



Linear Electronic Geometry: AB₂ Species (No Lone Pairs of Electrons on A)

- Some examples of molecules with this geometry are:

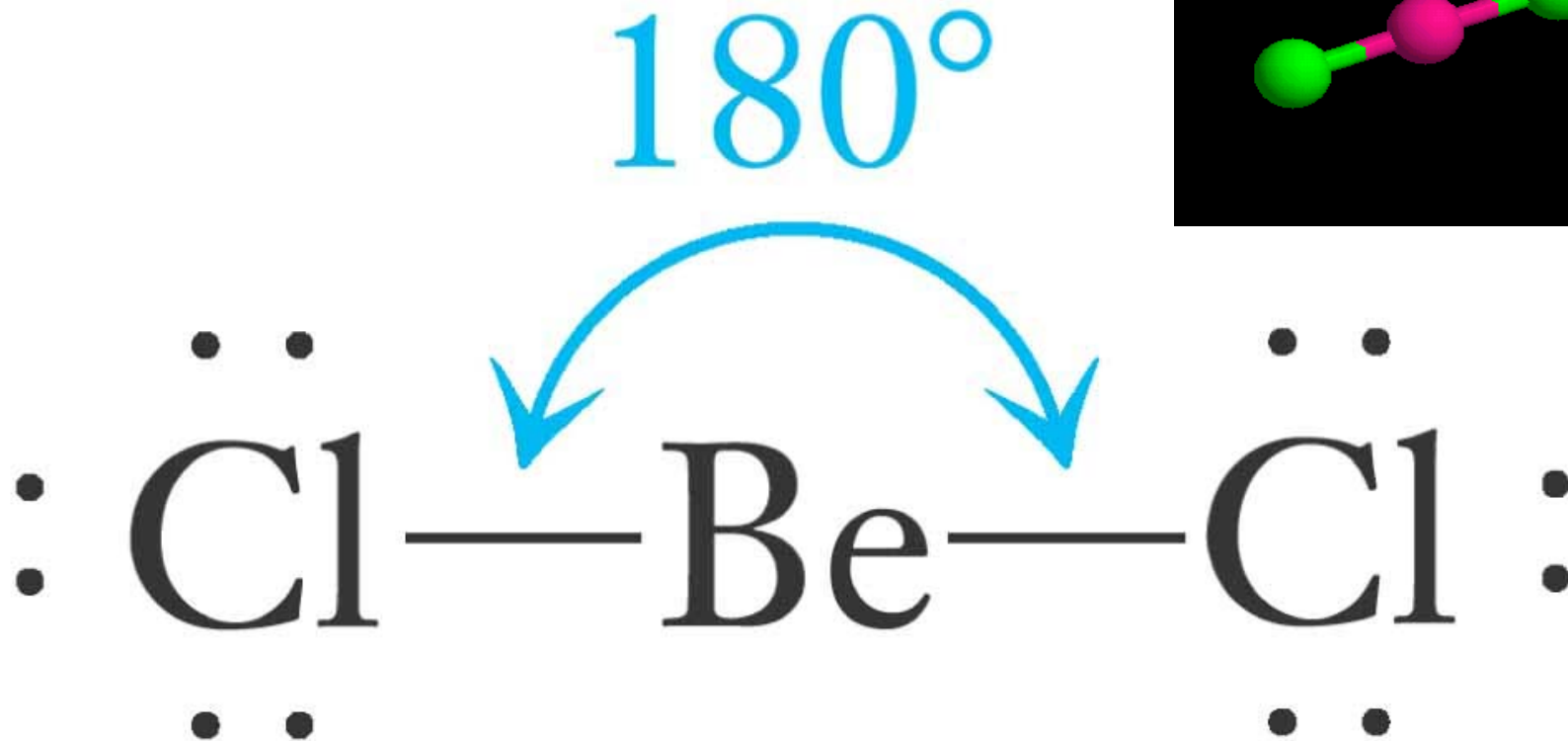
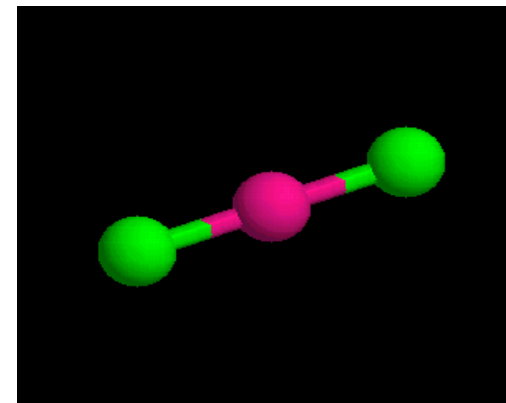
BeCl₂, BeBr₂, BeI₂, HgCl₂, CdCl₂

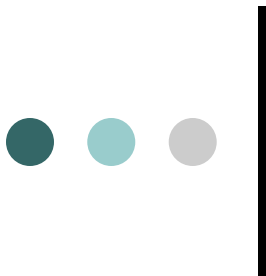
- All of these examples are linear, nonpolar molecules.
- Important exceptions occur when the two substituents are not the same!

BeClBr or BeIBr will be linear and polar!

Linear Electronic Geometry:
AB₂ Species (No Lone Pairs of
Electrons on A)

Electronic Geometry





Linear Electronic Geometry: AB₂ Species (No Lone Pairs of Electrons on A)

