

Reagenti di shift

# Reagenti di shift - $^1\text{H}$ NMR

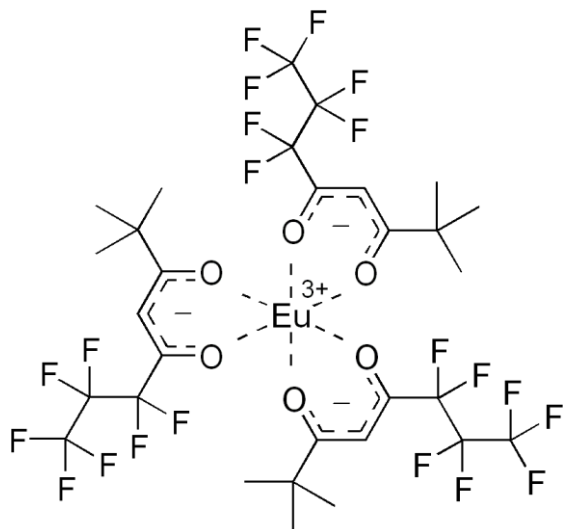
Sono complessi di ioni di metalli paramagnetici della serie dei lantanidi come Eu(III), Yb(III), Pr(III), che vengono aggiunti a un campione per semplificare gli spettri NMR, attraverso uno spostamento dei segnali di protoni della molecola causato dalle loro proprietà paramagnetiche.

Eu(III), Yb(III) inducono spostamenti a campo basso

Pr(III) inducono spostamenti a campo alto

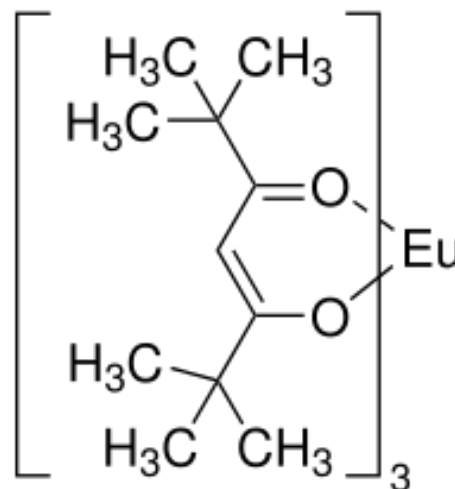
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In generale sono complessi chelati di questi ioni con  $\beta$ -dichetoni



$\text{Eu}(\text{fod})_3$

Fod: 6,6,7,7,8,8,8-eptafluoro-2,2-dimetil-3,5-ottandione

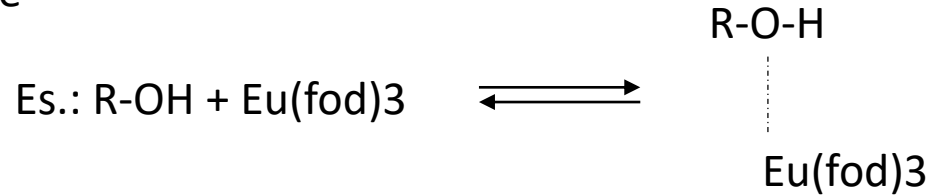


$\text{Eu}(\text{dpm})_3$

Dpm: 2,2,6,6,-tetrametil-3,5-eptandione (dipivaloilmetano)

# Reagenti di shift - $^1\text{H}$ NMR

Composti con atomi donatori si complessano reversibilmente con l'atomo centrale



Si hanno nello spettro  $^1\text{H}$  NMR spostamenti dei segnali di protoni che dipendono da:

- a. Distanza fra il centro metallico e il gruppo di protoni
- b. Concentrazione dello shift reagents nella soluzione
- c. Stabilità del complesso

