

## Ibridizzazione (o ibridazione)

$$\psi_i = a_i \psi(s) + b_i \psi(p_x) + c_i \psi(p_y) + d_i \psi(p_z)$$

$$\psi_1 = a_1 \psi(s) + b_1 \psi(p_x) + c_1 \psi(p_y) + d_1 \psi(p_z)$$

$$\psi_2 = a_2 \psi(s) + b_2 \psi(p_x) + c_2 \psi(p_y) + d_2 \psi(p_z)$$

$$\psi_3 = a_3 \psi(s) + b_3 \psi(p_x) + c_3 \psi(p_y) + d_3 \psi(p_z)$$

$$\psi_4 = a_4 \psi(s) + b_4 \psi(p_x) + c_4 \psi(p_y) + d_4 \psi(p_z)$$

$$\psi(s) = f(r)$$

$$\psi(p_x) = f(r) 3^{1/2} \text{sen}\vartheta \cos\varphi$$

$$\psi(p_y) = f(r) 3^{1/2} \text{sen}\vartheta \text{sen}\varphi$$

$$\psi(p_z) = f(r) 3^{1/2} \cos\vartheta$$

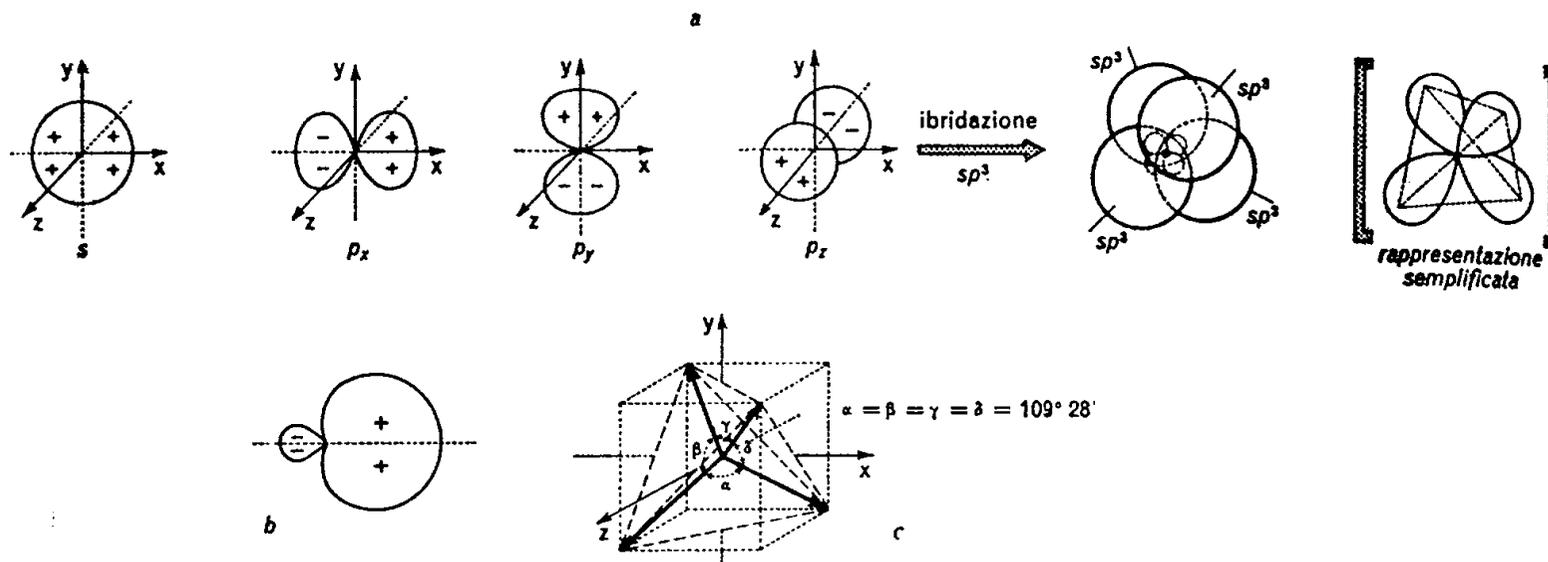
$$\int \psi_i^2 dV = 1$$

$$i = 1, 2, 3, 4$$

