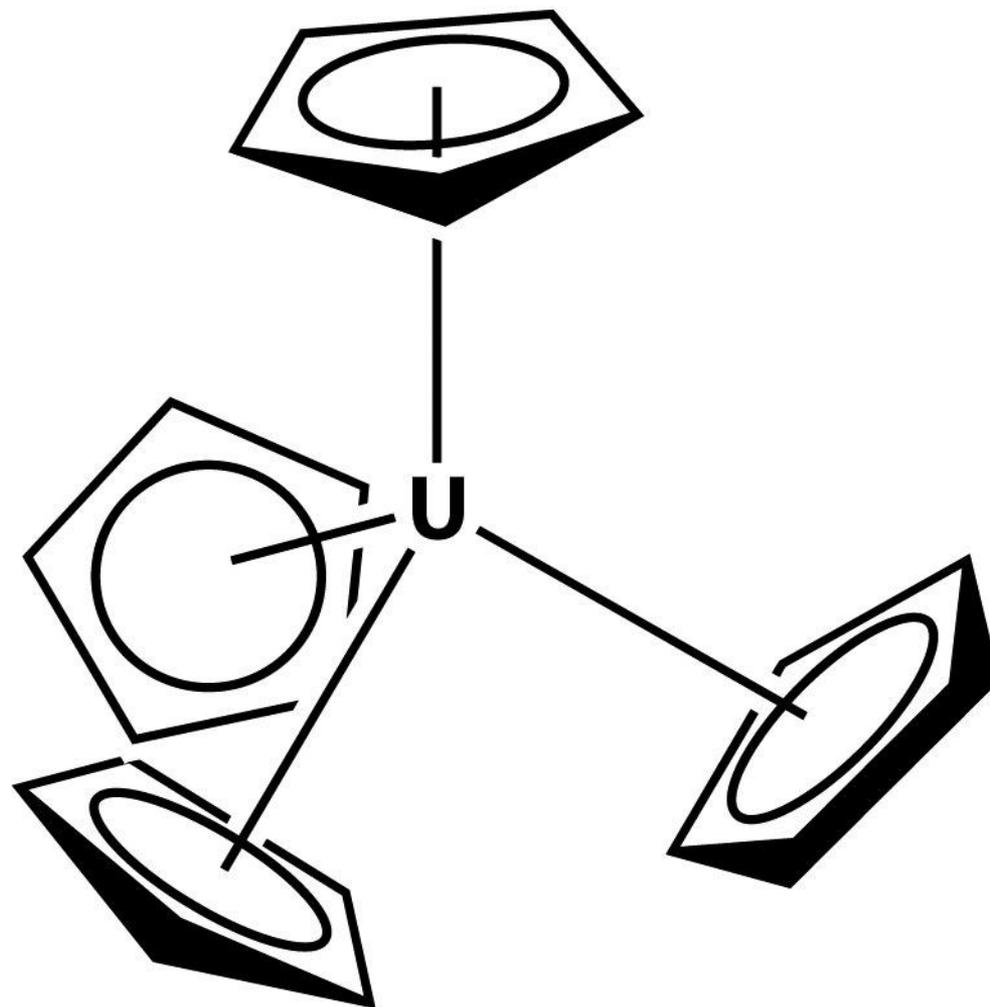
Ca-BTP



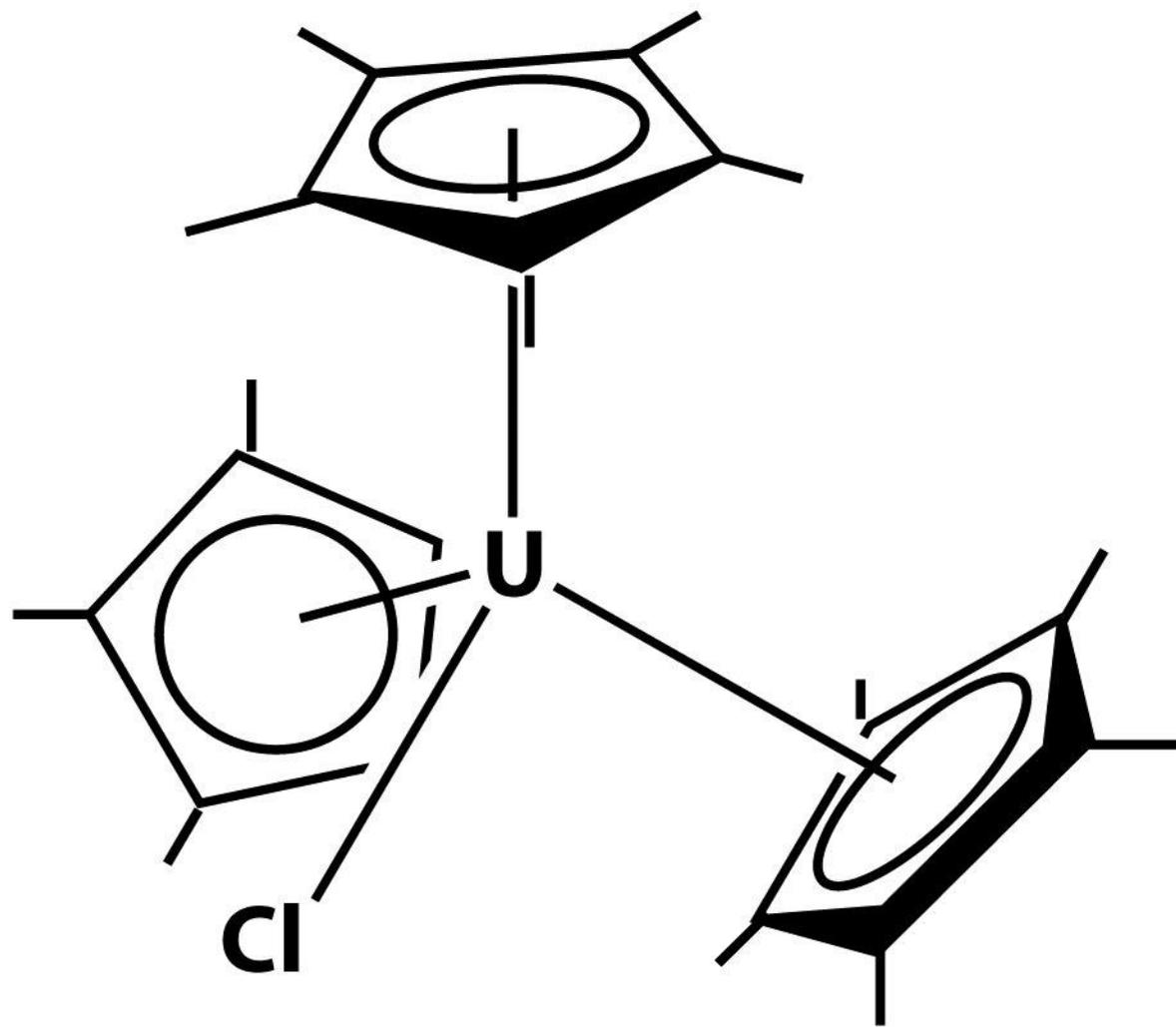
CyMe₄-BTBP

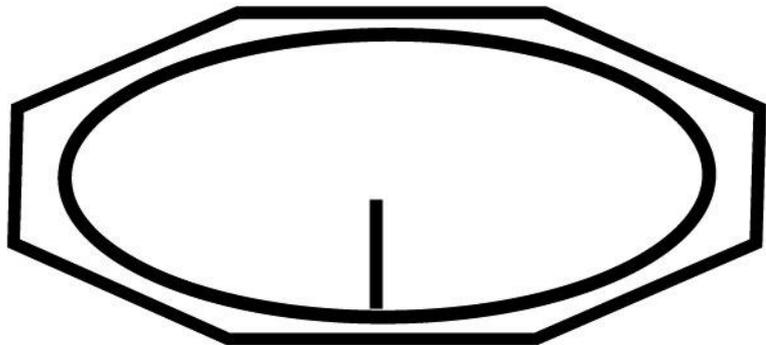


