

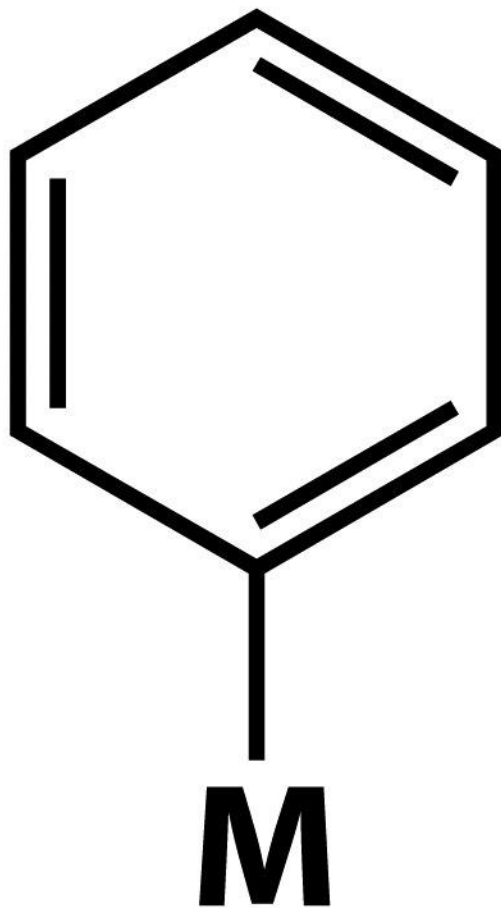
**$\eta^1$ -alkenile**

**R**



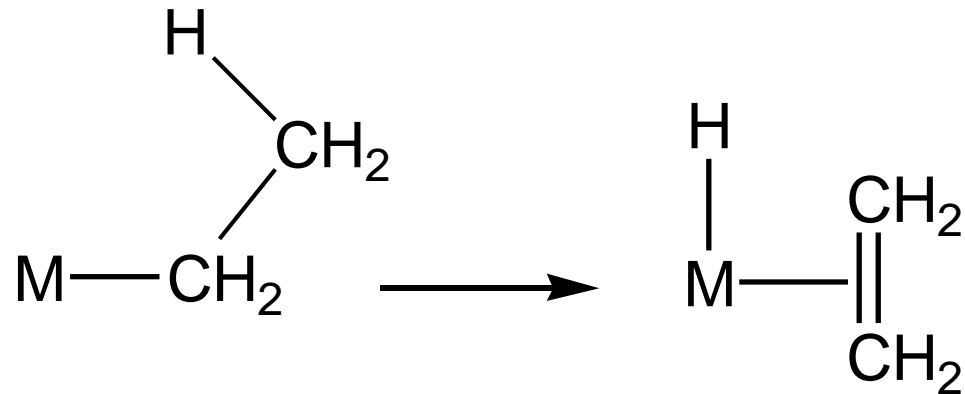
**M**

**$\eta^1$ -alchinile**



$\eta^1$ -arile

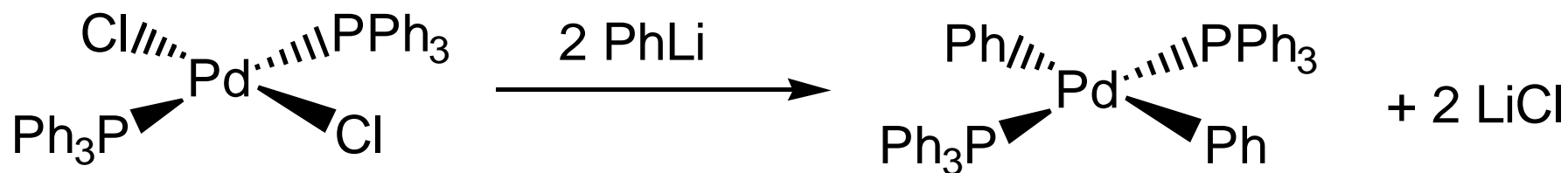
# $\beta$ -eliminazione di idruro



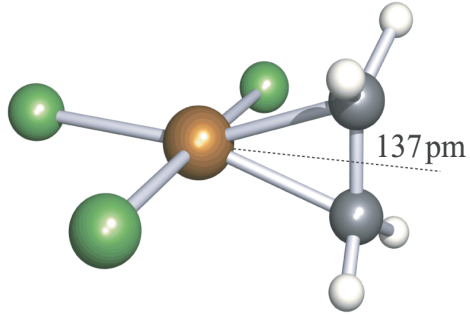
Gruppi stabili:

metile, benzile ( $\text{CH}_2\text{C}_6\text{H}_5$ ), neopentile ( $\text{CH}_2\text{CMe}_3$ ), e trimetilsililmetile ( $\text{CH}_2\text{SiMe}_3$ )

# Tipico processo di sintesi



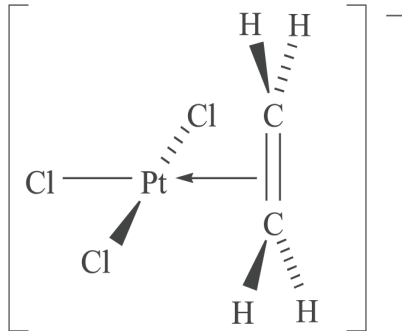
In alternativa si usano reattivi di Grignard

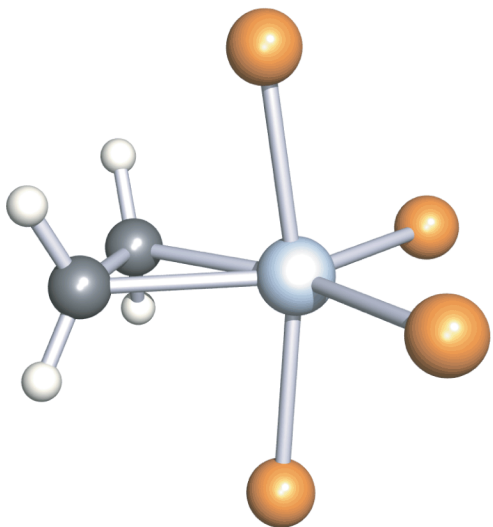


C-C = 137 pm vs 134 pm nell'etene

$\eta^2$ -alchene

coordinazione *side-on*

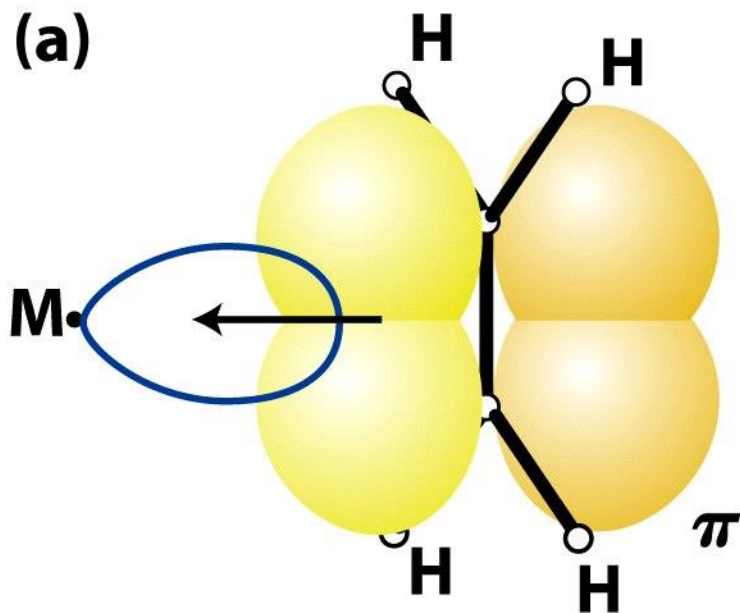




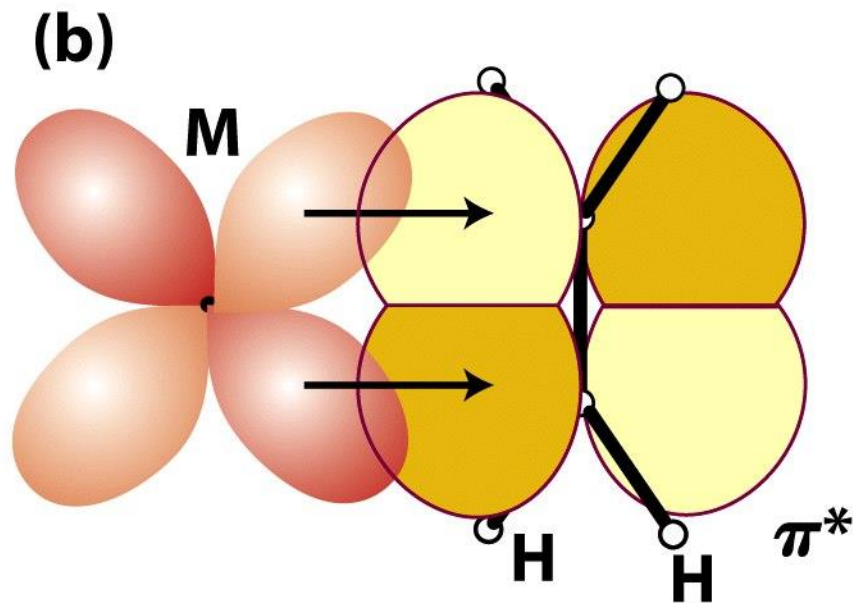
metallaciclopropano

Struttura ai raggi-X di  $\text{Ru}(\eta^2\text{-C}_2\text{H}_4)(\text{PMe}_3)_4$

C-C = 144 pm vs 134 pm nell'etene

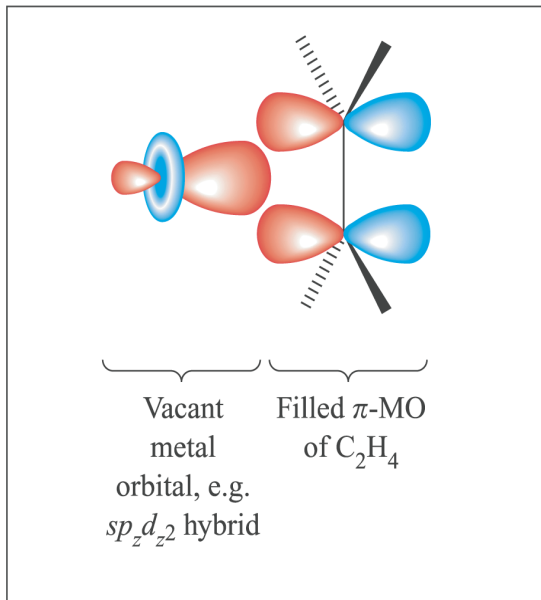
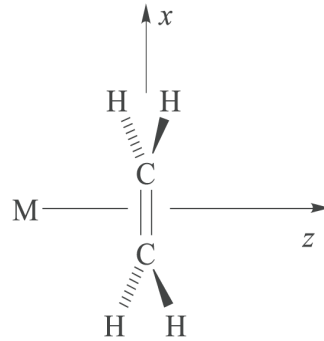


Orbitale di simmetria  $\pi$  per l'etene isolato, ma di simmetria  $\sigma$  quando l'etene è coordinato  $\eta^2$ , cioè *side-on*