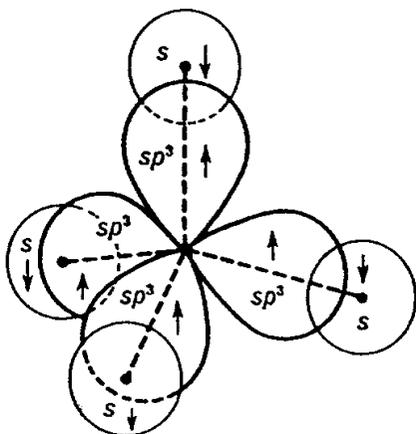
$$a_i^2 + b_i^2 + c_i^2 + d_i^2 = 1$$

# Ibridazione $sp^3$ dell'atomo di C

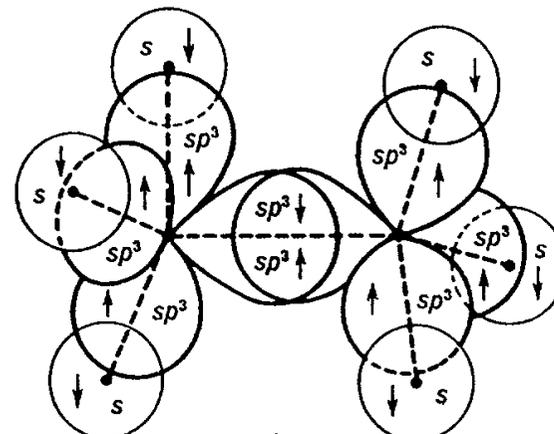
$2p \uparrow \uparrow \text{---}$ $2s \uparrow\downarrow$ $1s \uparrow\downarrow$ <i>Stato fondamentale</i>	$2p \uparrow \uparrow \uparrow$ $2s \uparrow\text{---}$ $1s \uparrow\downarrow$ <i>Stato di tetravalenza</i>	$\uparrow \uparrow \uparrow \uparrow$ $2sp^3$ $1s \uparrow\downarrow$ <i>Stato di ibridazione <math>sp^3</math></i>
↑ E	↑ E	↑ E



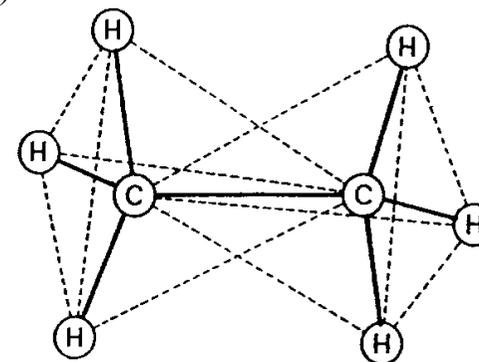
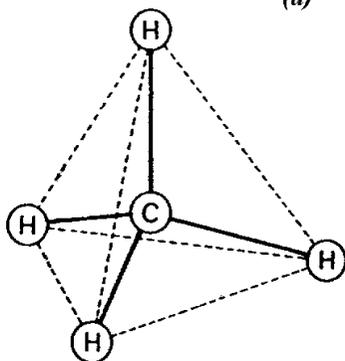
# Idrocarburi ALCANI



(a) Le molecole del metano (a) e dell'etano (b)



(b)