$\text{Th}(\text{Cp})_4$

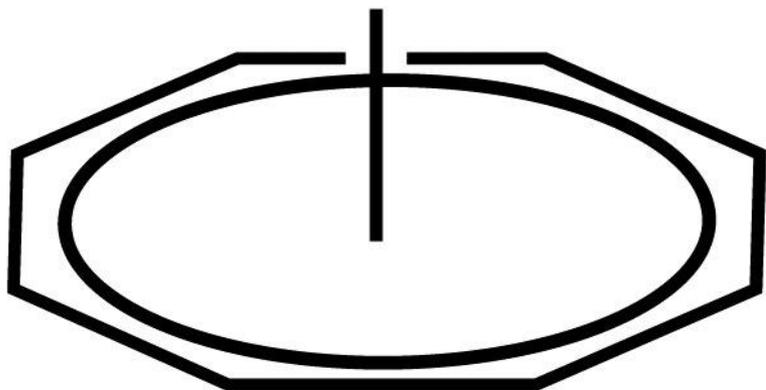


$U(Cp)_4$

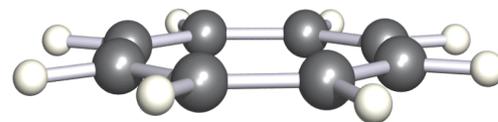