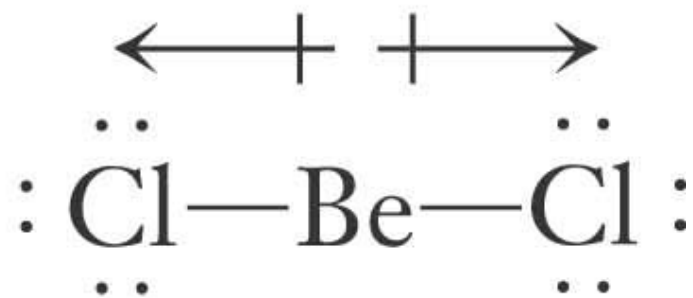
Polarity



$$\text{EN} = \begin{array}{ccc} 3.0 & 1.5 & 3.0 \end{array}$$



$$1.5 \quad 1.5$$



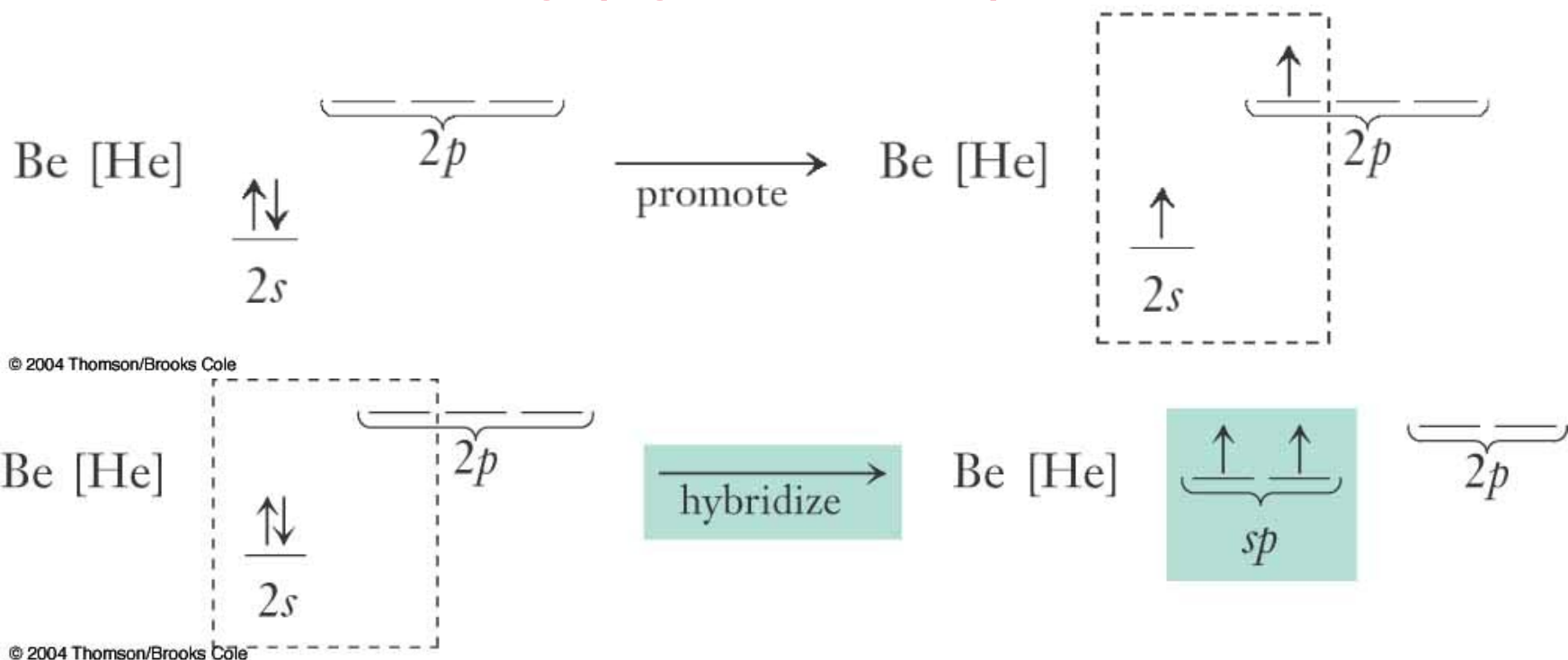
net dipole = 0

$$\Delta(\text{EN}) =$$

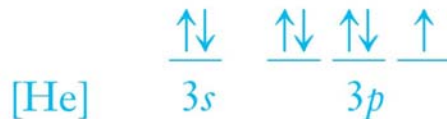
© 2004 Thomson/Brooks Cole

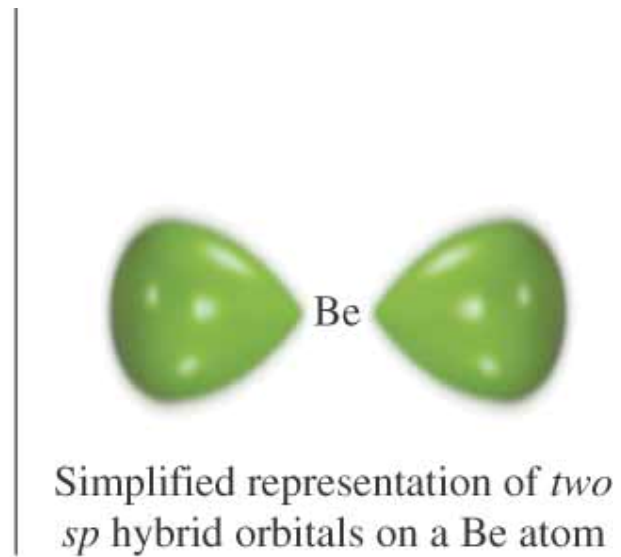
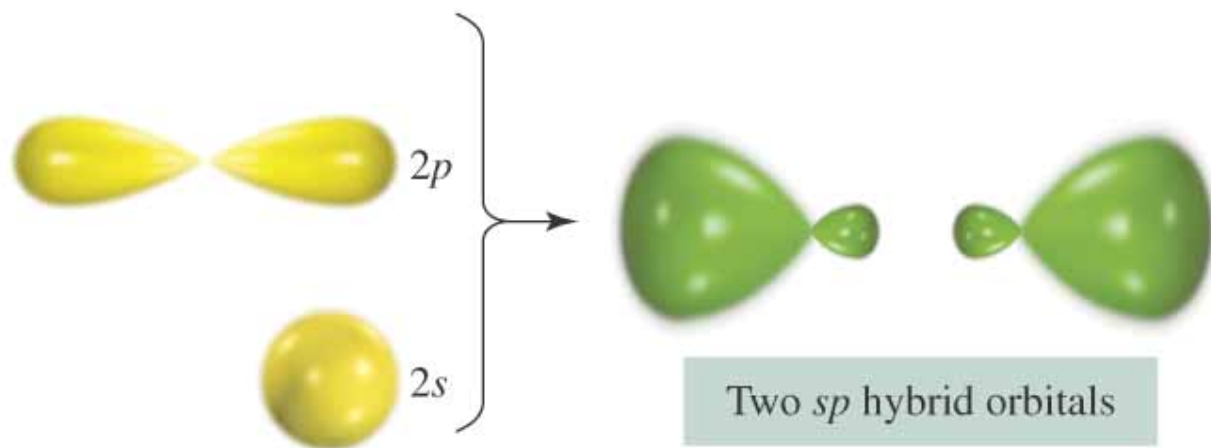
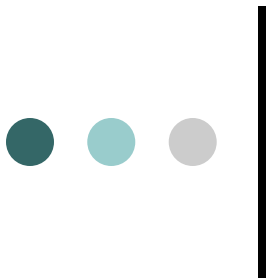
Linear Electronic Geometry: AB₂ Species (No Lone Pairs of Electrons on A)

Valence Bond Theory (Hybridization)

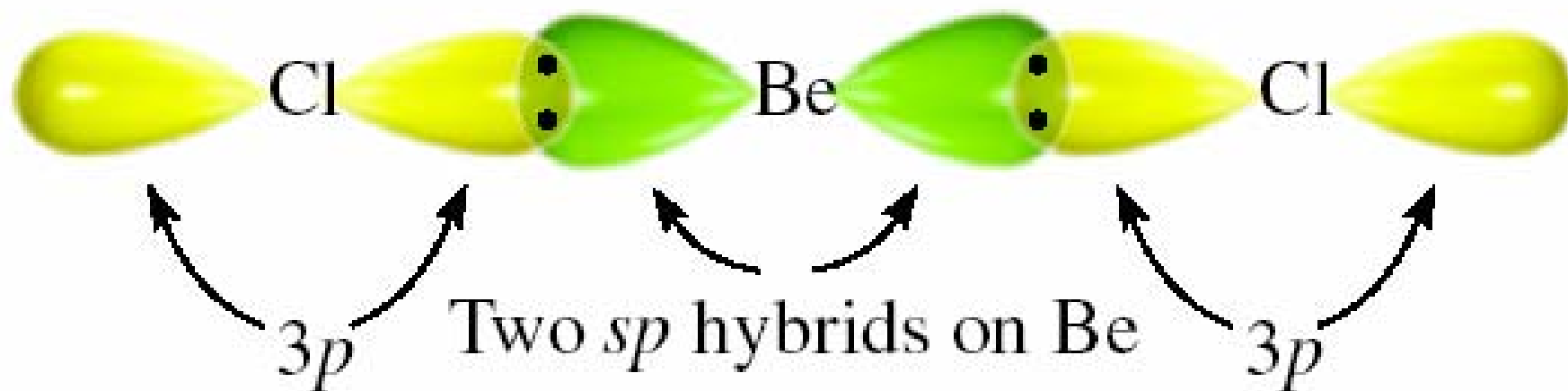


Cl ground state configuration:





Linear Electronic Geometry:
AB₂ Species (No Lone Pairs of
Electrons on A)





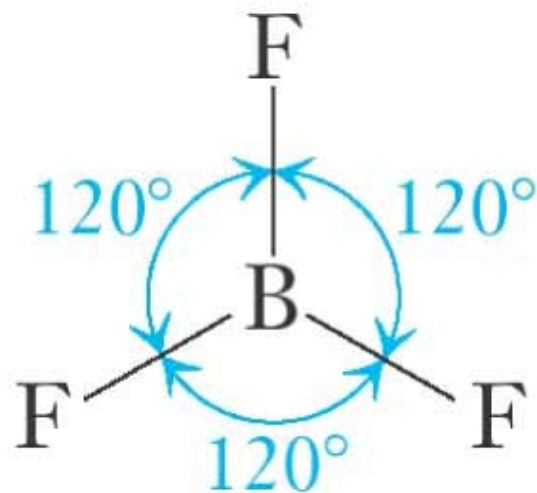
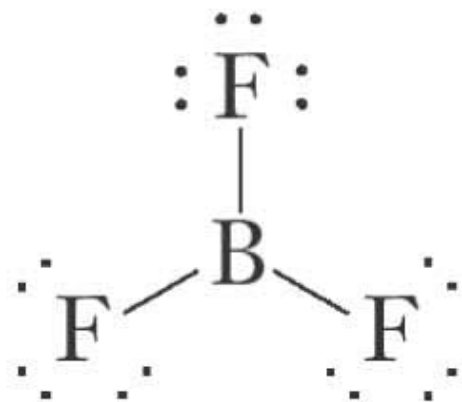
Trigonal Planar Electronic Geometry: AB₃ Species (No Lone Pairs of Electrons on A)

- Some examples of molecules with this geometry are:
BF₃, BCl₃
- All of these examples are trigonal planar, nonpolar molecules.
- Important exceptions occur when the three substituents are not the same!
BF₂Cl or BCl₂Br will be trigonal planar and polar!

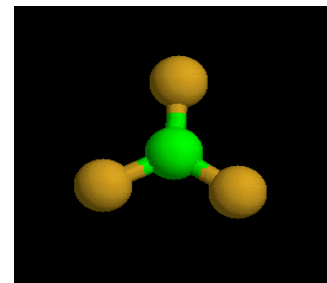
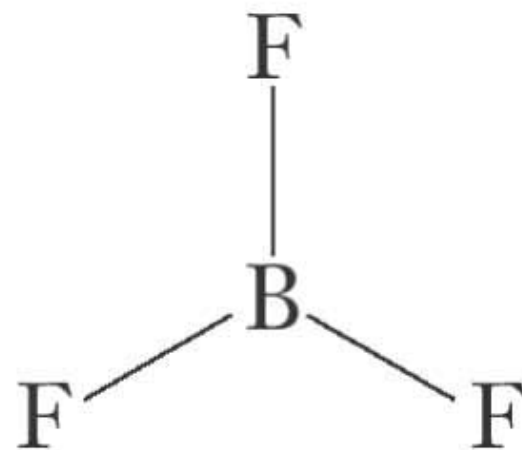
● ● ●

Trigonal Planar Electronic Geometry: AB₃ Species (No Lone Pairs of Electrons on A)

Dot Formula

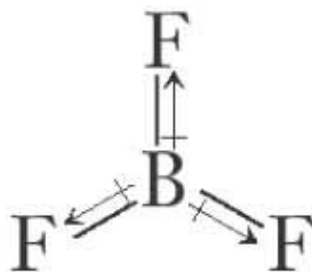
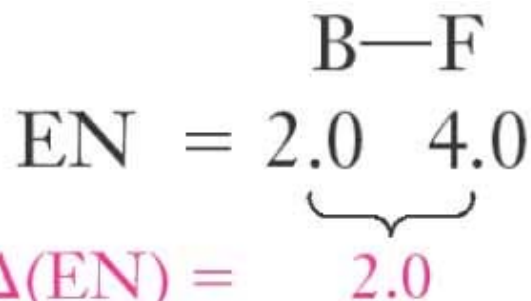


Electronic Geometry



● ● ● | Trigonal Planar Electronic Geometry:
AB₃ Species (No Lone Pairs of
Electrons on A)

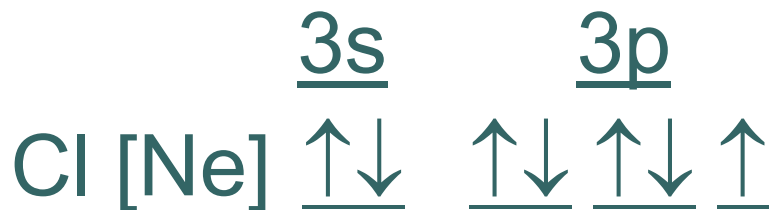
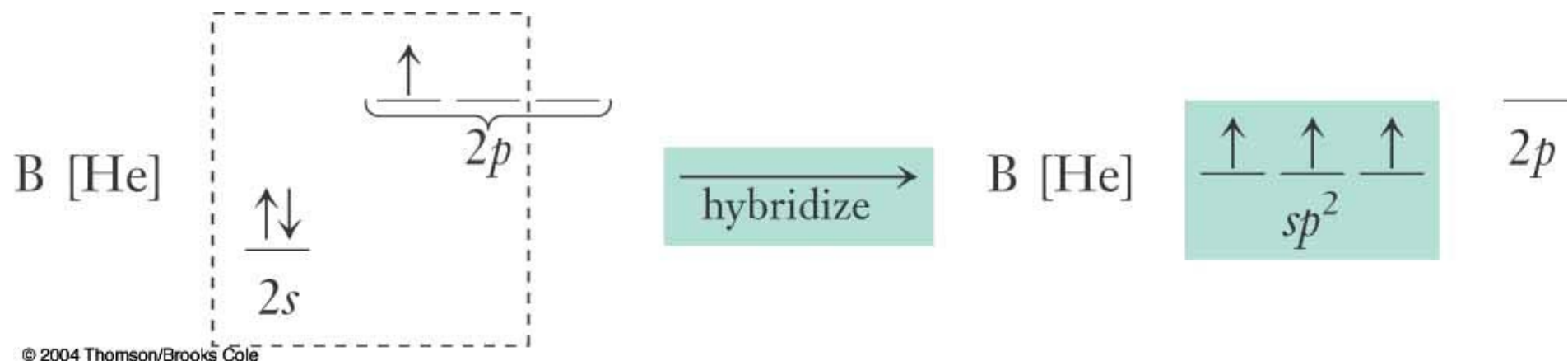
Polarity

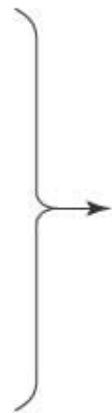
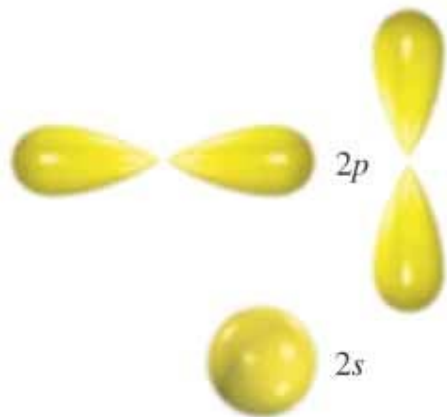
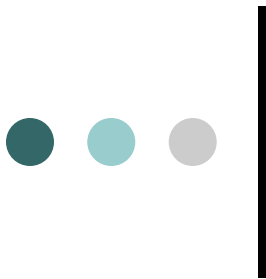


net molecular dipole = 0

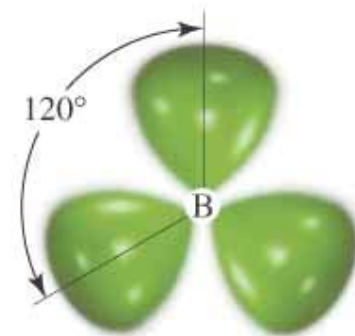
Trigonal Planar Electronic Geometry: AB₃ Species (No Lone Pairs of Electrons on A)