$n = 3$   $C_3H_8$  Propano

$n = 4$   $C_4H_{10}$  Butano

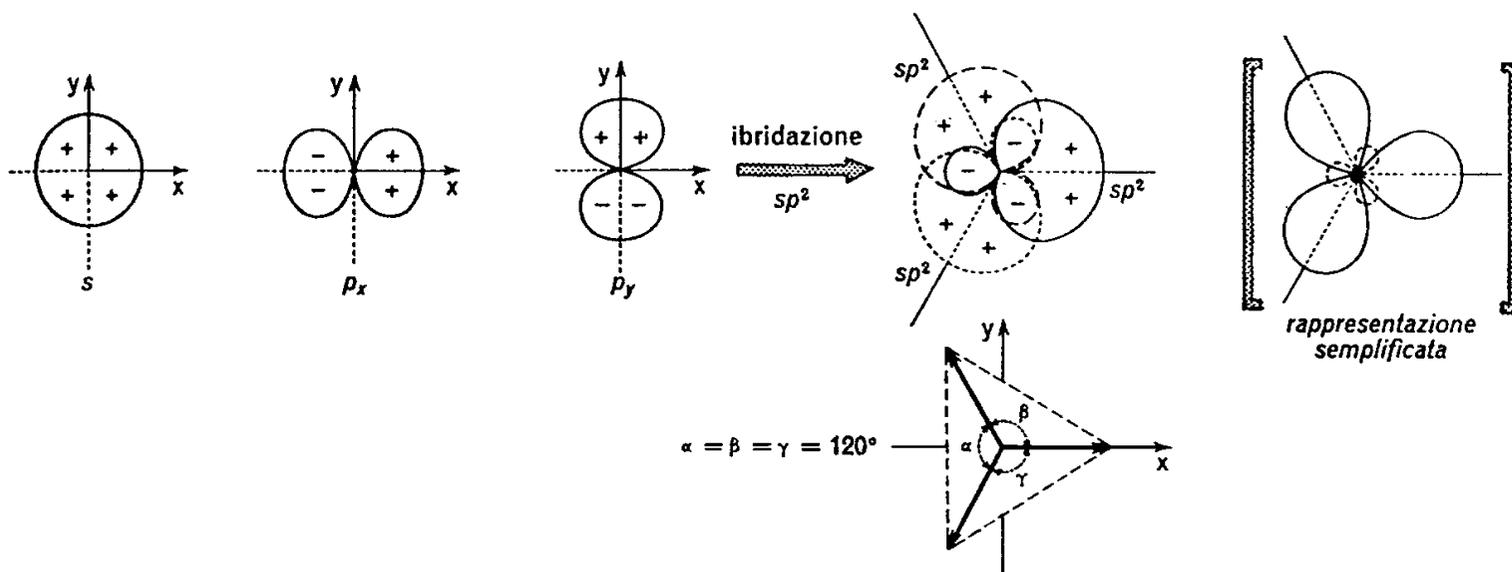
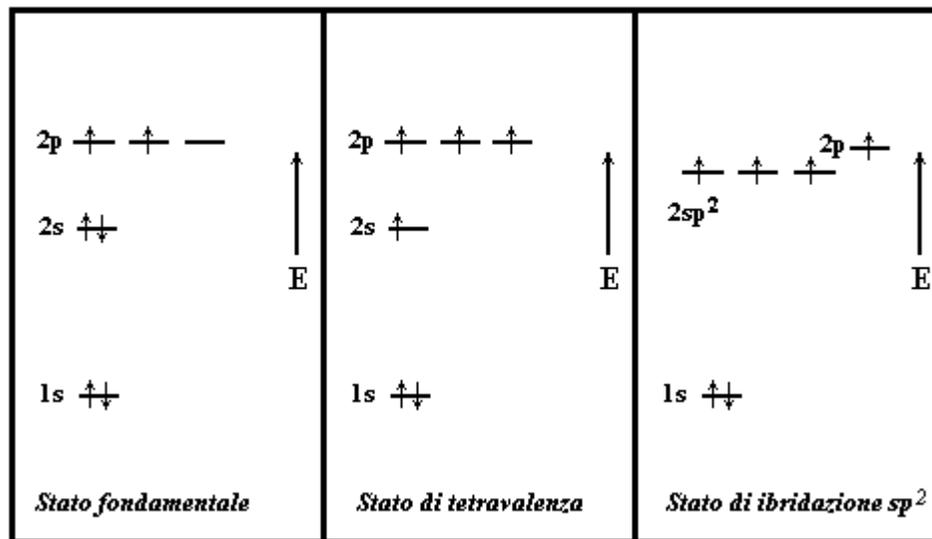
$n = 5$   $C_5H_{12}$  Pentano