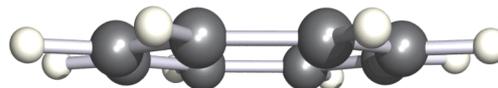


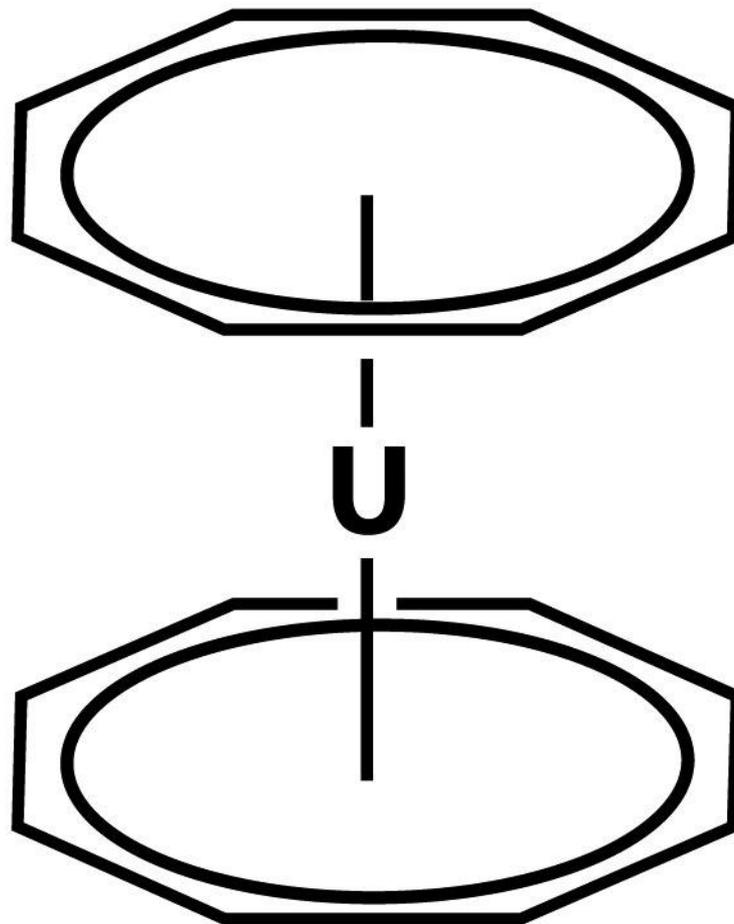


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Torocene





Uranocene