Valence Bond Theory (Hybridization)



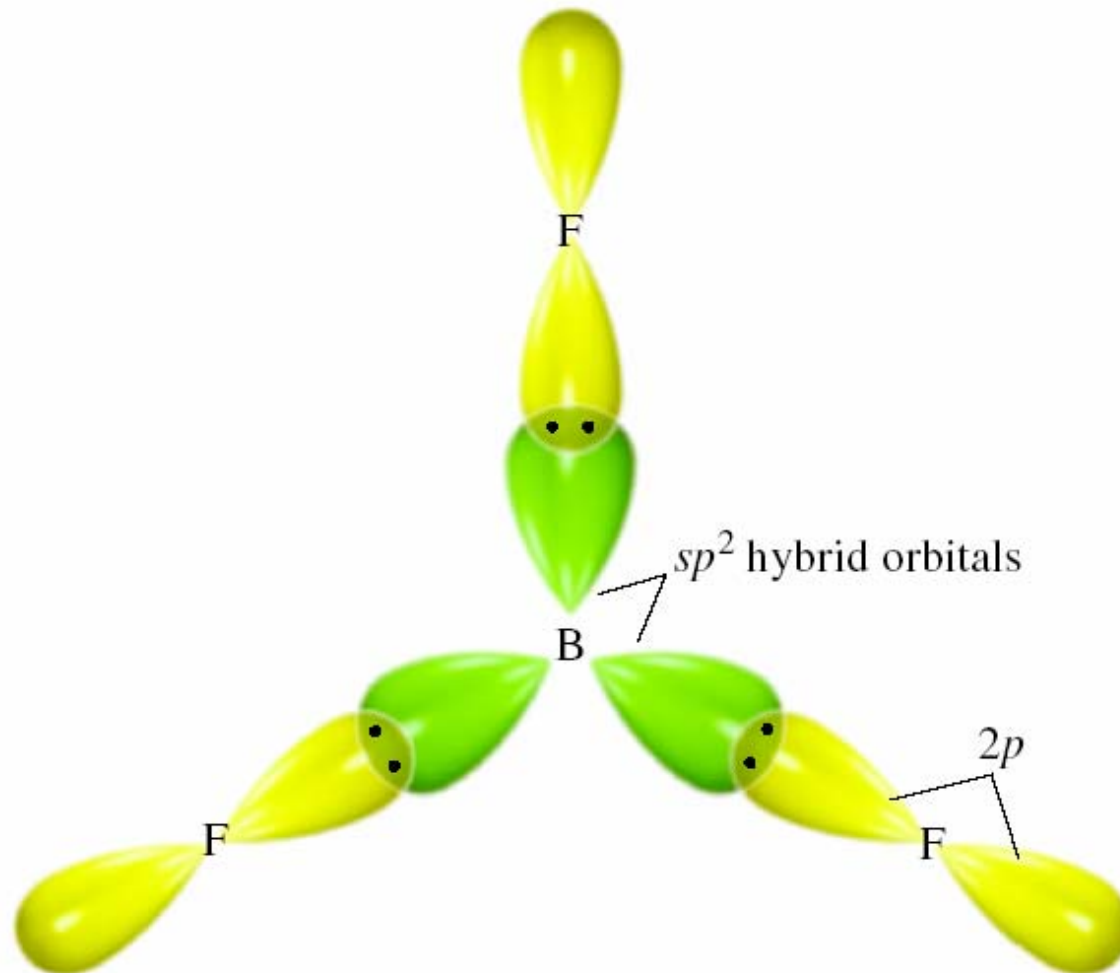


Three sp^2 hybrid orbitals



Simplified representation of *three* sp^2 hybrid orbitals on a B atom

Trigonal Planar Electronic Geometry:
AB₃ Species (No Lone Pairs of
Electrons on A)





Tetrahedral Electronic Geometry: AB₄ Species (No Lone Pairs of Electrons on A)

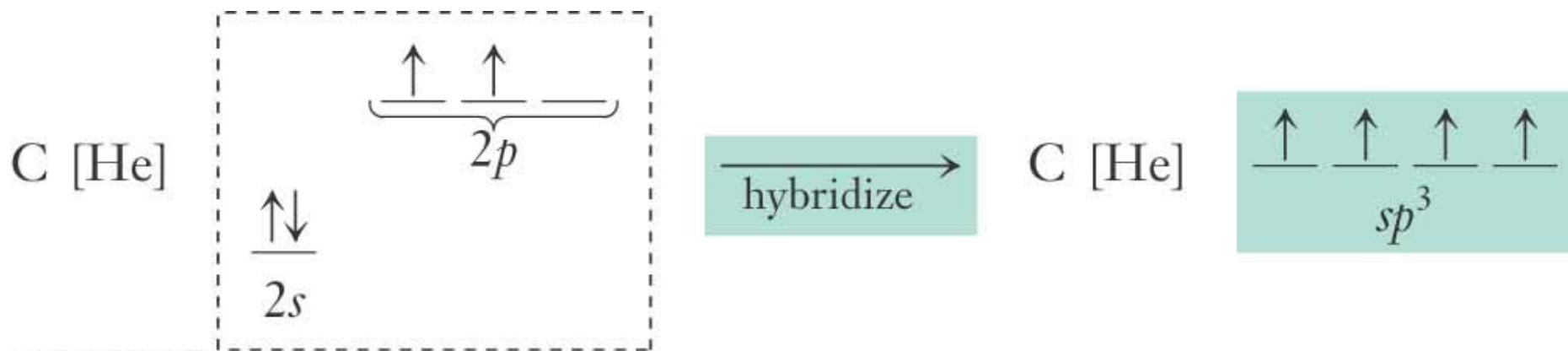
- Some examples of molecules with this geometry are:



- All of these examples are tetrahedral, nonpolar molecules.
- Important exceptions occur when the four substituents are not the same!