$n = 6$   $C_6H_{14}$  Esano

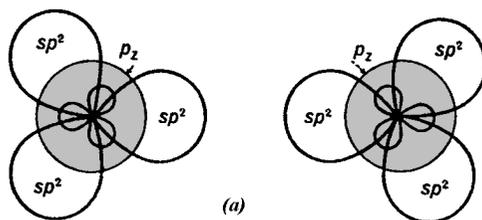
$n = 7$   $C_7H_{16}$  Eptano

$n = 8$   $C_8H_{18}$  Ottano

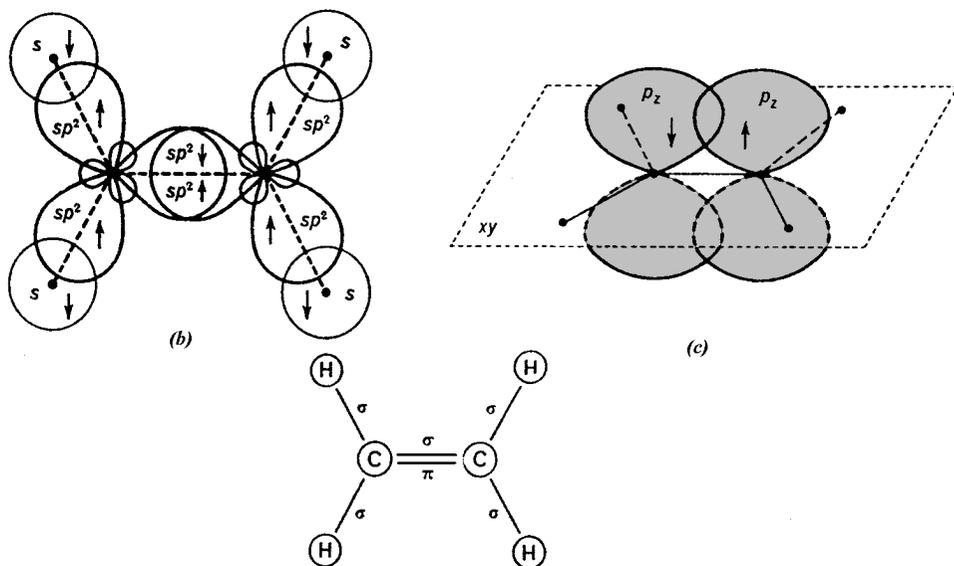
# Ibridazione $sp^2$ dell'atomo di C



# Idrocarburi ALCENI



La molecola dell'etilene  $C_2H_4$ : (a) orbitali dei due atomi di carbonio partecipanti ai legami; (b) legame  $\sigma$ ; (c) legame  $\pi$ .



$n = 3$   $C_3H_6$  Propene

$n = 6$   $C_6H_{12}$  Esene

$n = 4$   $C_4H_8$  Butene

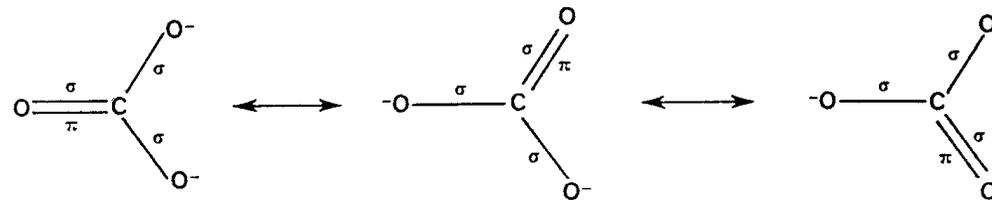
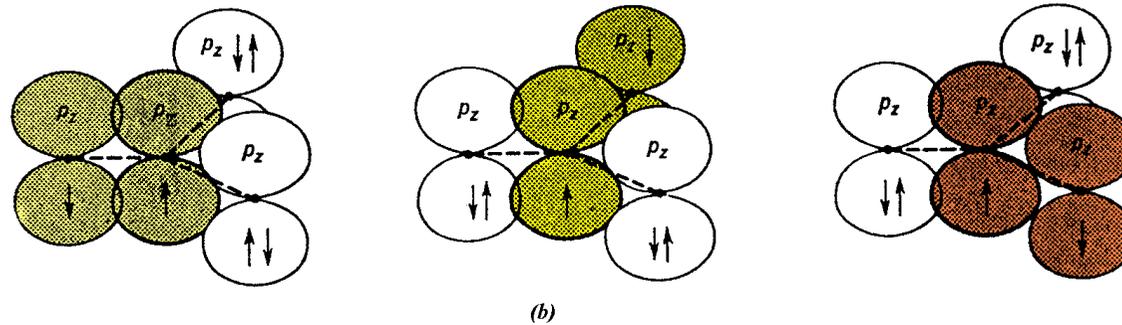
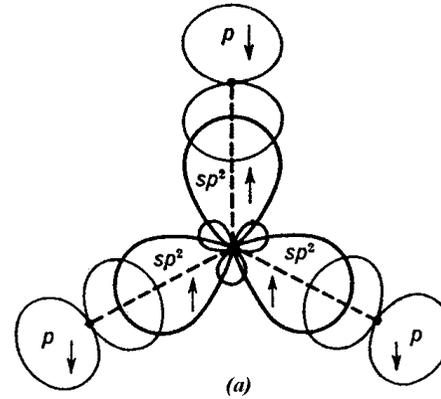
$n = 7$   $C_7H_{14}$  Eptene

