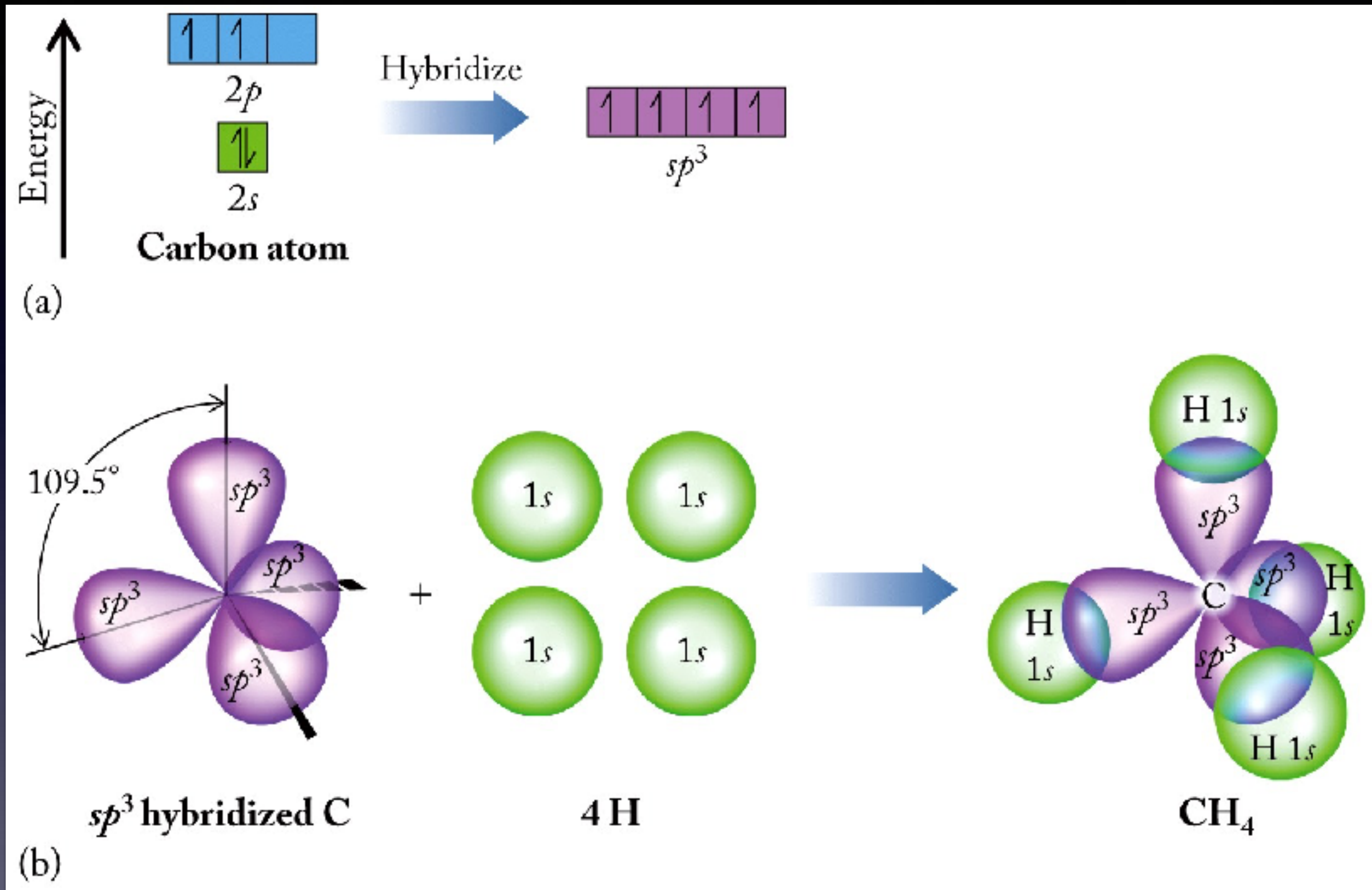
Previously in Molecularity…

GKF 5.22



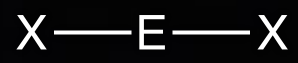
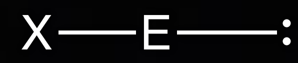
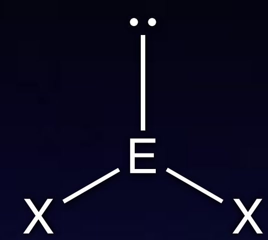
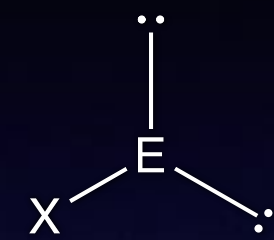
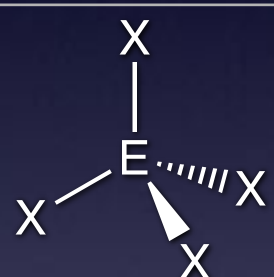
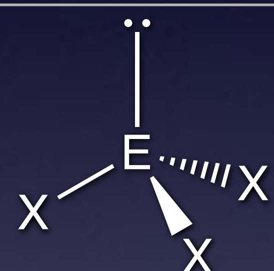
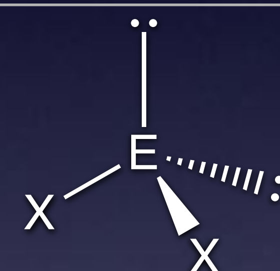
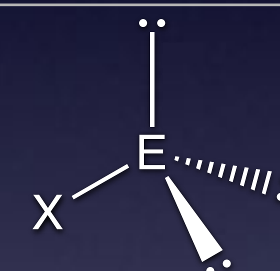