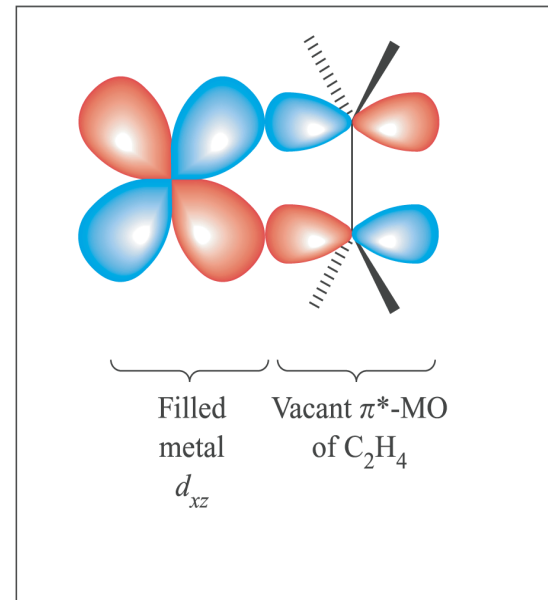


**modello di Dewar – Chatt – Duncanson**





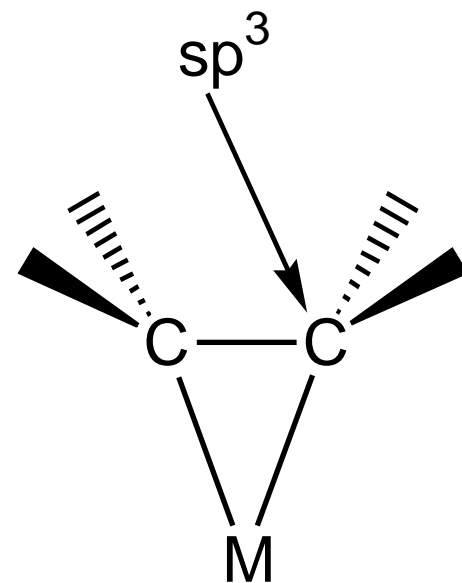
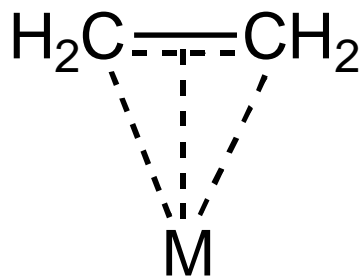
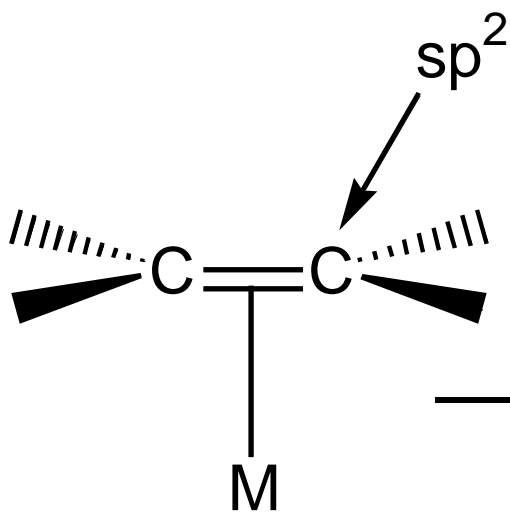
Alkene-to-M donation  
(a)



M-to-alkene back-donation  
(b)

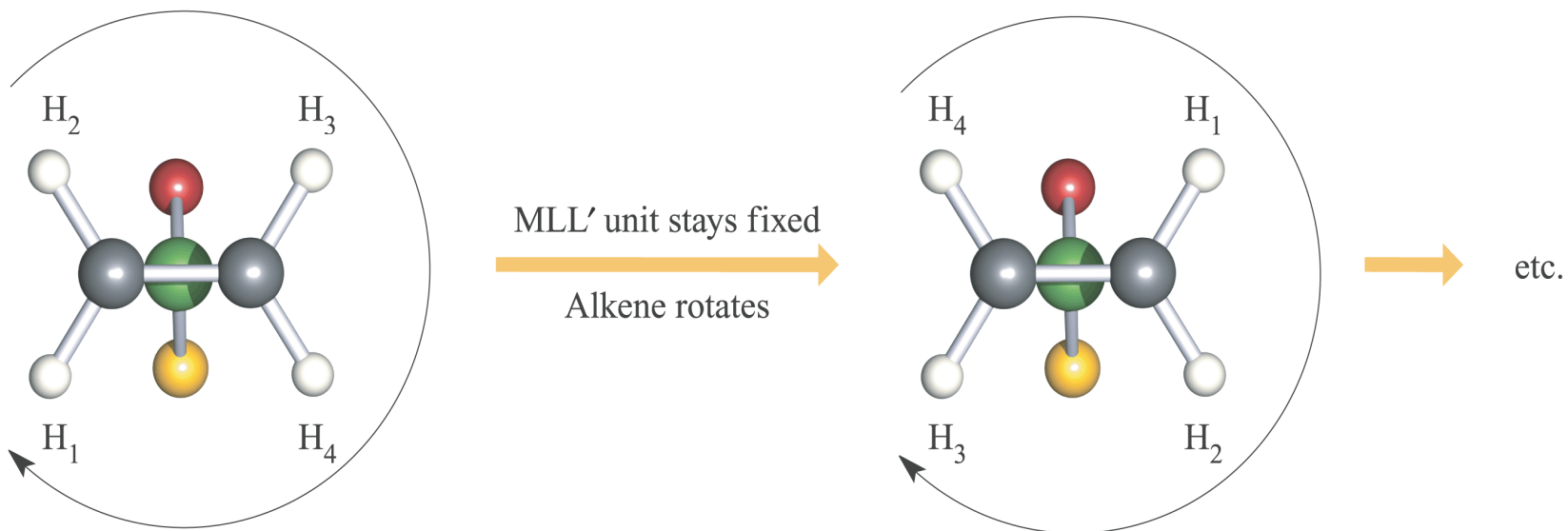
**modello di Dewar – Chatt – Duncanson**