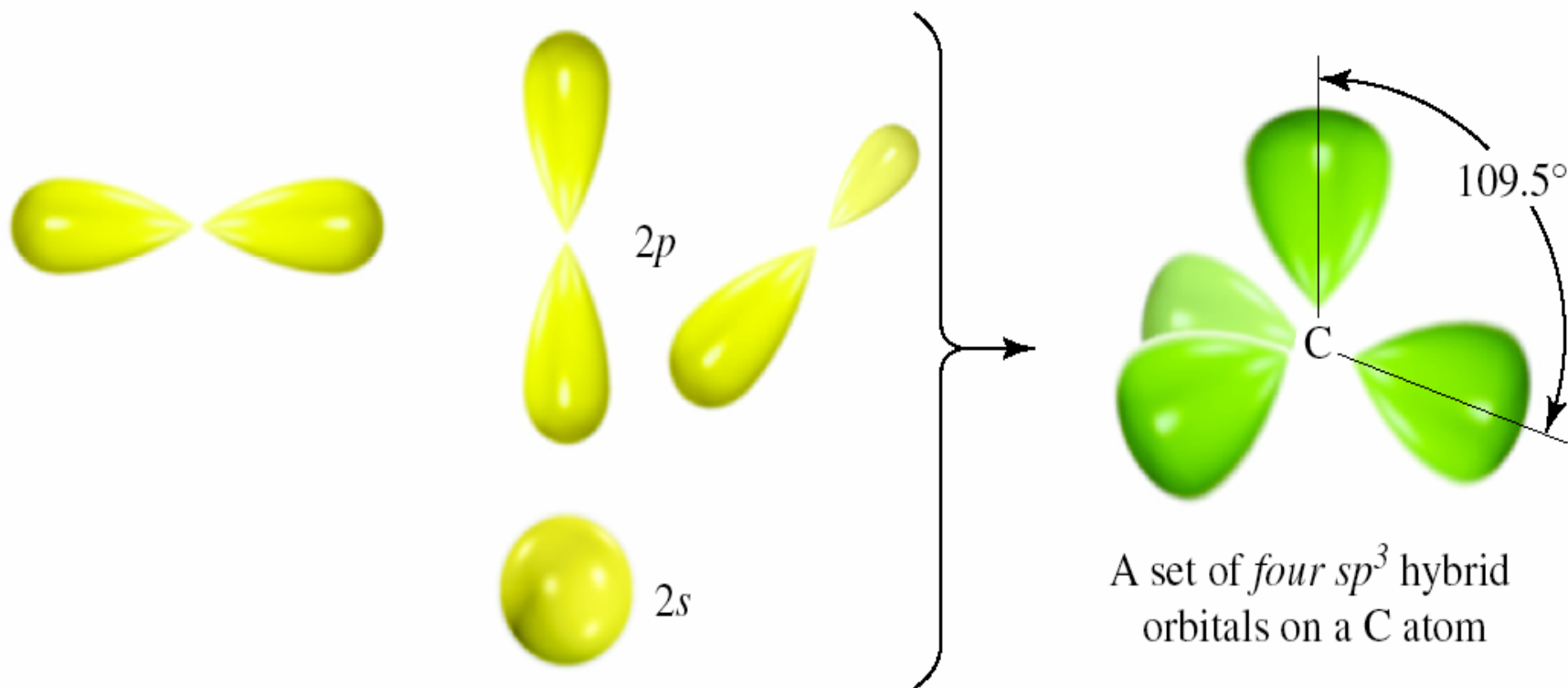
CF₃Cl or CH₂Cl₂ will be tetrahedral and polar!

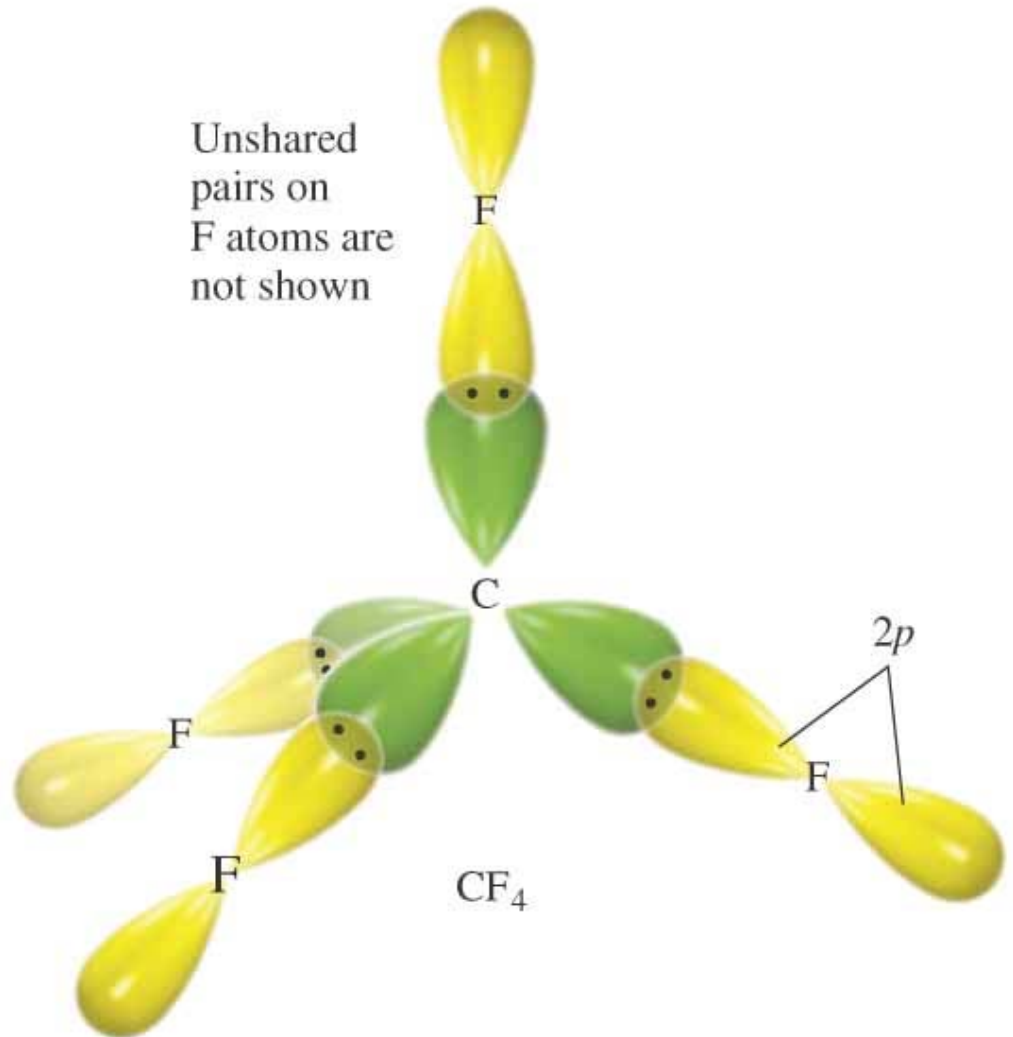
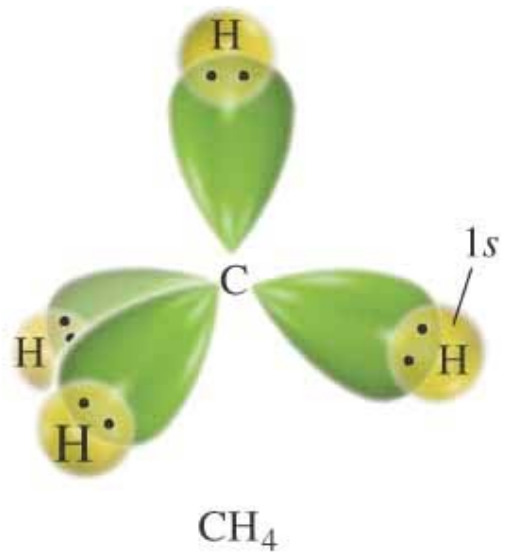
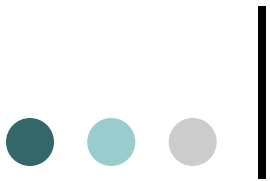
Tetrahedral Electronic Geometry: AB₄ Species (No Lone Pairs of Electrons on A)