# Reagenti di shift - $^1\text{H}$ NMR

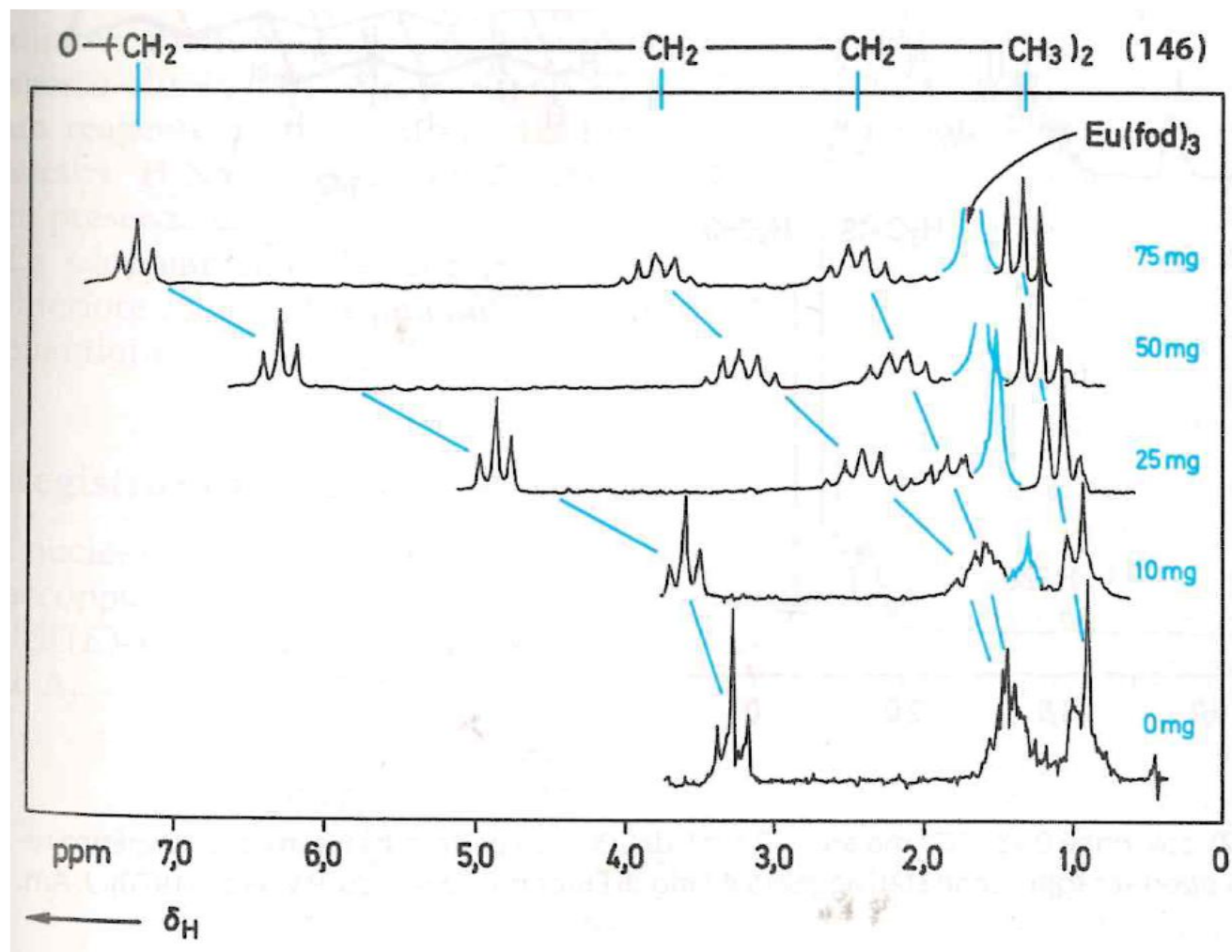