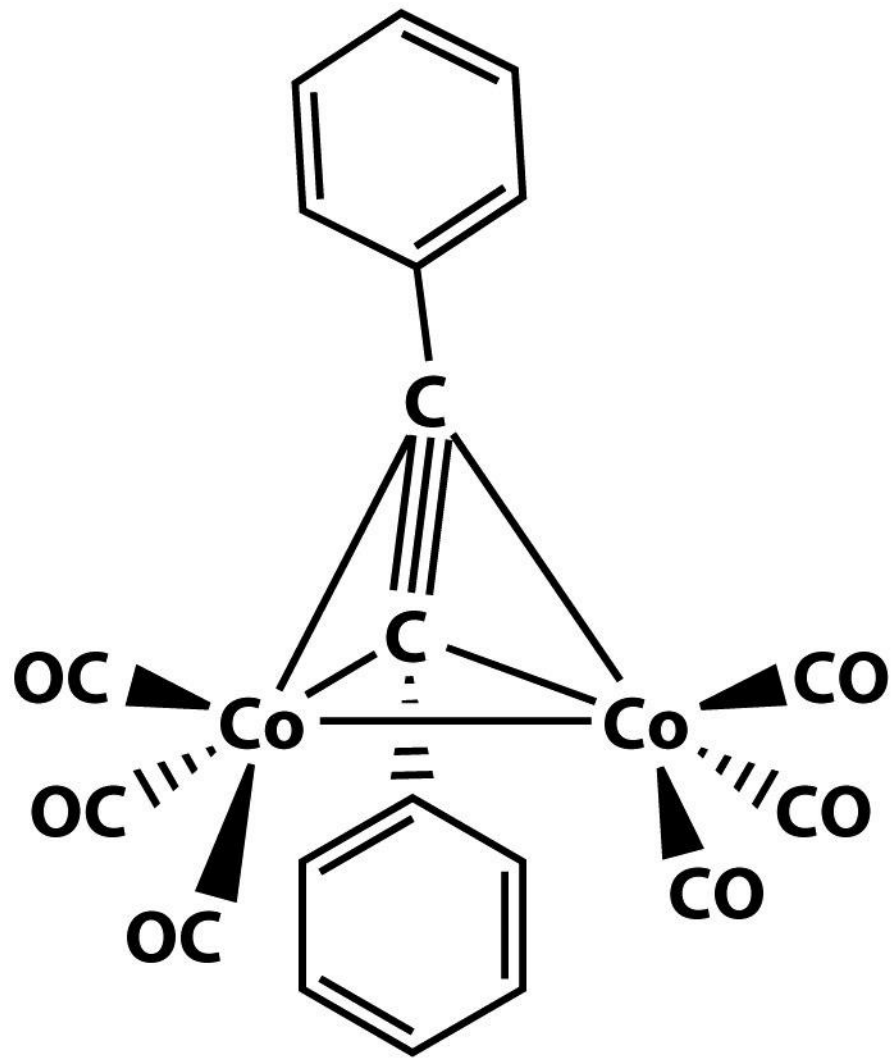
# Retrodonazione $\pi$



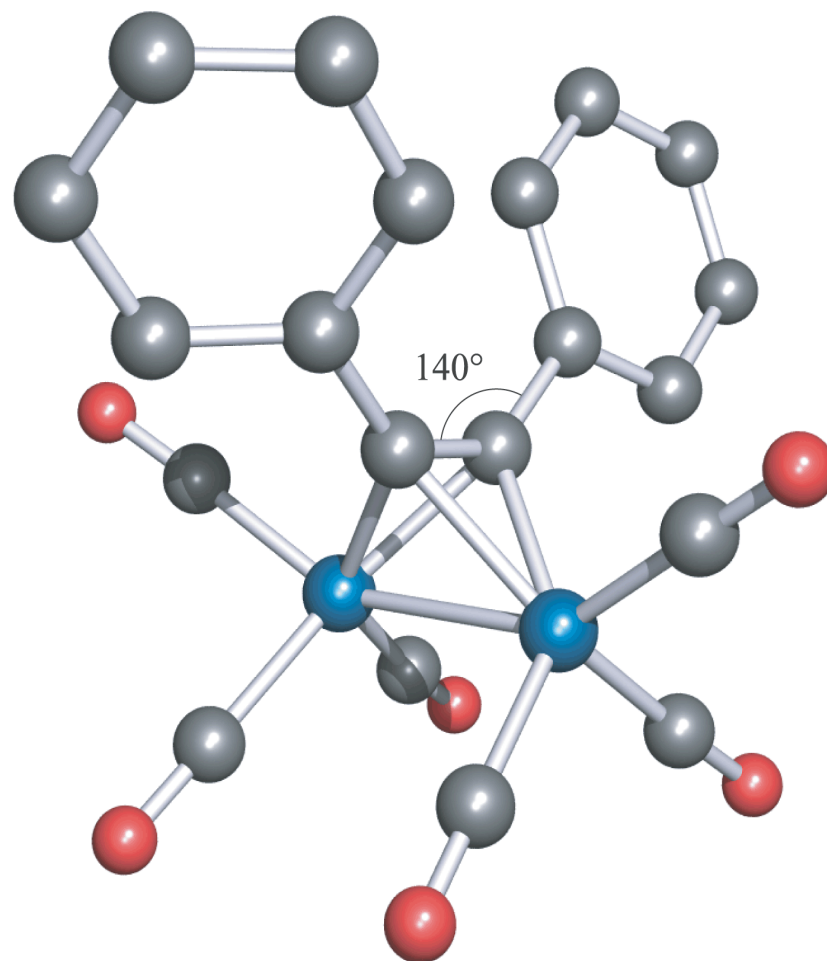
metallociclopropano

# FluSSIONALITÀ del legame $\eta^2$ -alchene





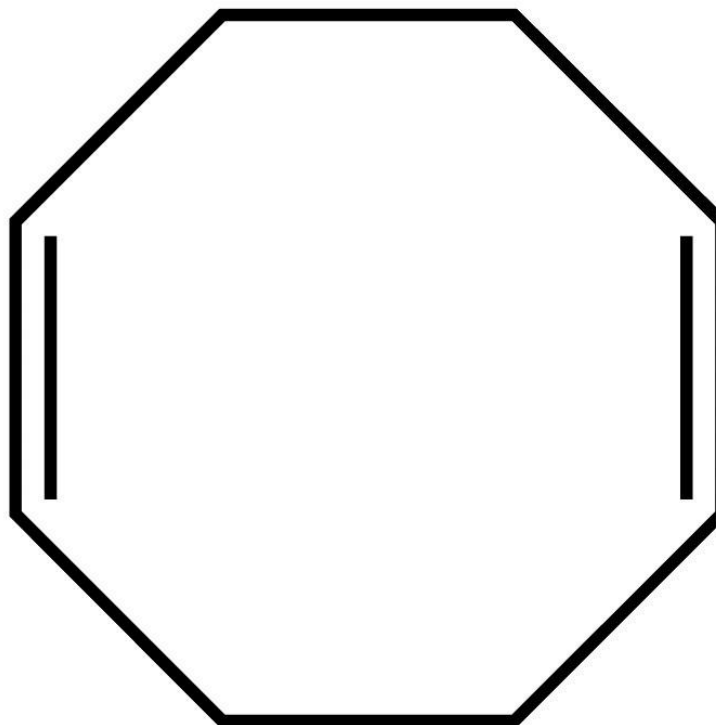
4-electron donor



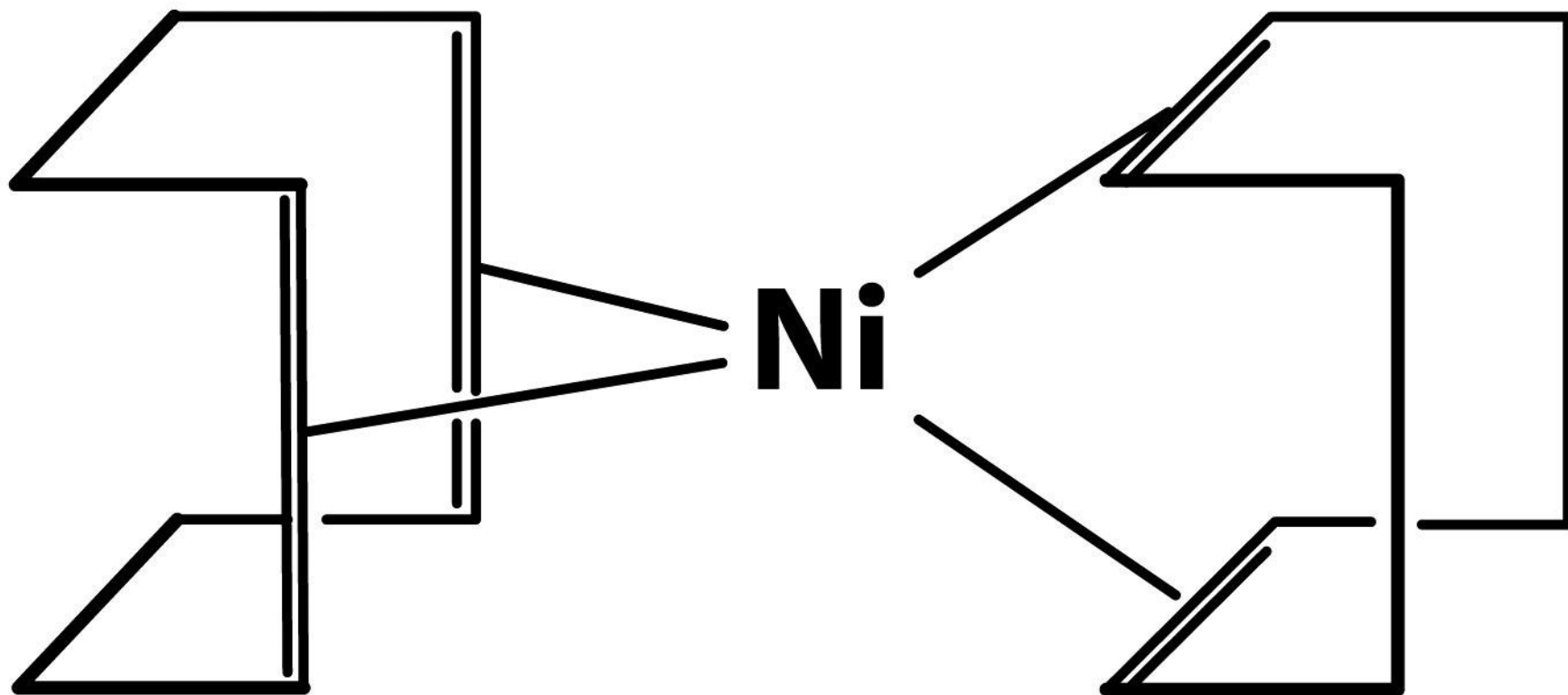
C—C in  $\text{Co}_2\text{C}_2$ -unit = 136 pm vs 120 pm in  $\text{C}_2\text{Ph}_2$

I due piani  $\text{C}_2\text{Co}$ , cioè i due legami  $\eta^2$ , sono circa ortogonali

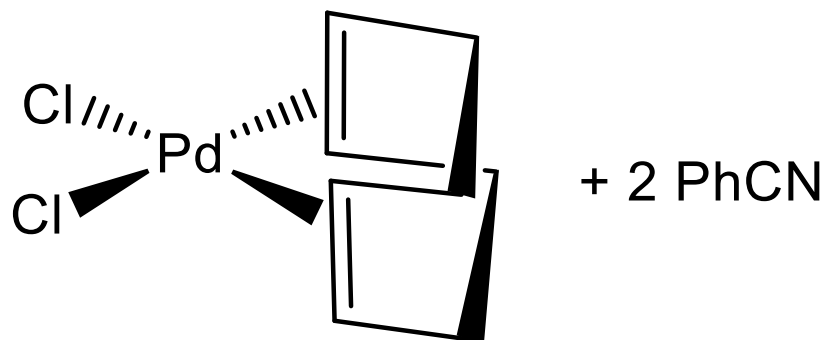
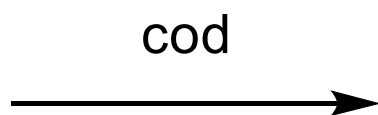
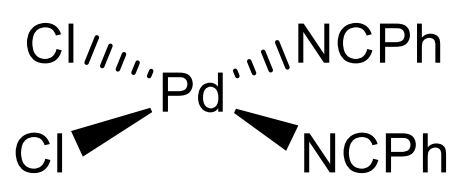
Dieni non-coniugati