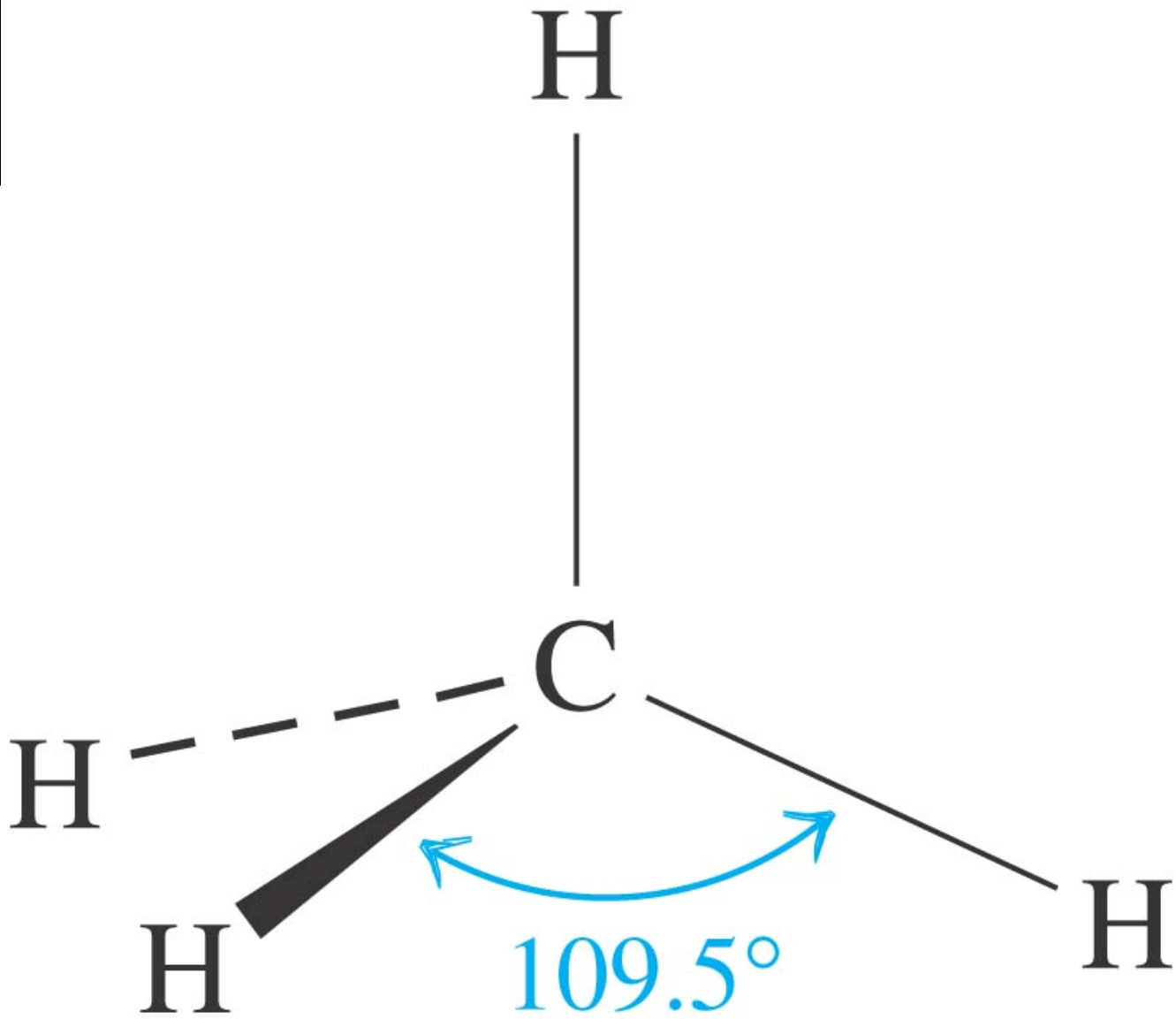
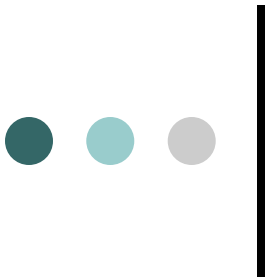


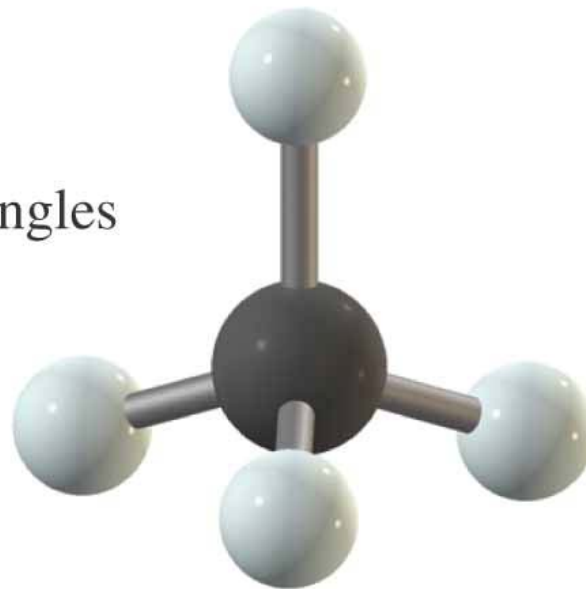
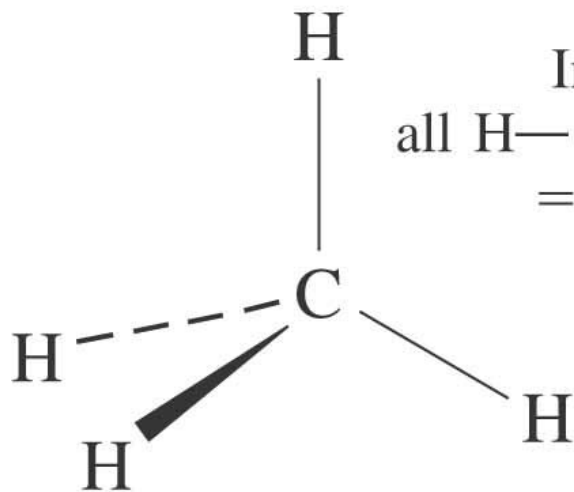
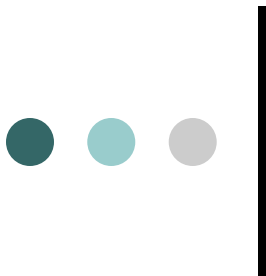
© 2004 Thomson/Brooks Cole

Tetrahedral Electronic Geometry:
 AB_4 Species (No Lone Pairs of
Electrons on A)

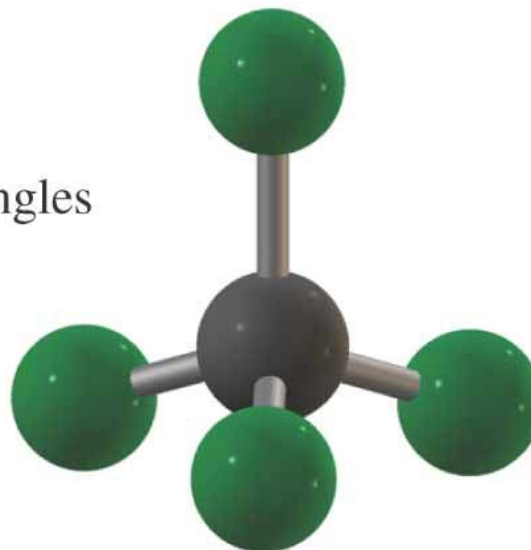
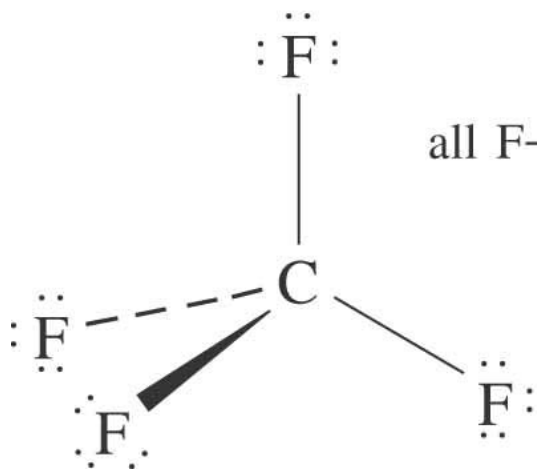