$n = 5$   $C_5H_{10}$  Pentene

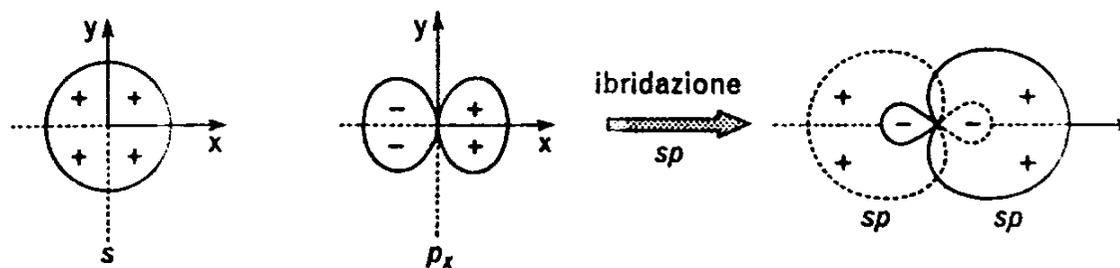
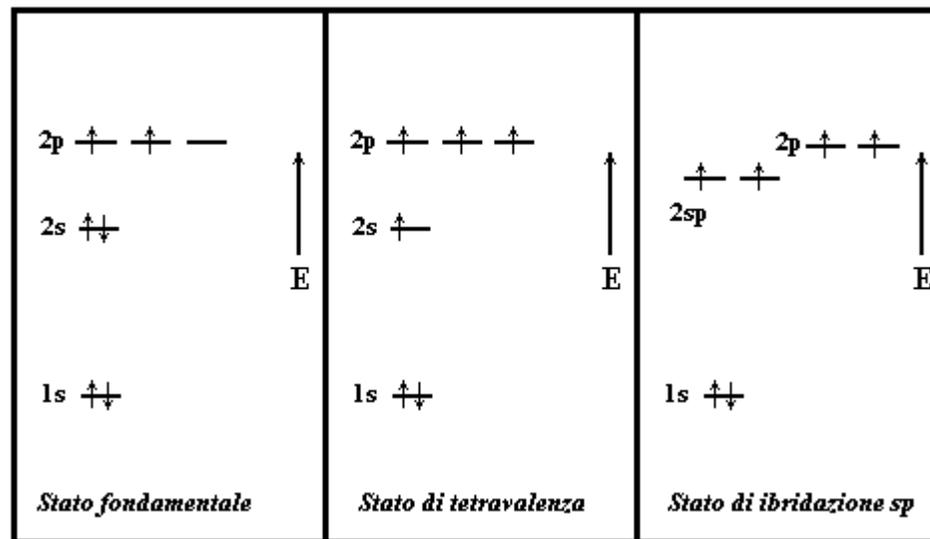
$n = 8$   $C_8H_{16}$  Ottene