**Cycloocta-1,5-diene, cod**

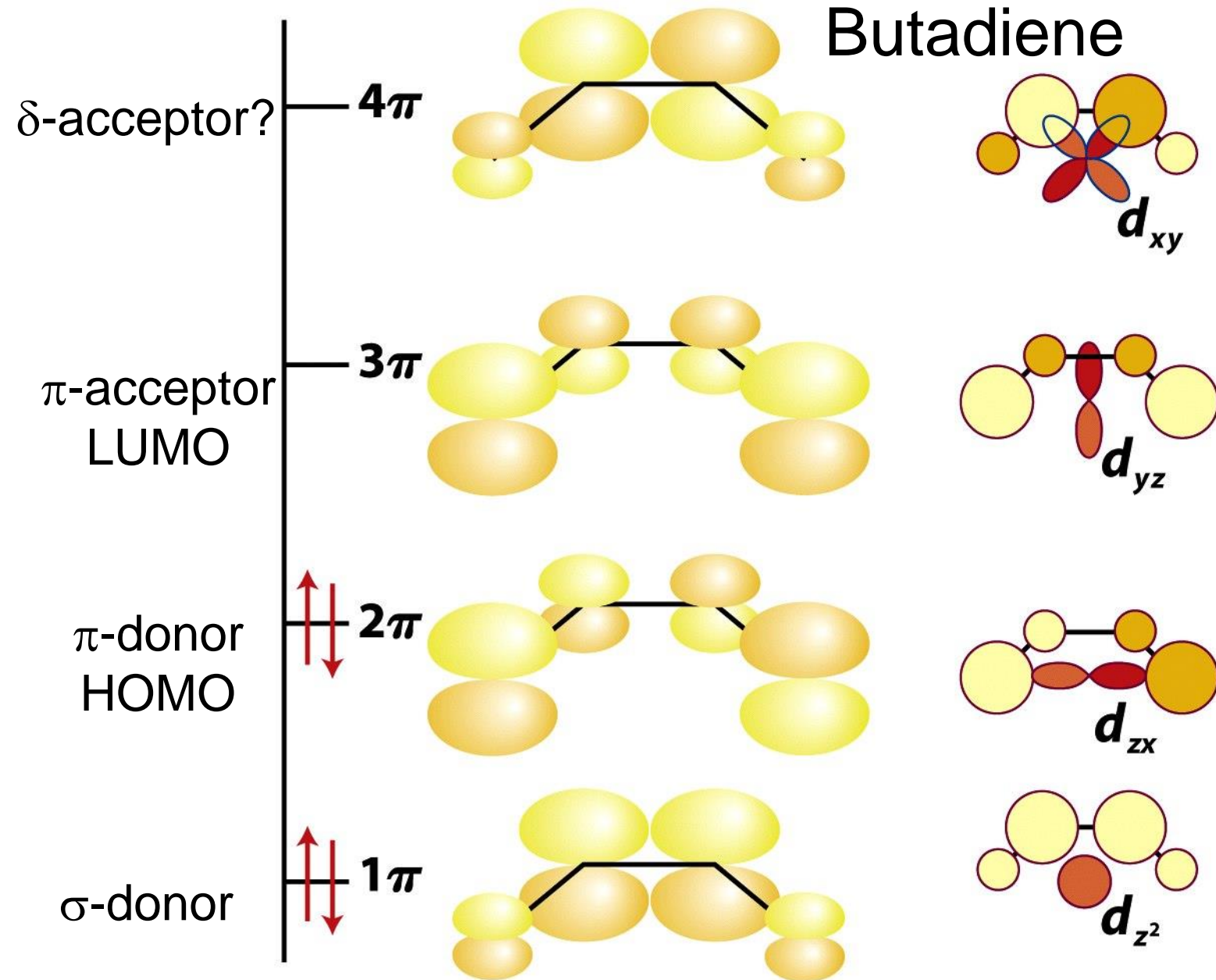


**$\text{Ni}(\text{cod})_2$**

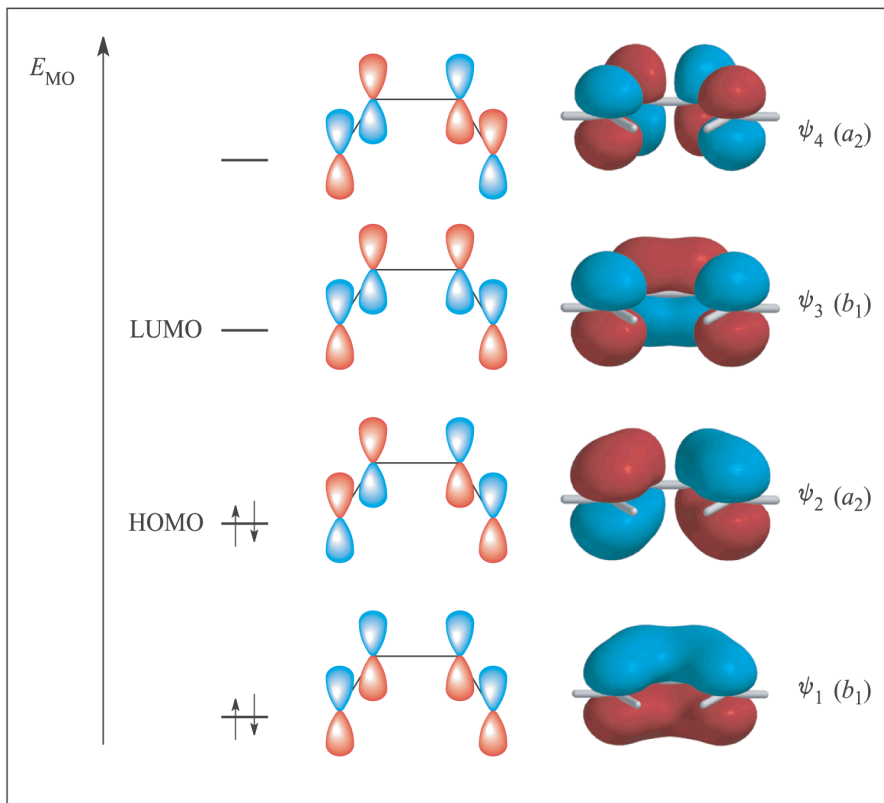




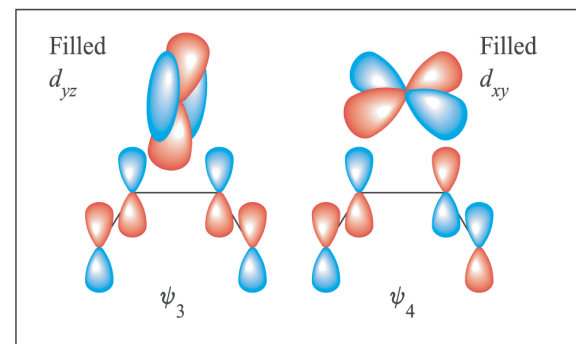
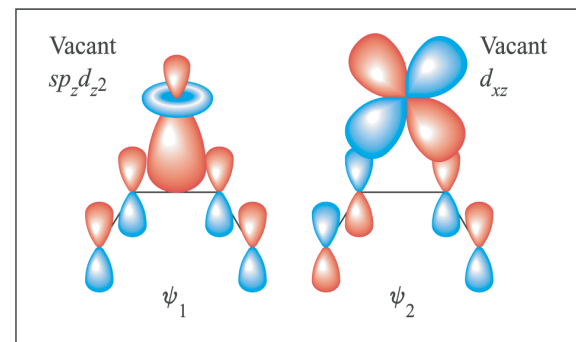
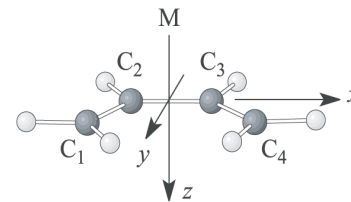
# Butadiene



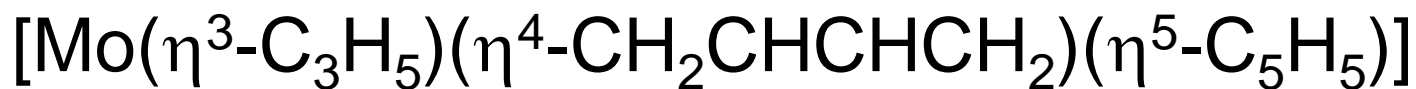
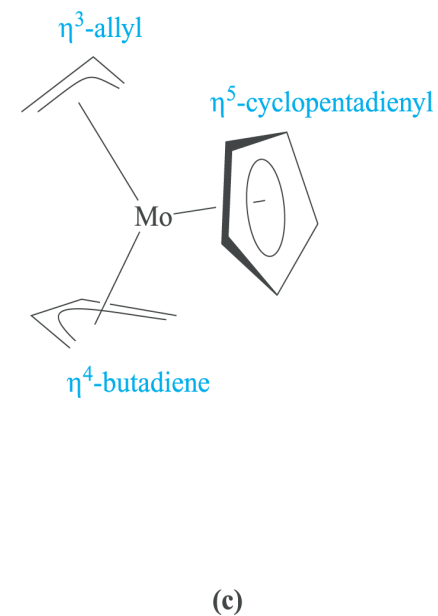
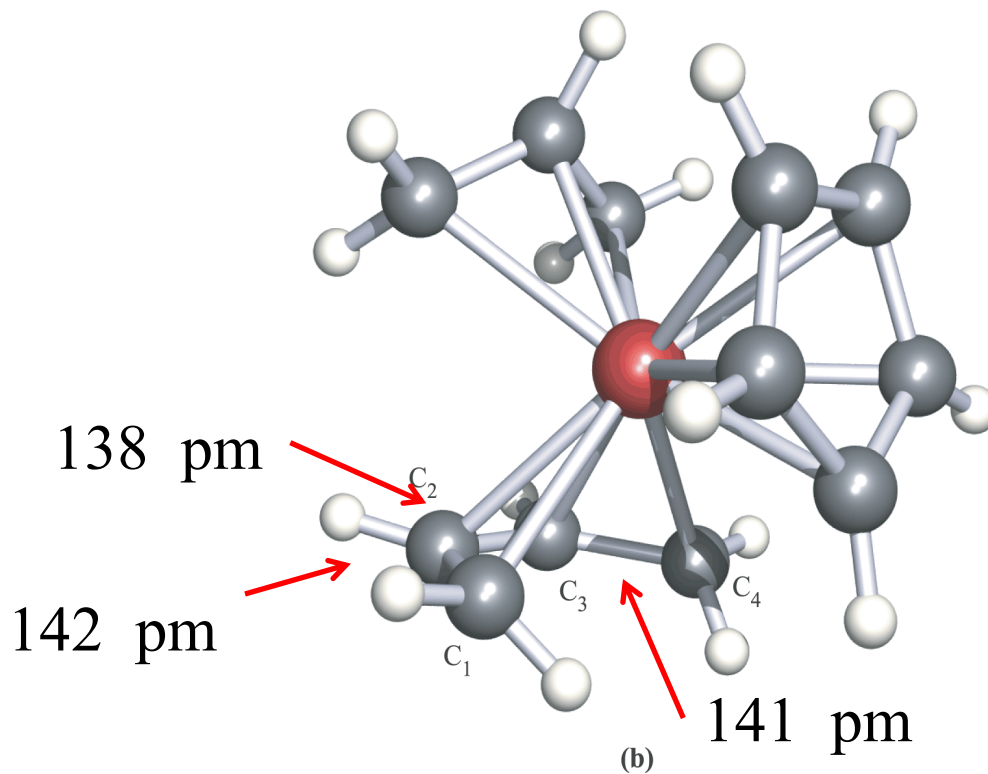
Il butadiene giace nel piano  $xy$ , sopra al metallo