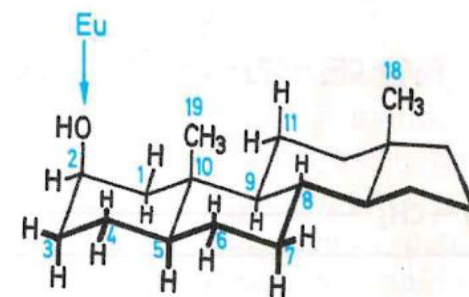
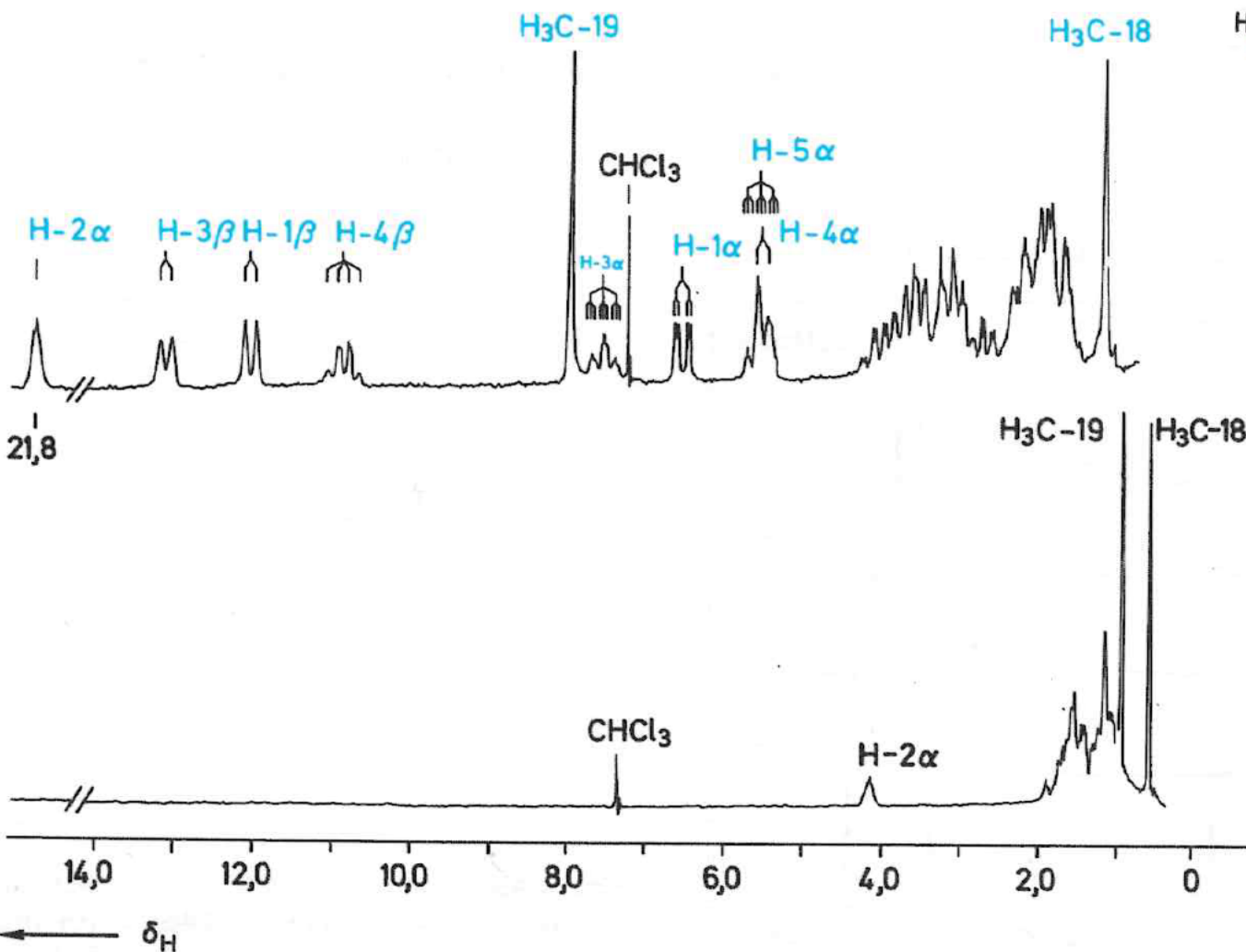