# Esempio di ibridizzazione $sp^2$ .

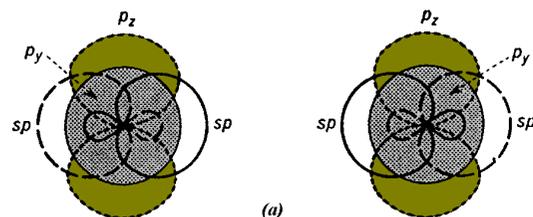
## Lo ione carbonato



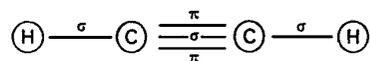
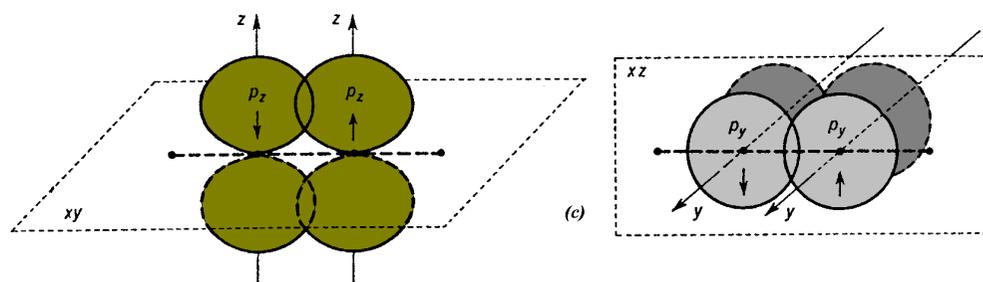
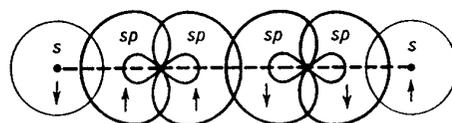
# Ibridazione sp dell'atomo di C



# Idrocarburi ALCHINI



La molecola dell'acetilene o etino  $C_2H_2$ : (a) orbitali dei due atomi di carbonio partecipanti ai legami; (b) legame  $\sigma$ ; (c) legame  $\pi$ .



n = 3  $C_3H_4$  Propino

n = 6  $C_6H_{10}$  Esino

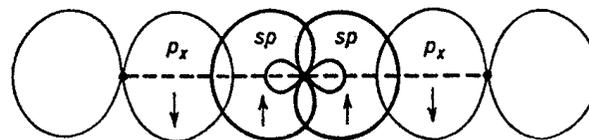
n = 4  $C_4H_6$  Butino

n = 7  $C_7H_{12}$  Eptino

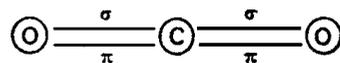
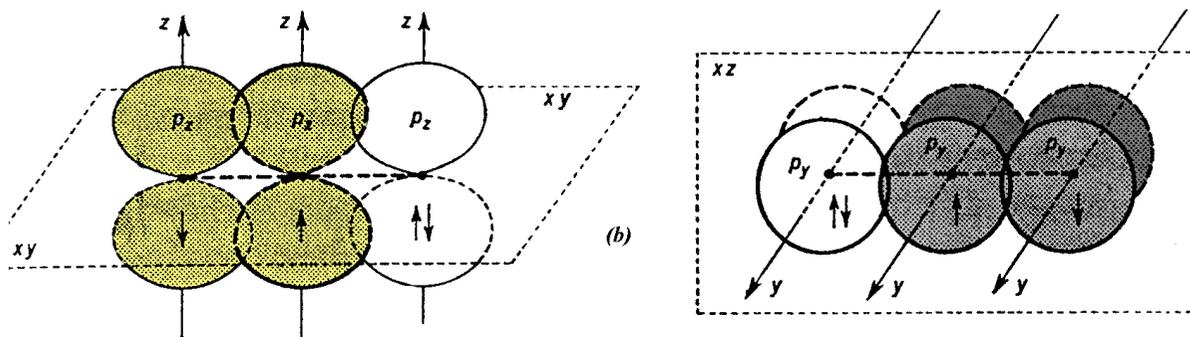
n = 5  $C_5H_8$  Pentino