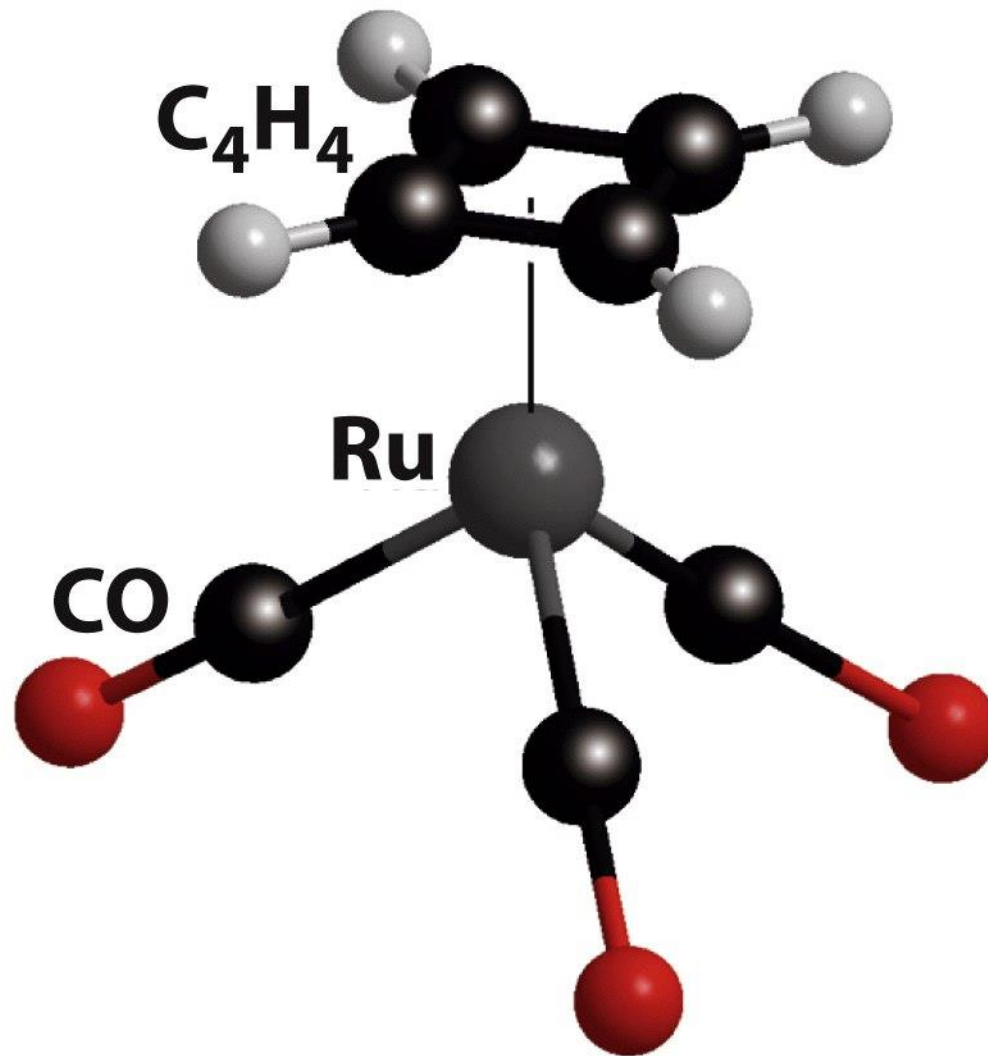


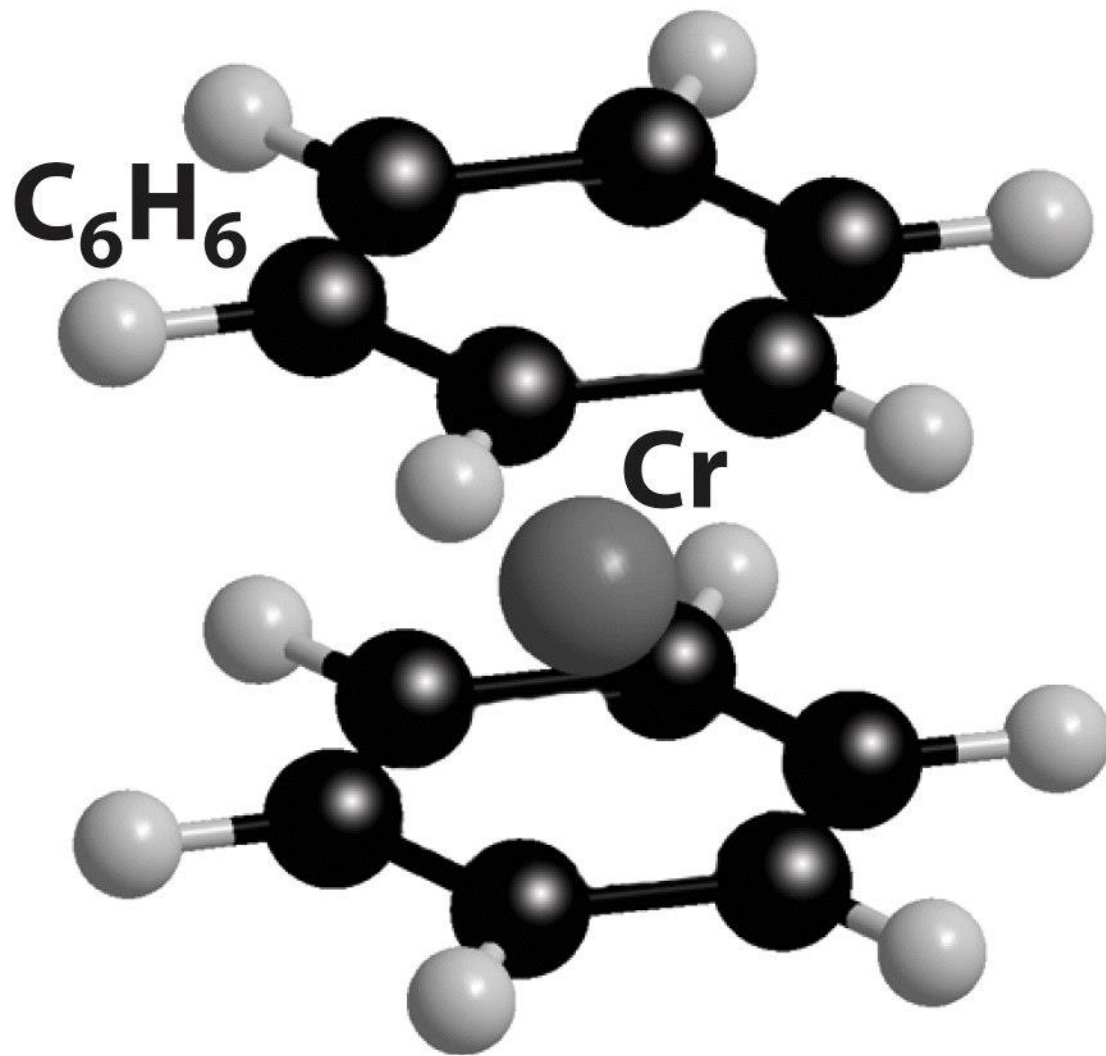
(a)

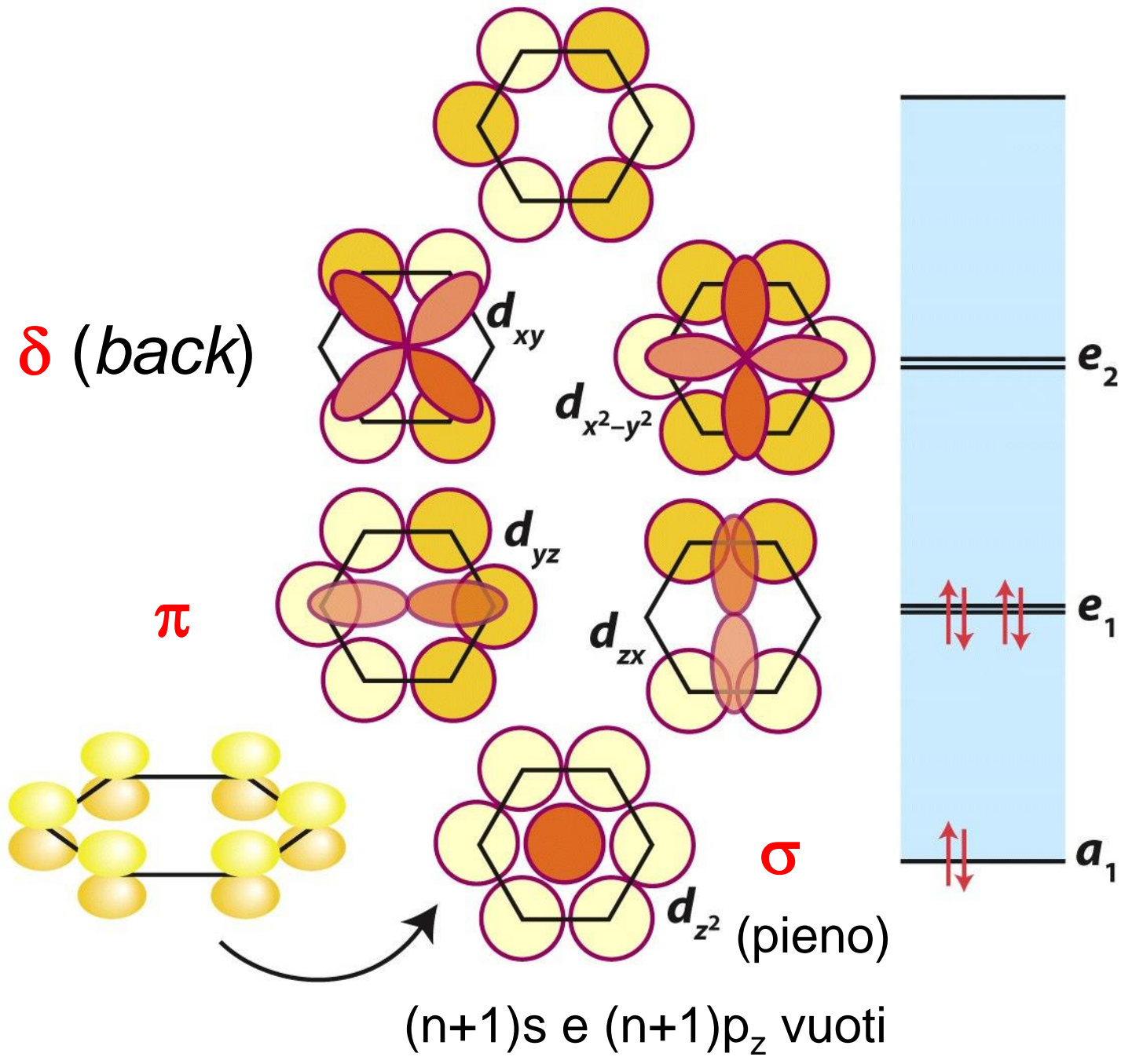


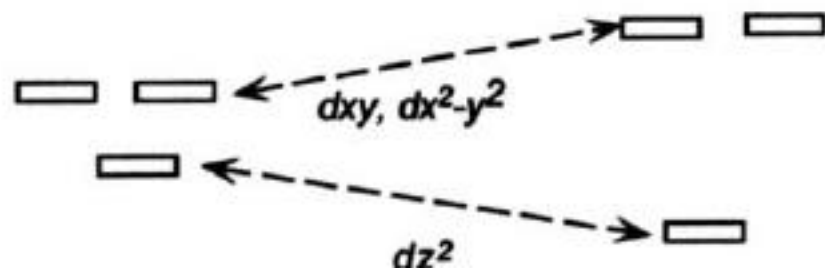
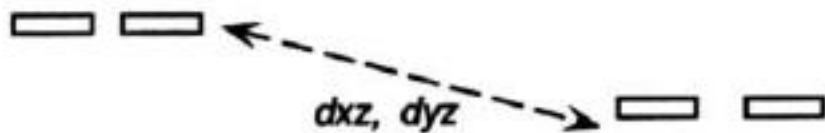
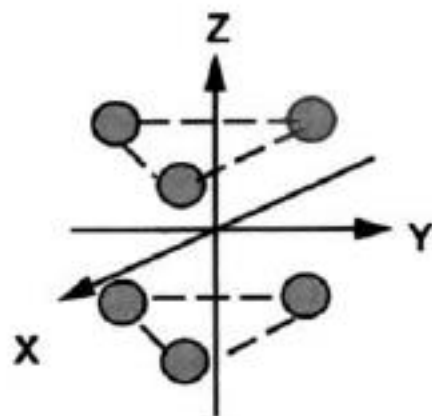
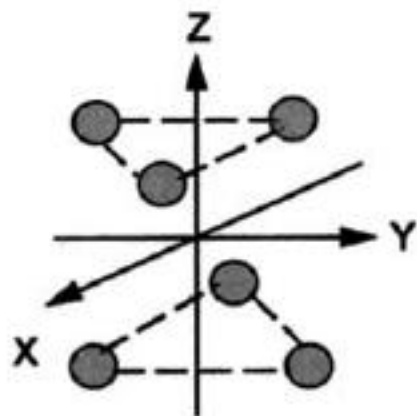
(b)

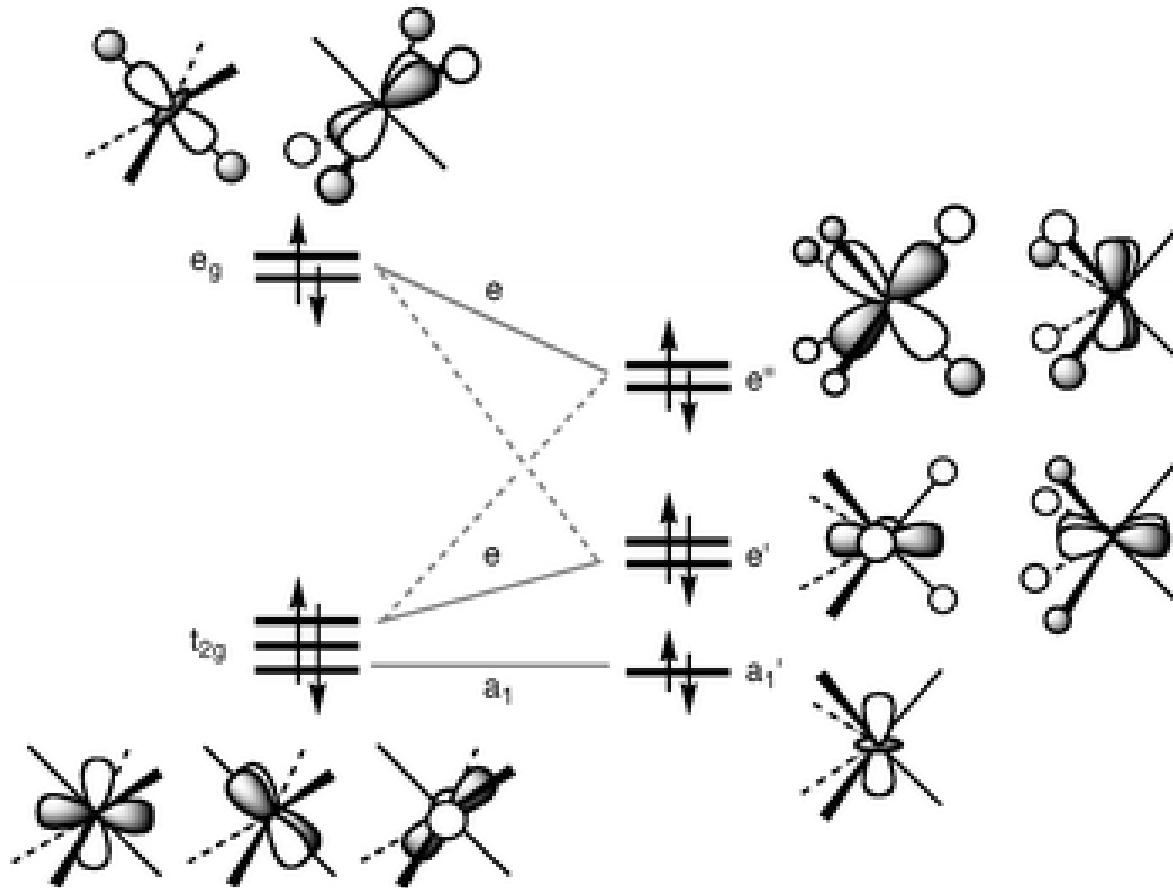
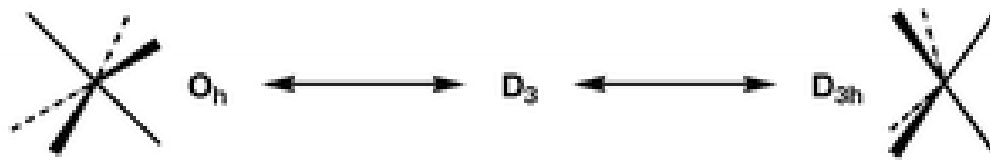