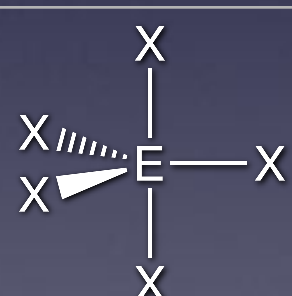
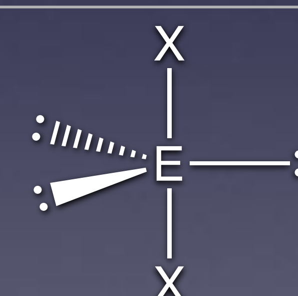
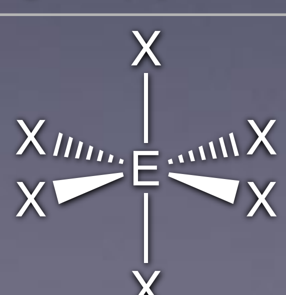
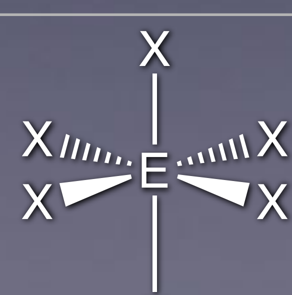
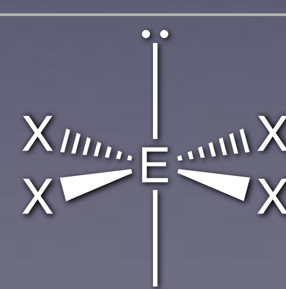
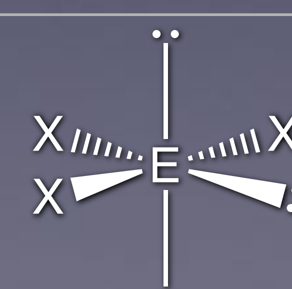
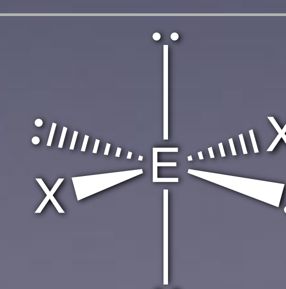
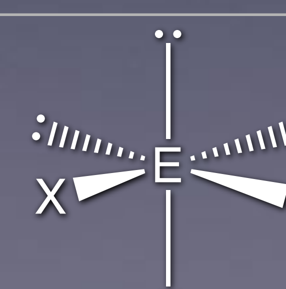
This is where the **tetrahedral** VSEPR structure comes from