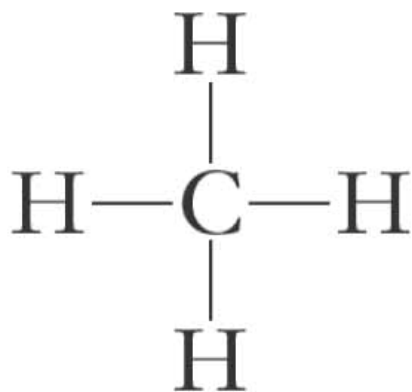






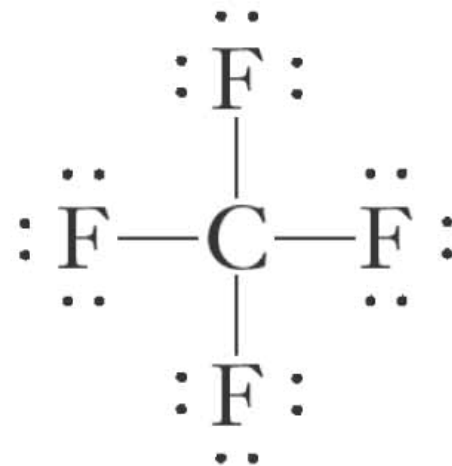
© 2004 Thomson/Brooks Cole



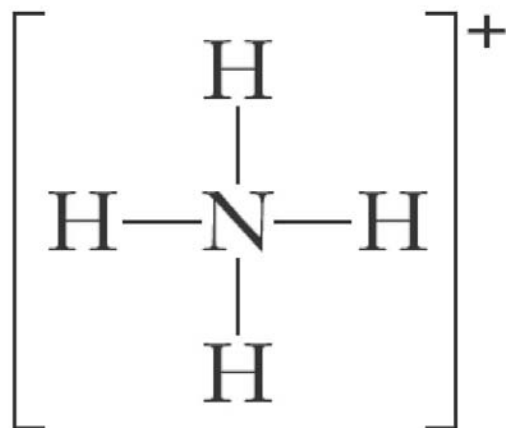


CH₄, methane

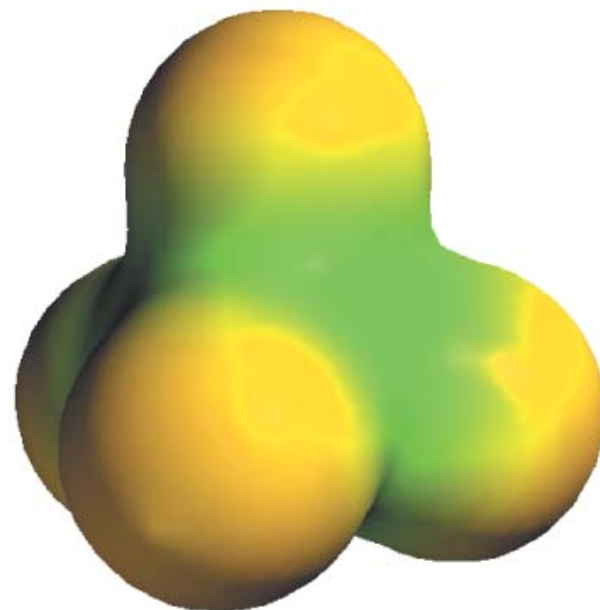
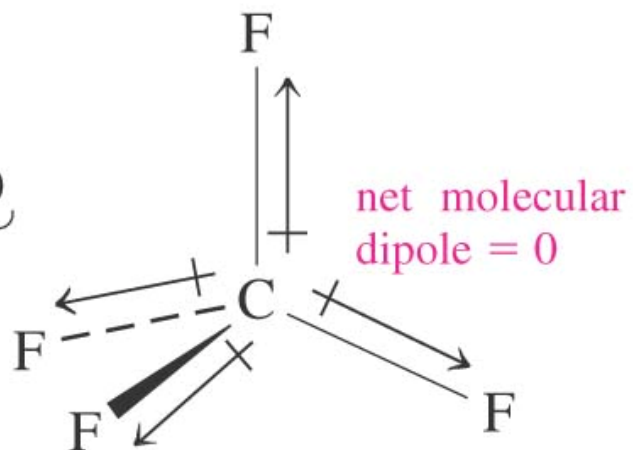
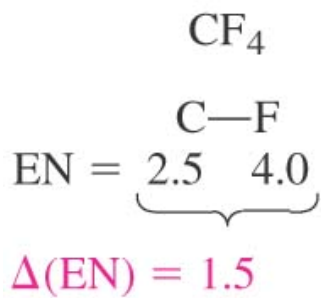
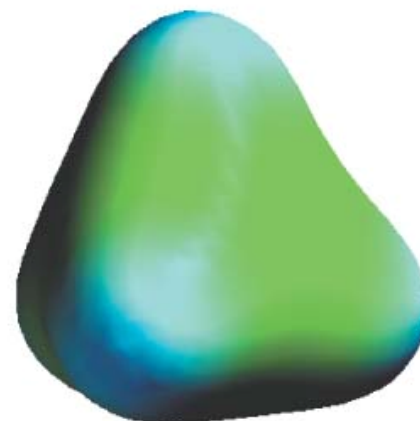
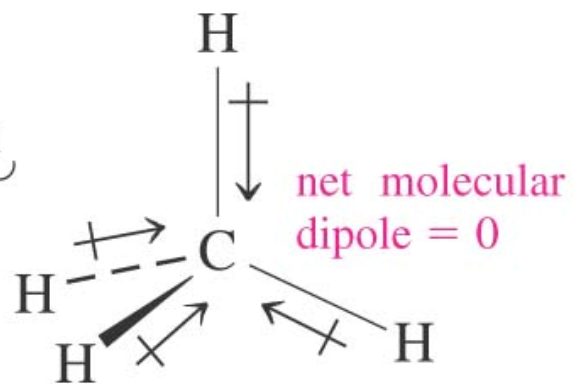
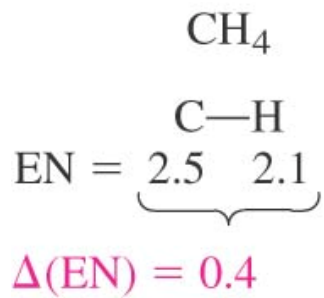
© 2004 Thomson/Brooks Cole