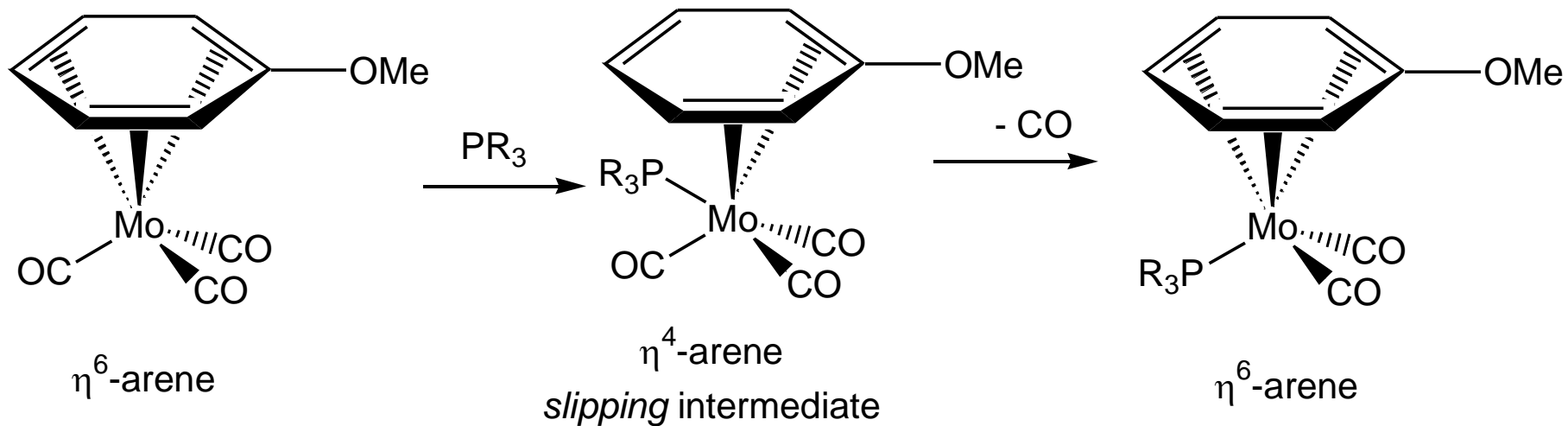
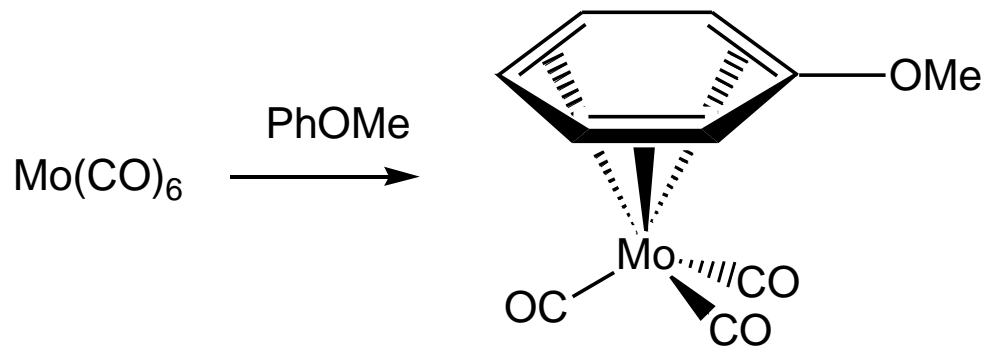






