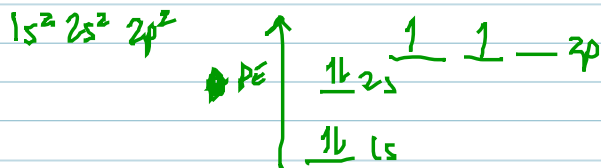
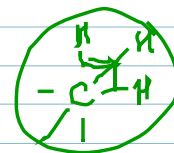
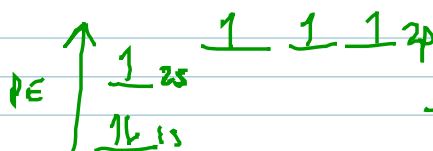


## ORBITAL HYBRIDIZATION

C  $\Rightarrow$  always forms 4 bonds (all single  $\rightarrow$  tetrahedral)



excited state



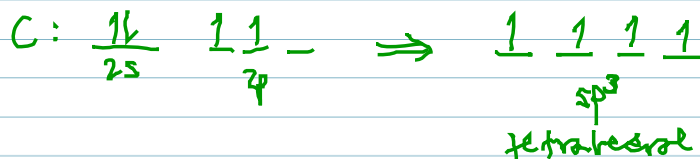
## HYBRID ORBITALS

$\rightarrow$  2 or more "nonequivalent" atomic orbitals combine to form new orbitals in order to bond

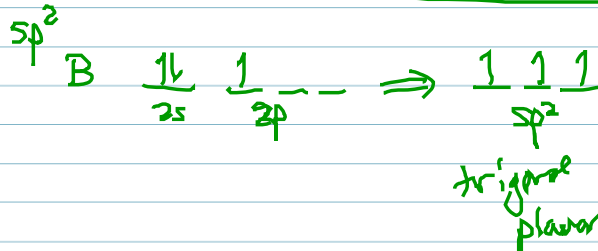
C:  $sp^3$

\* the E needed to hybridize is "paid for" by the E released when bonds form

$sp^3$



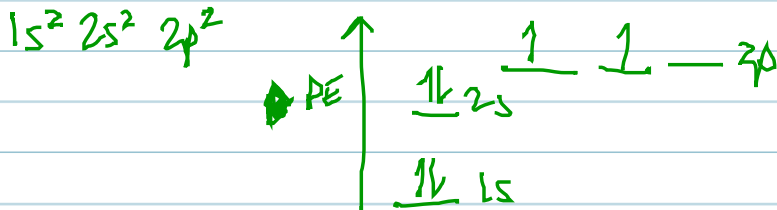
$sp^2$



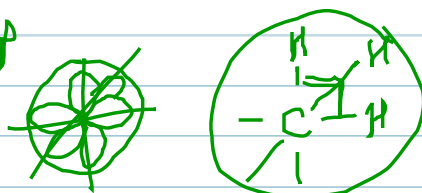
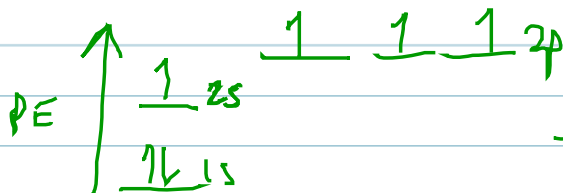
$2p$  perpendicular to the plane

# ORBITAL HYBRIDIZATION

C  $\Rightarrow$  always forms 4 bonds (all single  $\rightarrow$  tetrahedral)

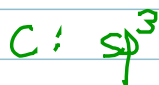


Excited state

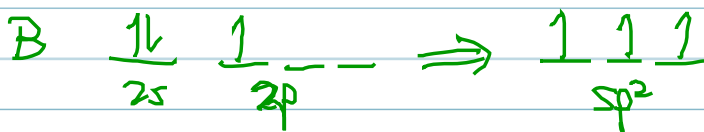
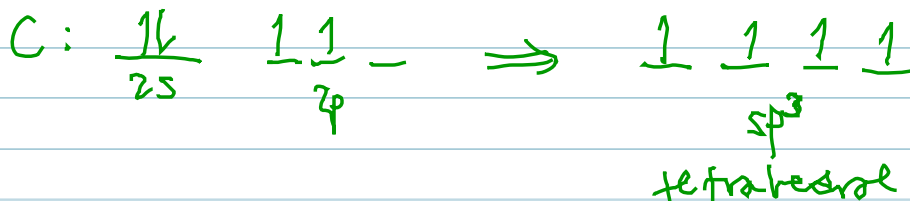


## HYBRID ORBITALS

$\rightarrow$  2 or more "nonequivalent" atomic orbitals combine to form new orbitals in order to bond