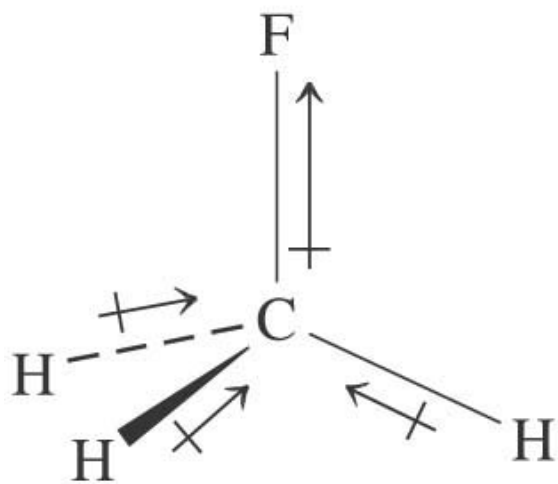


CF₄, carbon tetrafluoride

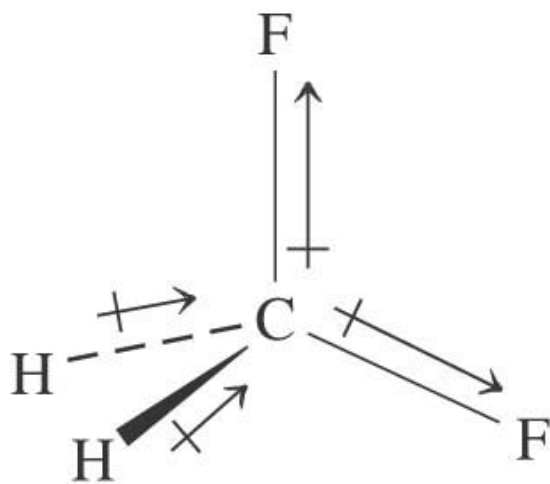
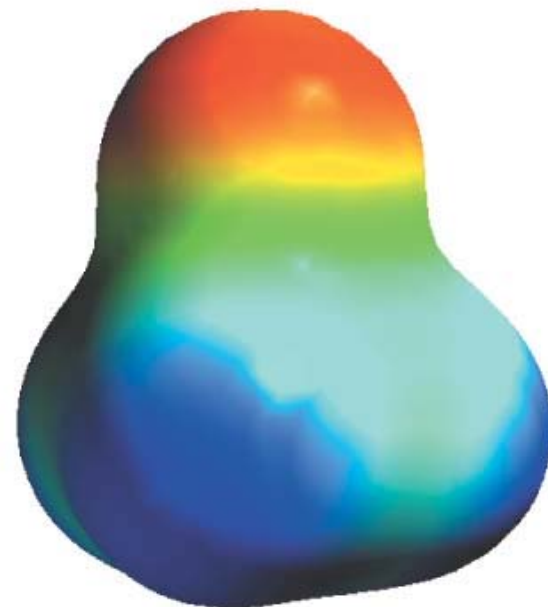


NH₄⁺, ammonium ion

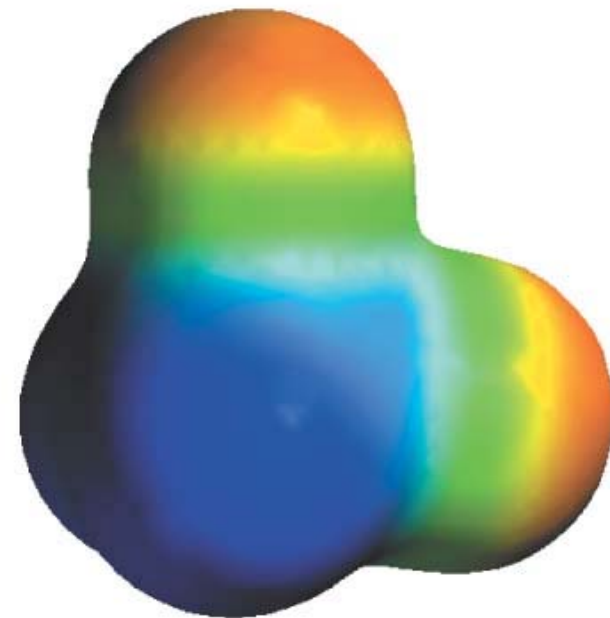


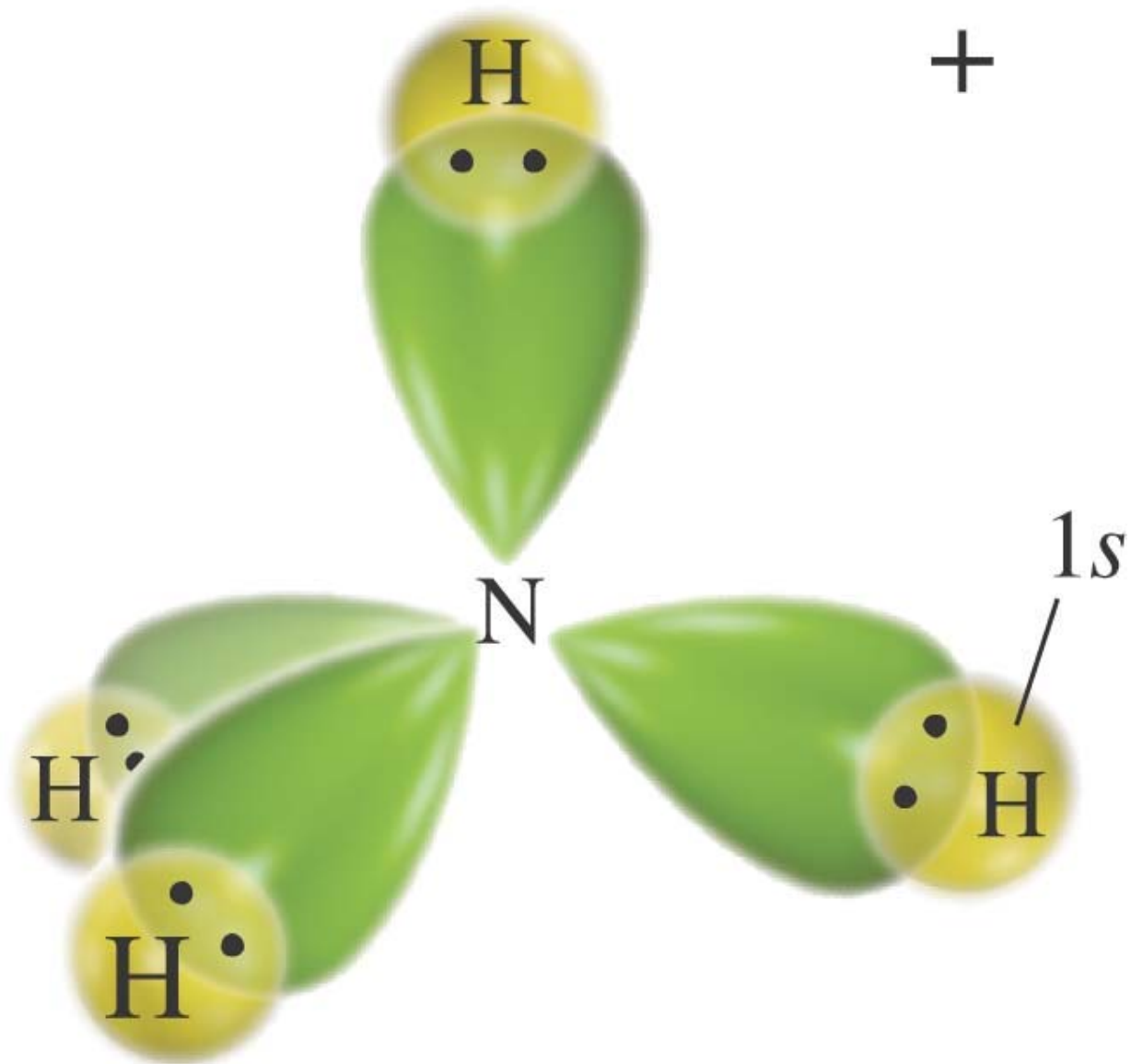
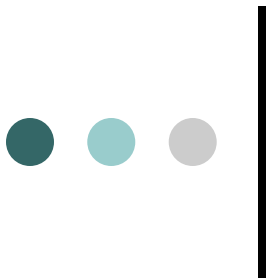


net molecular
dipole > 0



net molecular
dipole > 0





Chemistry is fun!