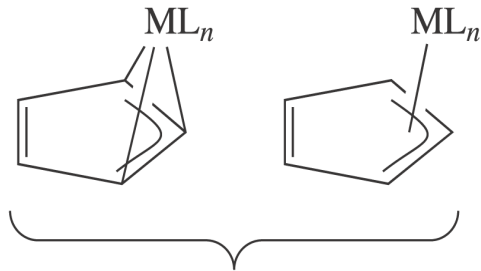




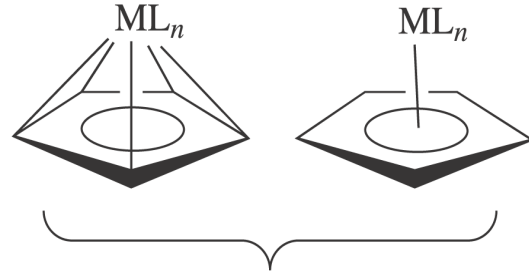




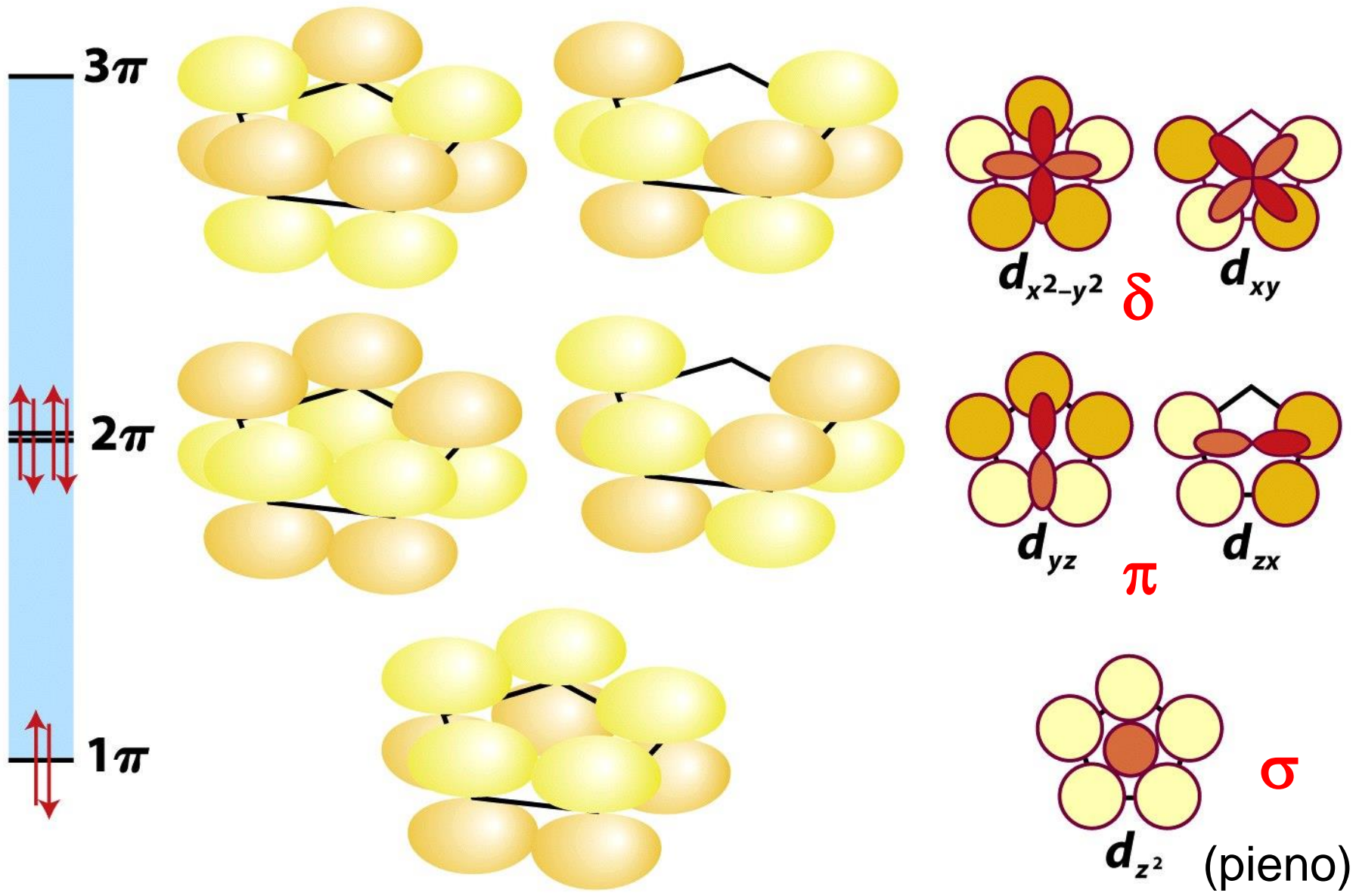
$\eta^1$ -mode



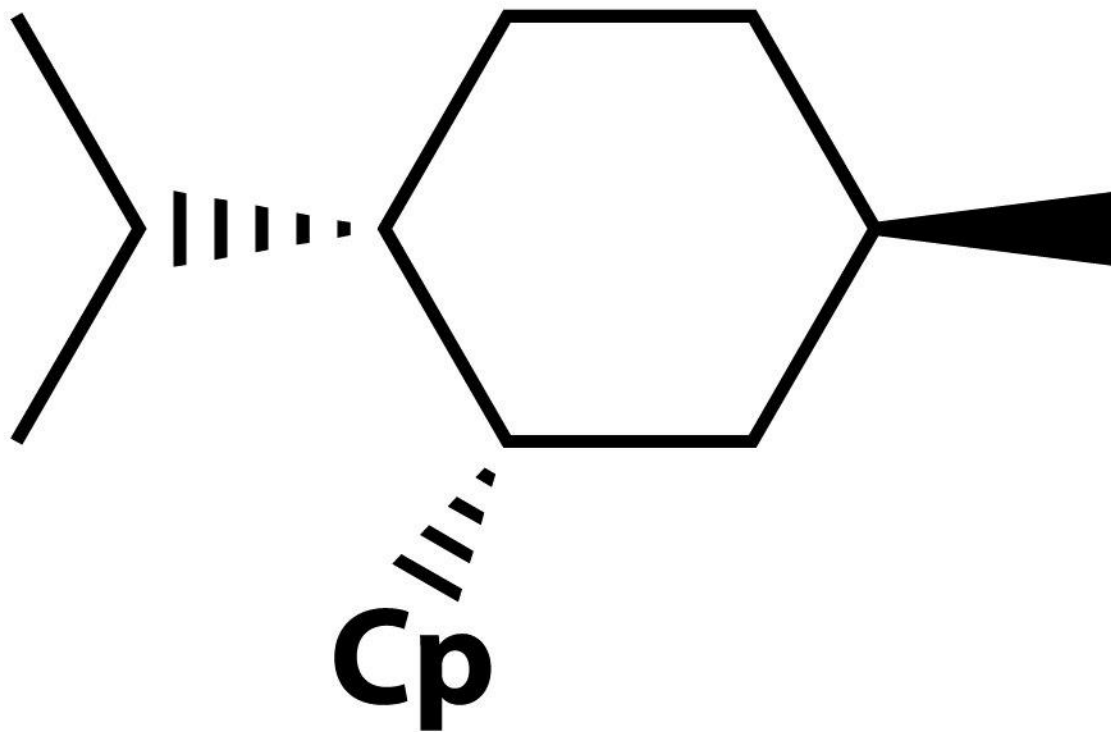
$\eta^3$ -mode



$\eta^5$ -mode

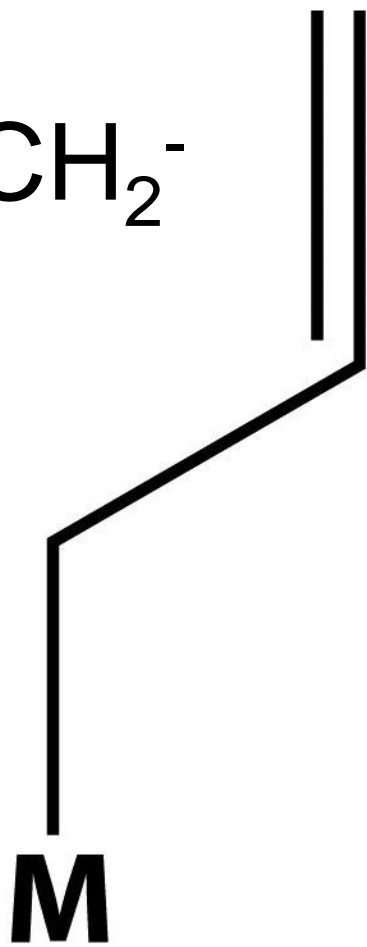


(n+1)s e (n+1)p<sub>z</sub> vuoti

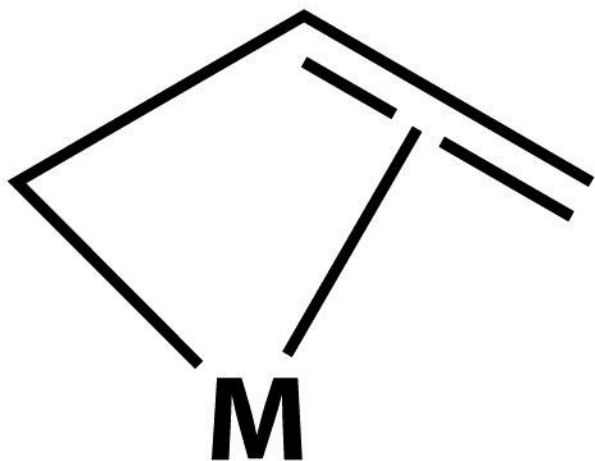


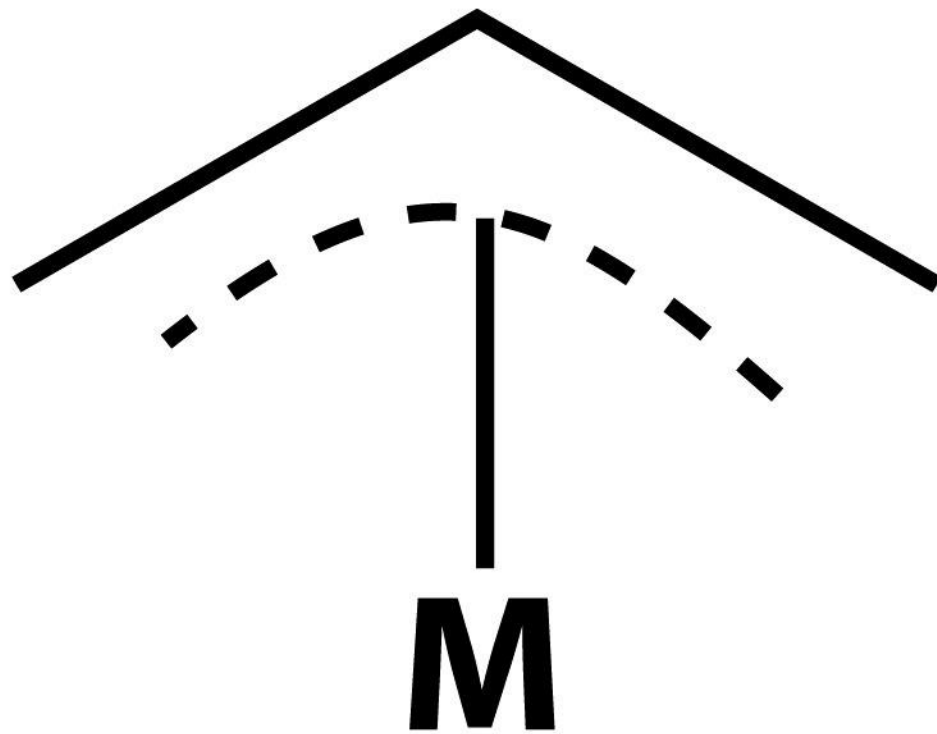
***neo-Menthylcyclopentadienyl***

Allyle,  $\text{CH}_2=\text{CH}-\text{CH}_2^-$



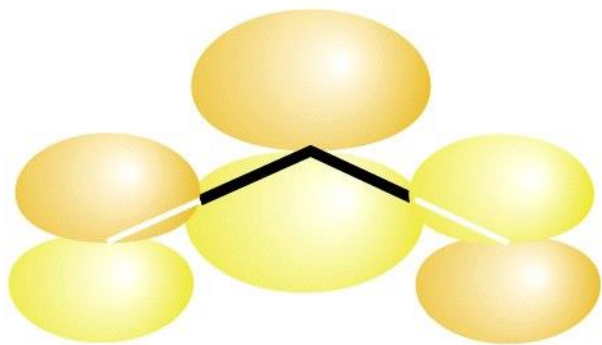
$\eta^1-(\text{CH}_2\text{CH}=\text{CH}_2)$





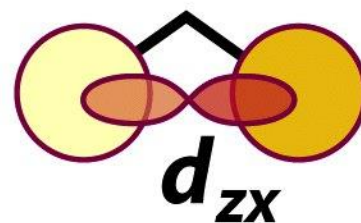
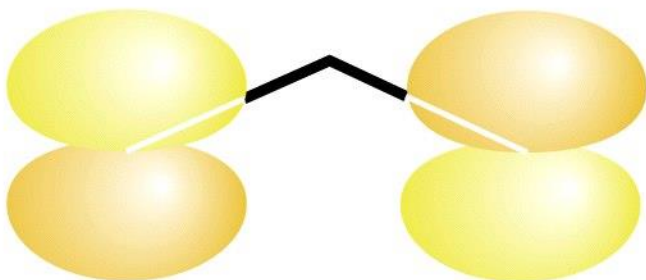
Accettore  $\pi$

$3\pi$



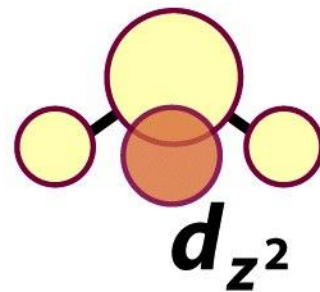
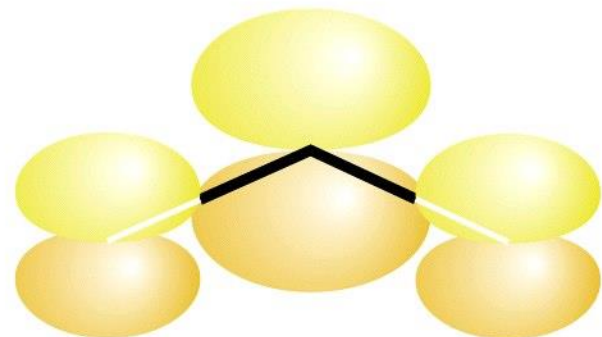
Donatore  $\pi$

$2\pi$



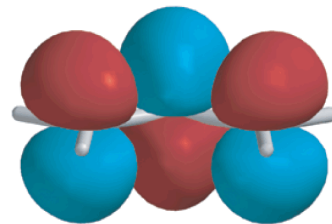
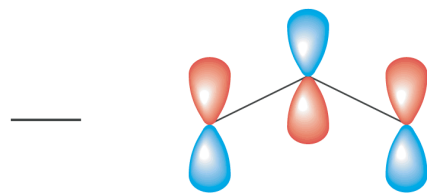
Donatore  $\sigma$

$1\pi$

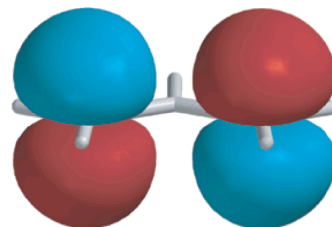
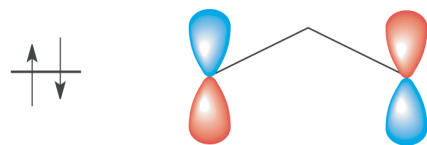




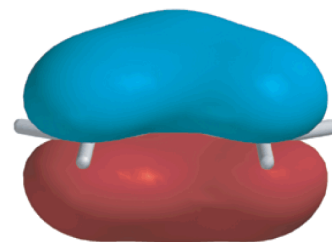
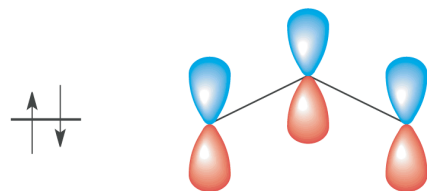
$E_{\text{MO}}$