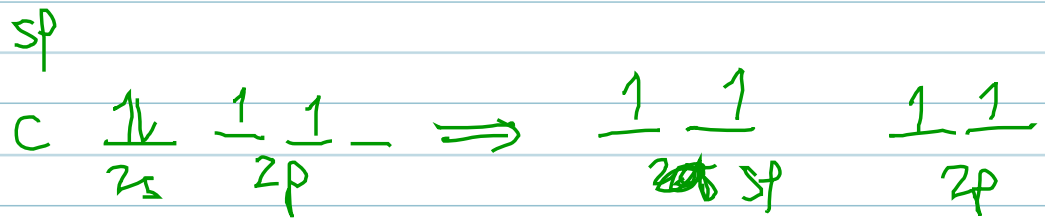
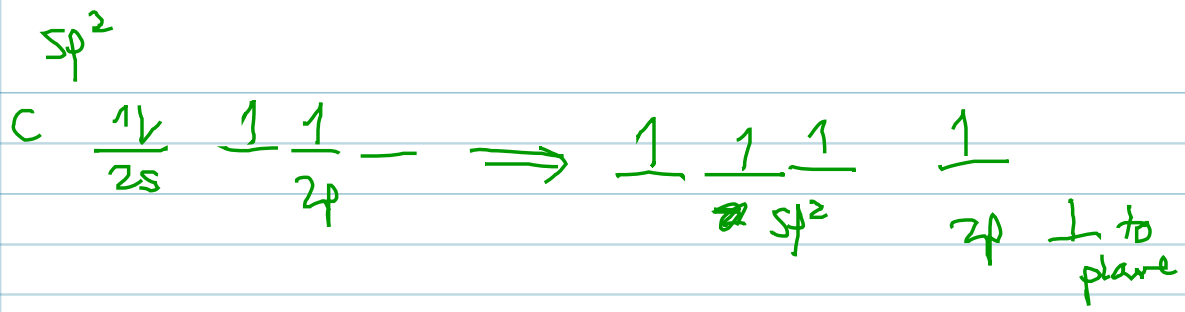


\* the E needed to hybridize is "paid for" by the E released when bonds form

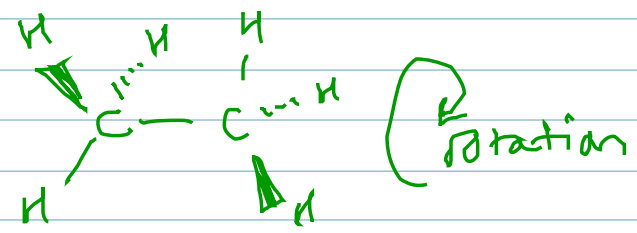
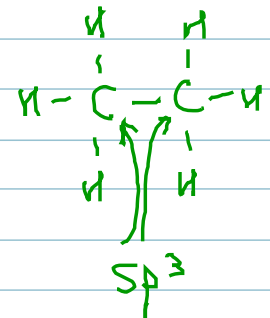


trigonal planar

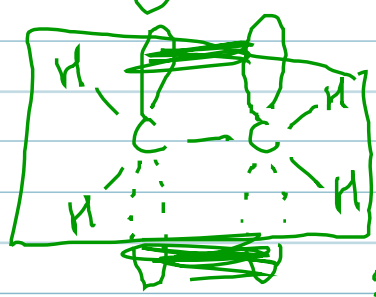
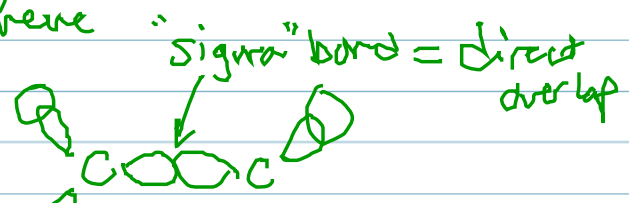
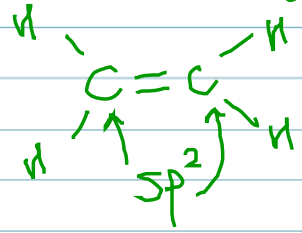
$\overline{2p}$  perpendicular to the plane



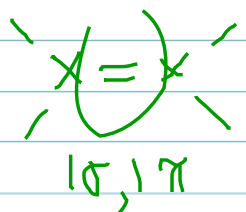
$C_2H_6$  ethane



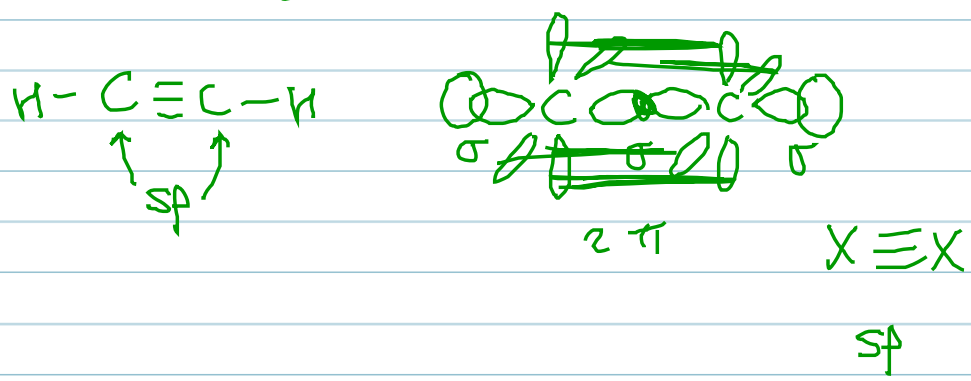
$C_2H_4$  ethylene ethene



$\pi$  bond  
sideways overlap  
of 2 parallel p  
orbitals



$C_2H_2$  ethyne acetylene



C: all single bonds  $\Rightarrow$  4  $\sigma$   $\Rightarrow$   $sp^3$   $\Rightarrow$  tetrahedral  
2 singles, 1 double  $\Rightarrow$  3  $\sigma$ , 1  $\pi$   $\Rightarrow$   $sp^2$   $\Rightarrow$  trigonal planar  
1 single, 1 triple  $\Rightarrow$  2  $\sigma$ , 2  $\pi$   $\Rightarrow$  sp  $\Rightarrow$  linear

2 doubles

$O=C=O$     2  $\sigma$ , 2  $\pi$   $\Rightarrow$  sp  $\Rightarrow$  linear