Figura:  
Dibutiletere +  
aggiunte  
progressive di  
Eu(fod)<sub>3</sub>

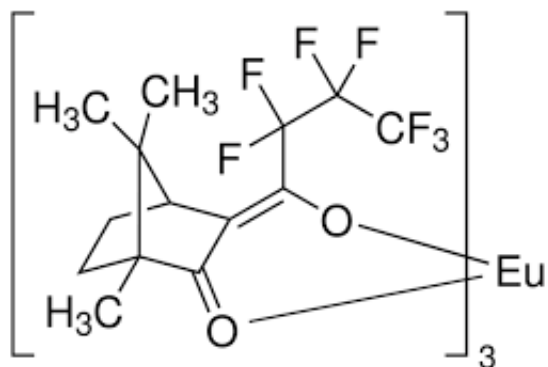
# Reagenti di shift - $^1\text{H}$ NMR



2-β-androstano-19,18-diol  
 $^1\text{H}$  NMR,  $\text{CDCl}_3$   
 +  $\text{Eu(dpm)}_3$

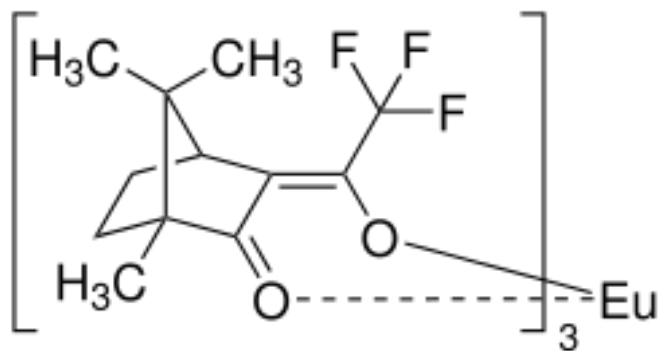
2-β-androstano-19,18-diol  
 $^1\text{H}$  NMR,  $\text{CDCl}_3$

# Reagenti di shift chirali



Eu(hfc)3

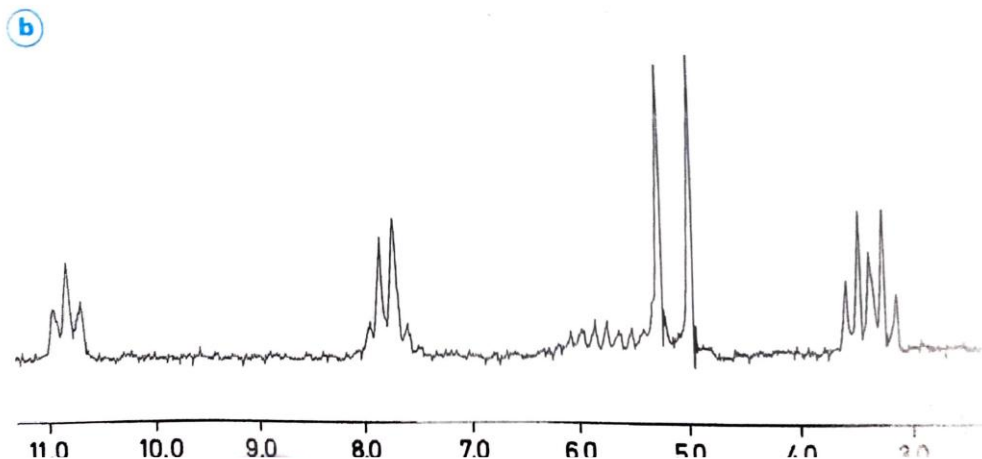
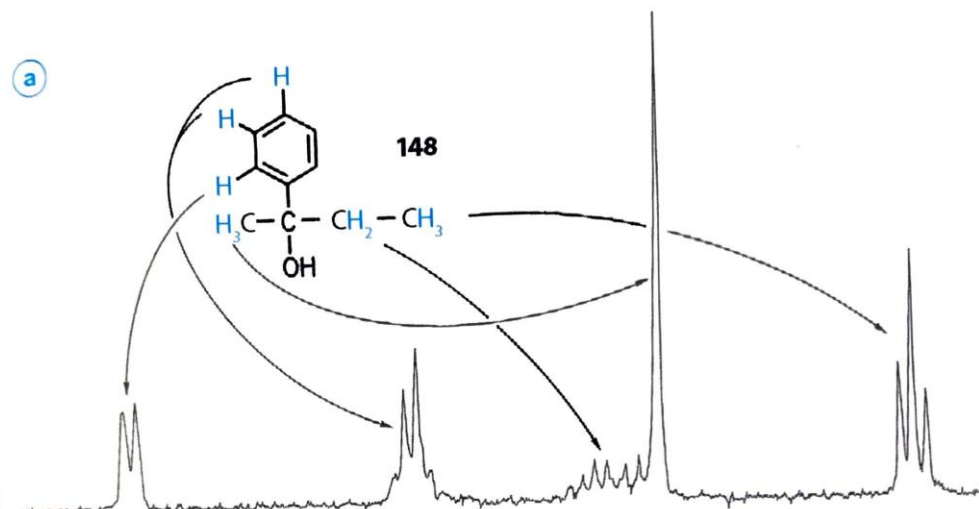
**Europium tris[3-(heptafluoropropylhydroxymethylene)-(+)-camphorate]**



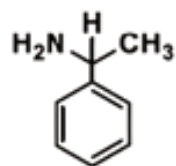
Eu(Facam)3

**Europium tris[3-(trifluoromethylhydroxymethylene)-(+)-camphorate]**

# Reagenti di shift chirali



# Reagenti di shift chirali



With  
Chiral shift reagents



With  
Chiral shift reagents



With out  
Chiral shift reagents