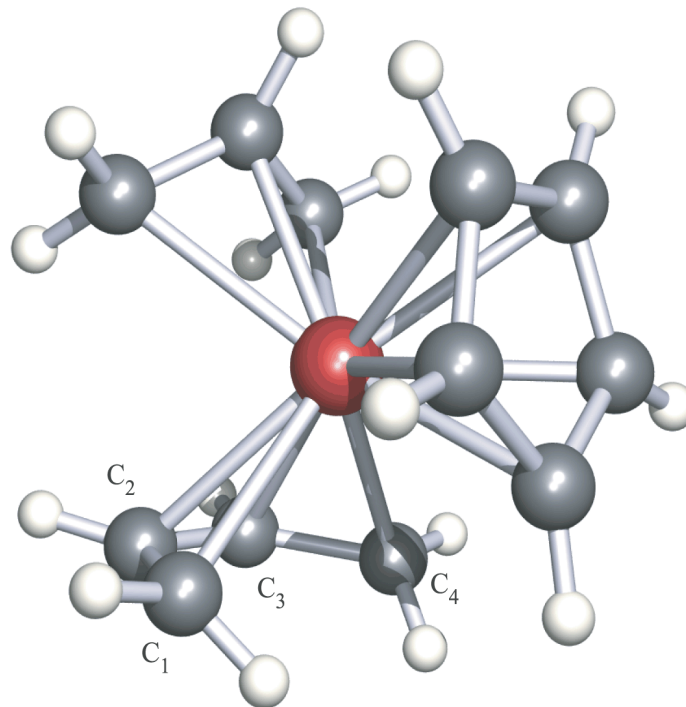
$\psi_3 (b_1)$  Antibonding



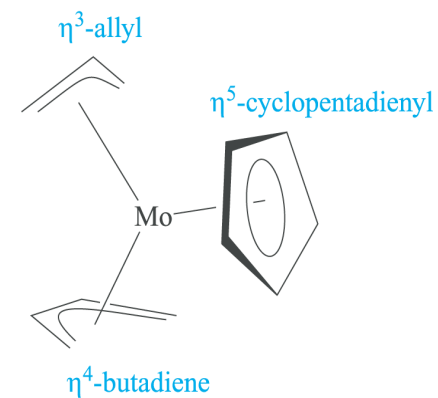
$\psi_2 (a_2)$  Non-bonding



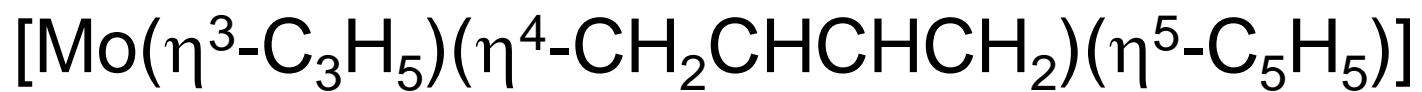
$\psi_1 (b_1)$  Bonding

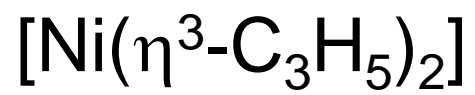
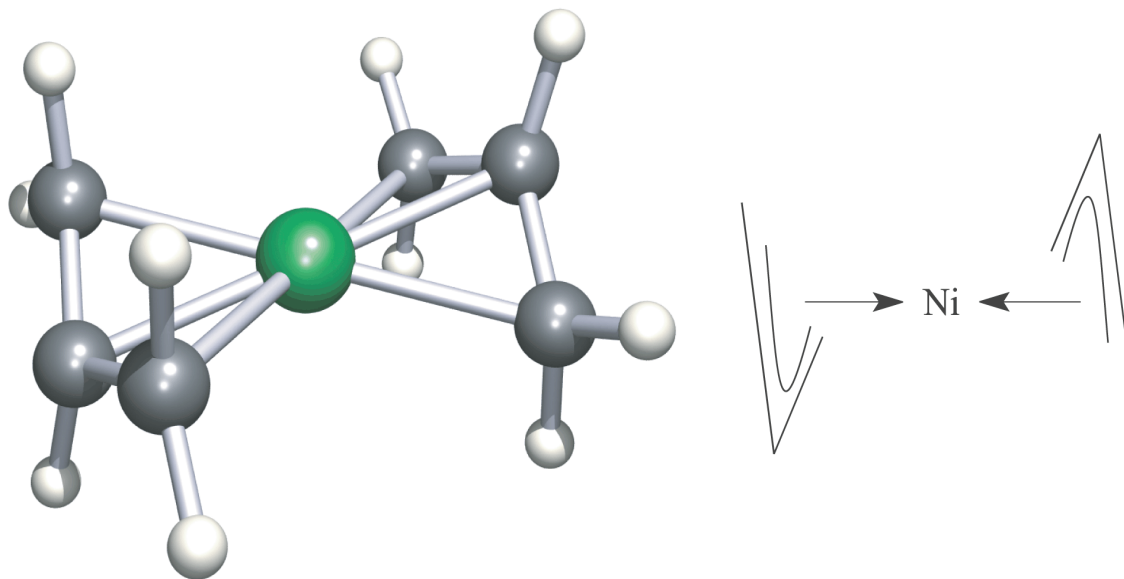


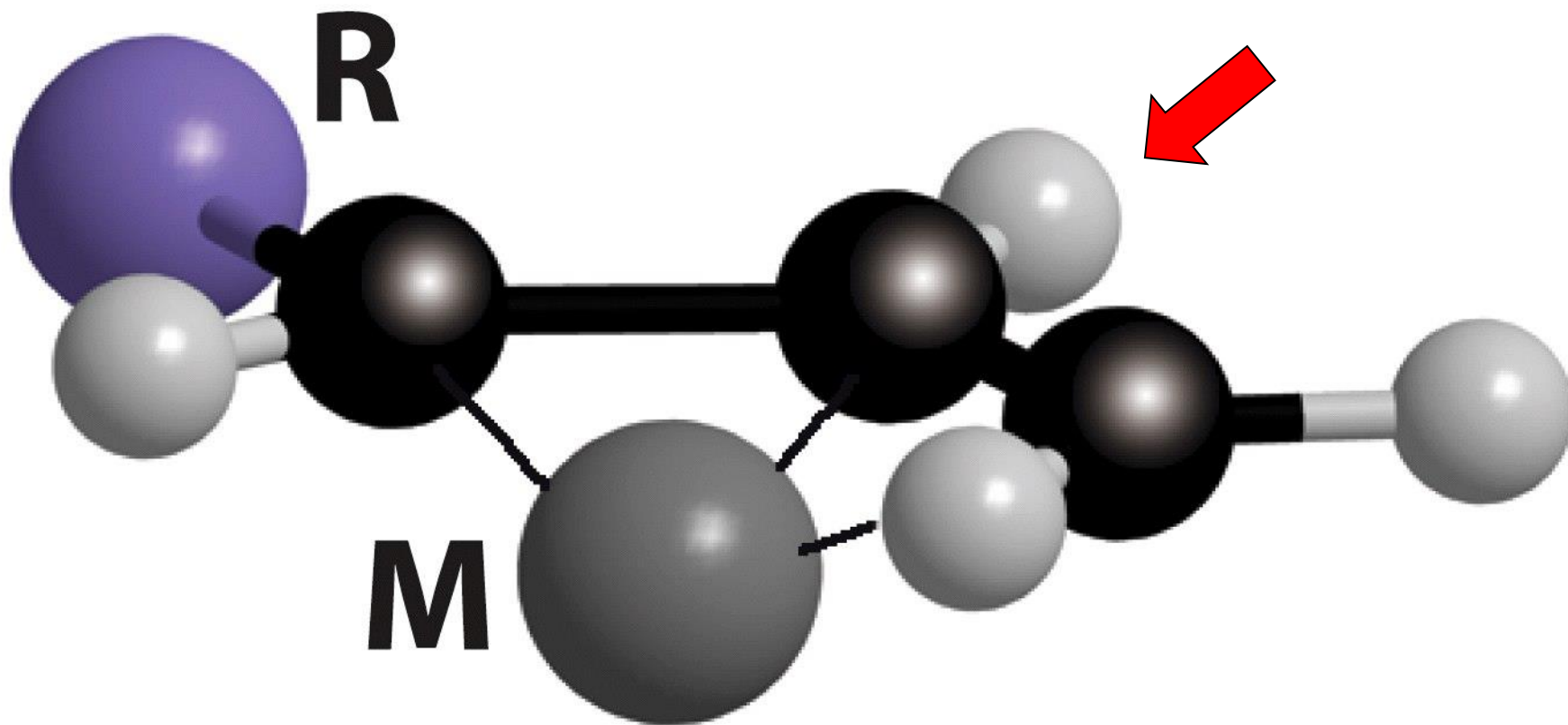
(b)



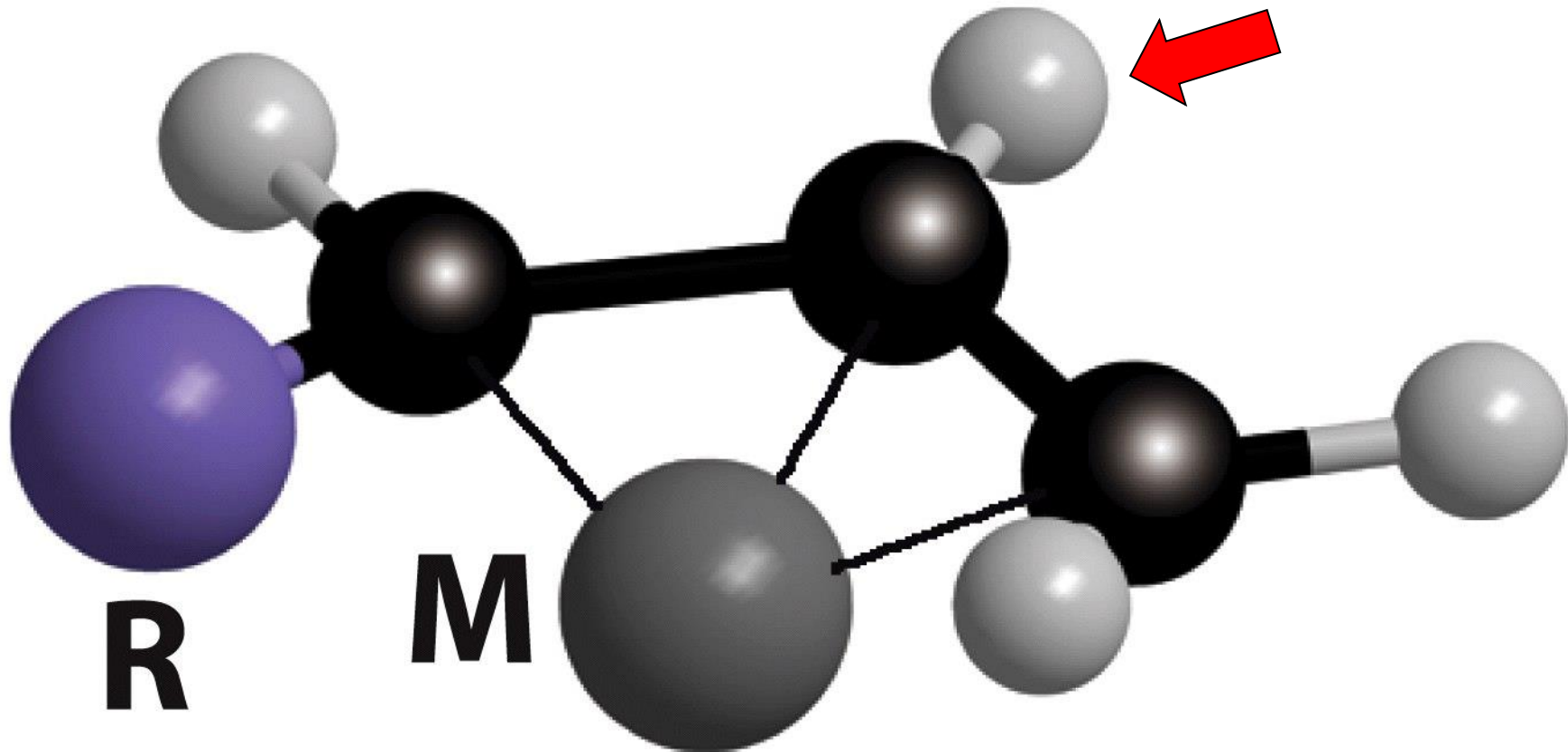
(c)







*syn*



*anti*

# Meccanismo di scambio $\eta^3 \rightarrow \eta^1 \rightarrow \eta^3$