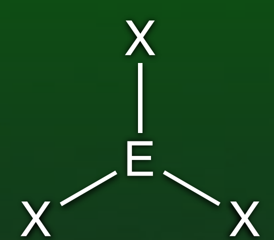
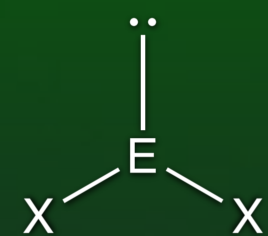
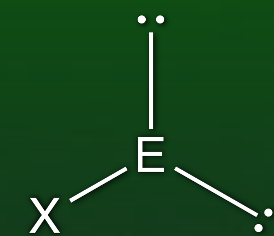
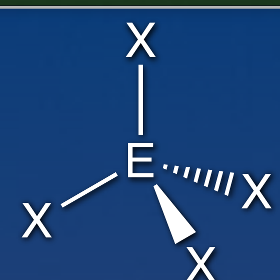
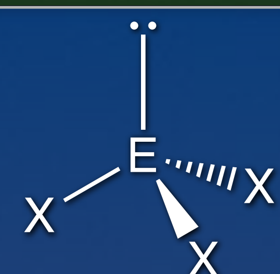
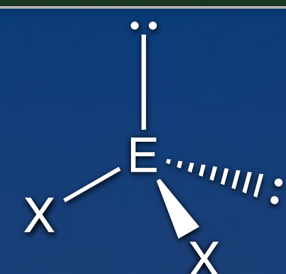
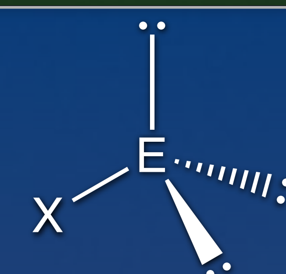
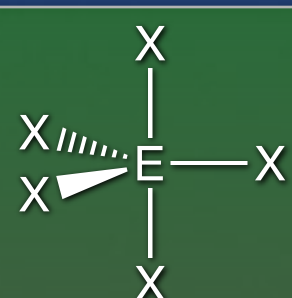
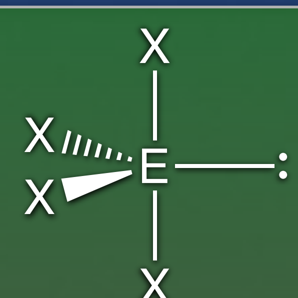
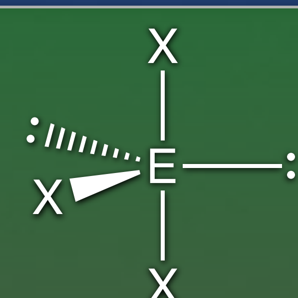
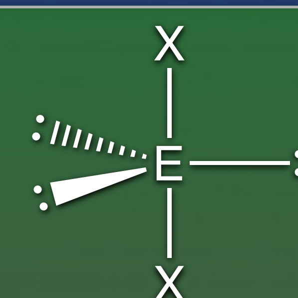
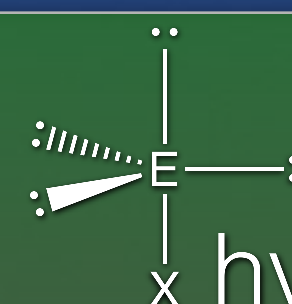
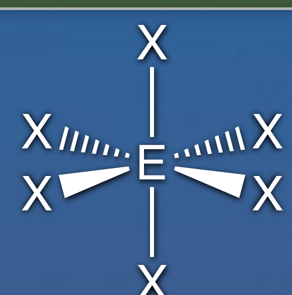
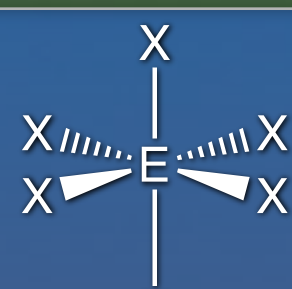
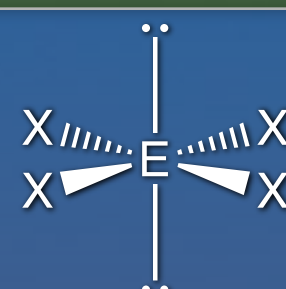
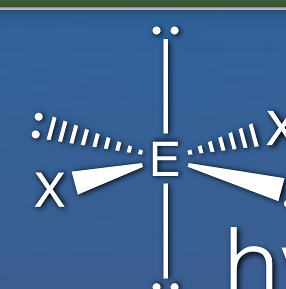
Where are we going today?