n = 8  $C_8H_{14}$  Ottino

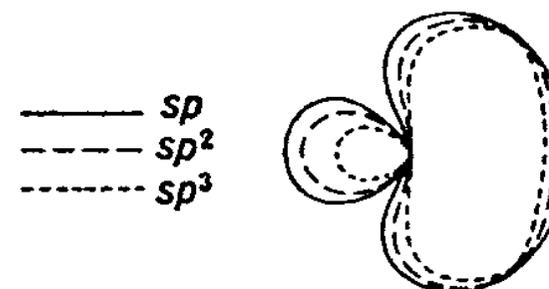
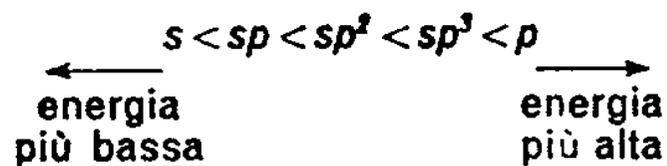
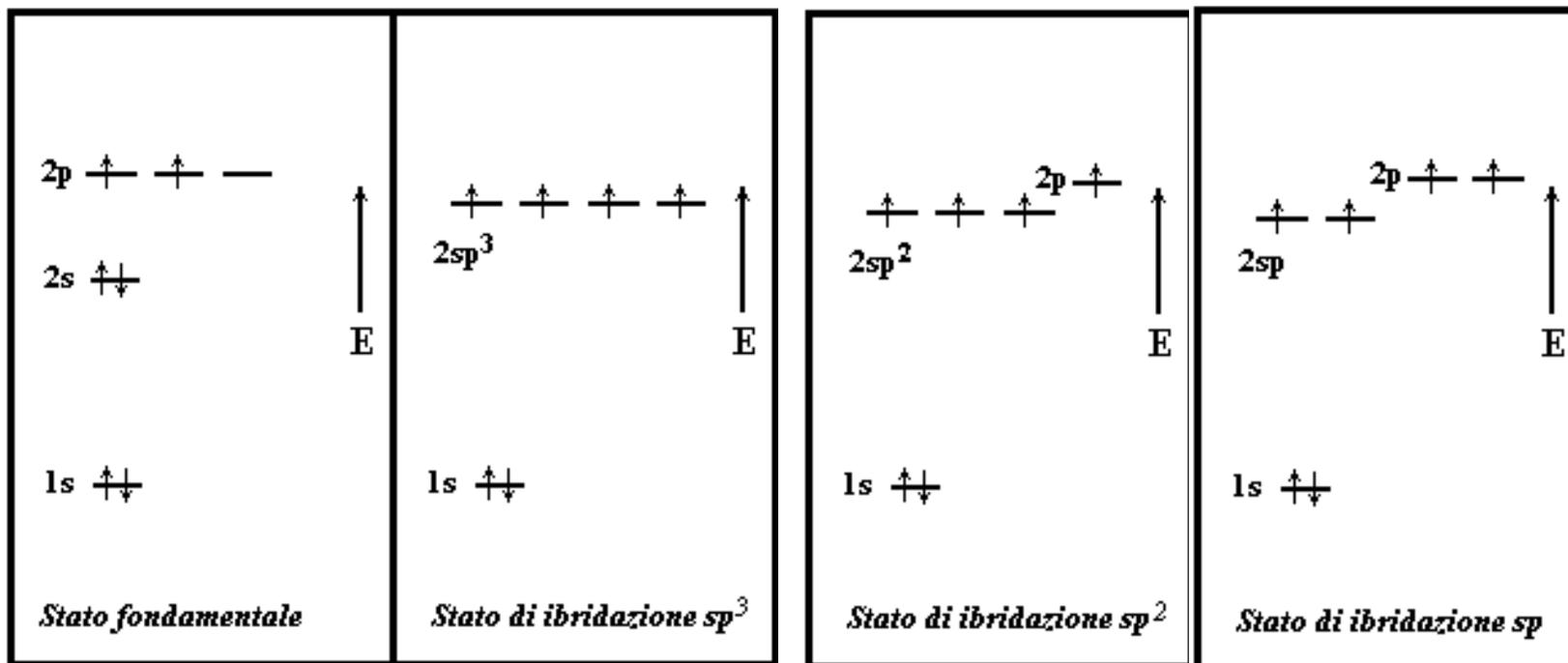
# La molecola del diossido di carbonio CO<sub>2</sub>



(a)

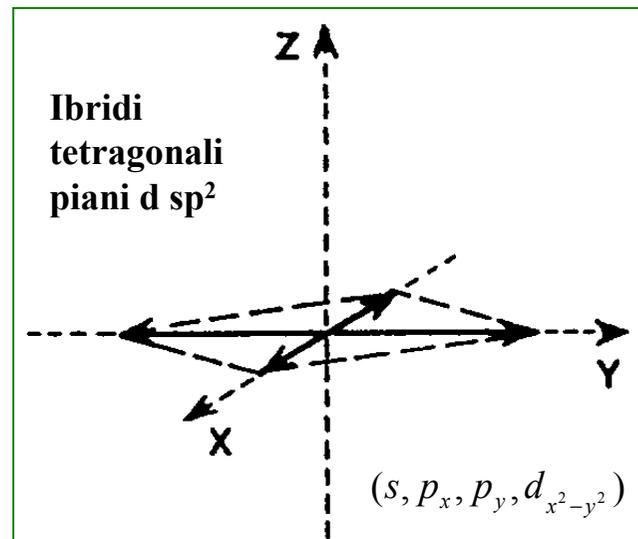
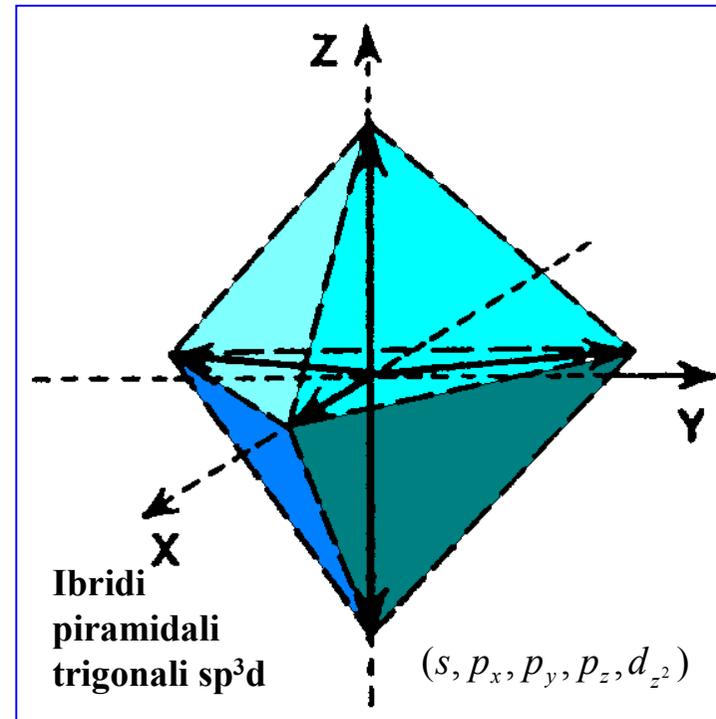
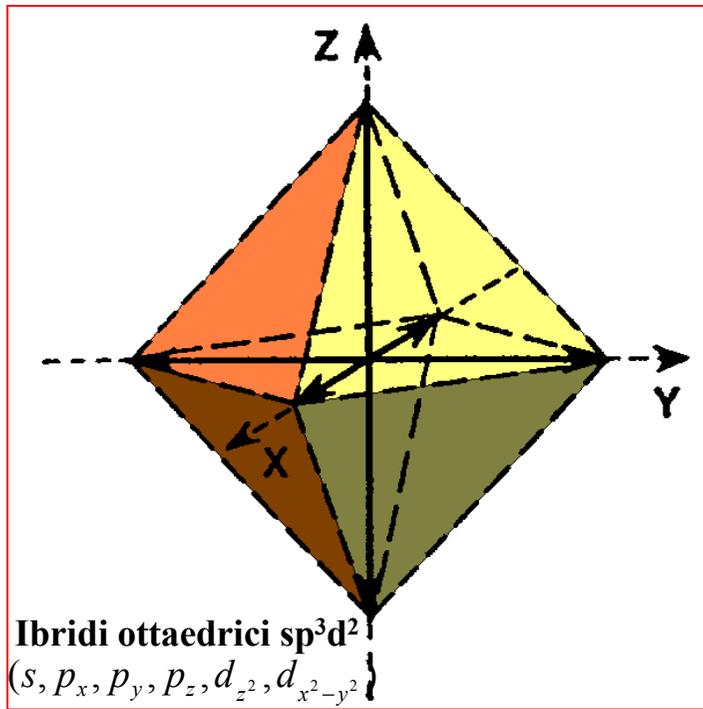


(a) Legame  $\sigma$  ; (b) legame  $\pi$



contorni rappresentativi  
 degli orbitali ibridi  $sp^3$ ,  $sp^2$ ,  $sp$   
 dell'atomo di carbonio [ $v^2 = 0,01$ ]

# Altri tipi di ibridizzazione



## Altri tipi di ibridizzazione