Ch1010-A17-A03 Lecture 19

- § 6.3 Hybridization: the molecules (Valence bond theory)

http://stevedeace.com/wp-content/uploads/2012/11/

SN	0 LP	1 LP	2 LP	3 LP	4 LP	5 LP
2	 Linear					
3	 Trigonal planar	 120° Bent				
4	 Tetrahedral	 Trig. pyramidal	 109.5° Bent			
5	 Trig. bipyrimidal	 See-saw	 T-shaped	 Linear		
6	 Octahedral	 Sq. pyramidal	 Sq. planar	 T-shaped	 Linear	

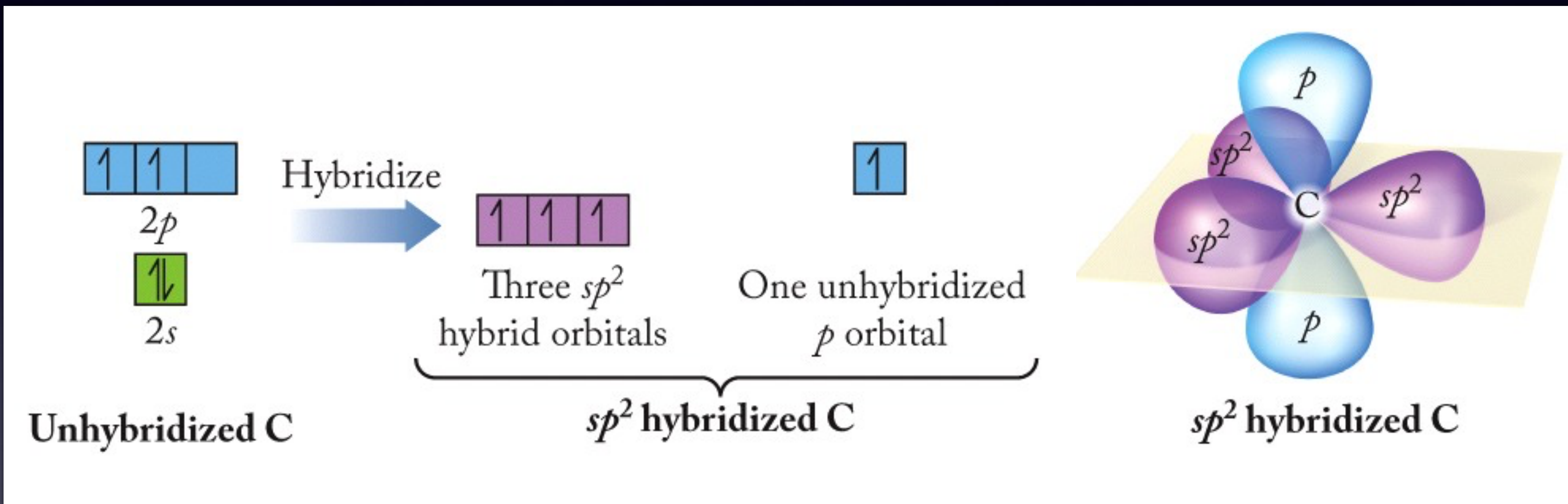
SN	0 LP	1 LP	2 LP	3 LP	4 LP	5 LP
2	 Linear					sp hybridization
3	 Trigonal planar	 120° Bent				sp^2 hybridization
4	 Tetrahedral	 Trig. pyramidal	 109.5° Bent			sp^3 hybridization
5	 Trig. bipyrimidal	 See-saw	 T-shaped	 Linear		sp^3d hybridization
6	 Octahedral	 Sq. pyramidal	 Sq. planar	 T-shaped	 Linear	sp^3d^2 hybridization

How to determine hybridization

- Start with VSEPR structure, and don't forget about leftover *p*'s!
    - Atoms with *sp* hybridization have 2 *p* orbitals remaining
    - Atoms with sp^2 hybridization have 1 *p* orbital remaining
    - Atoms with sp^3 hybridization have 0 *p* orbitals remaining
    - Carbon can demonstrate all three cases, *sp*, sp^2, or sp^3!

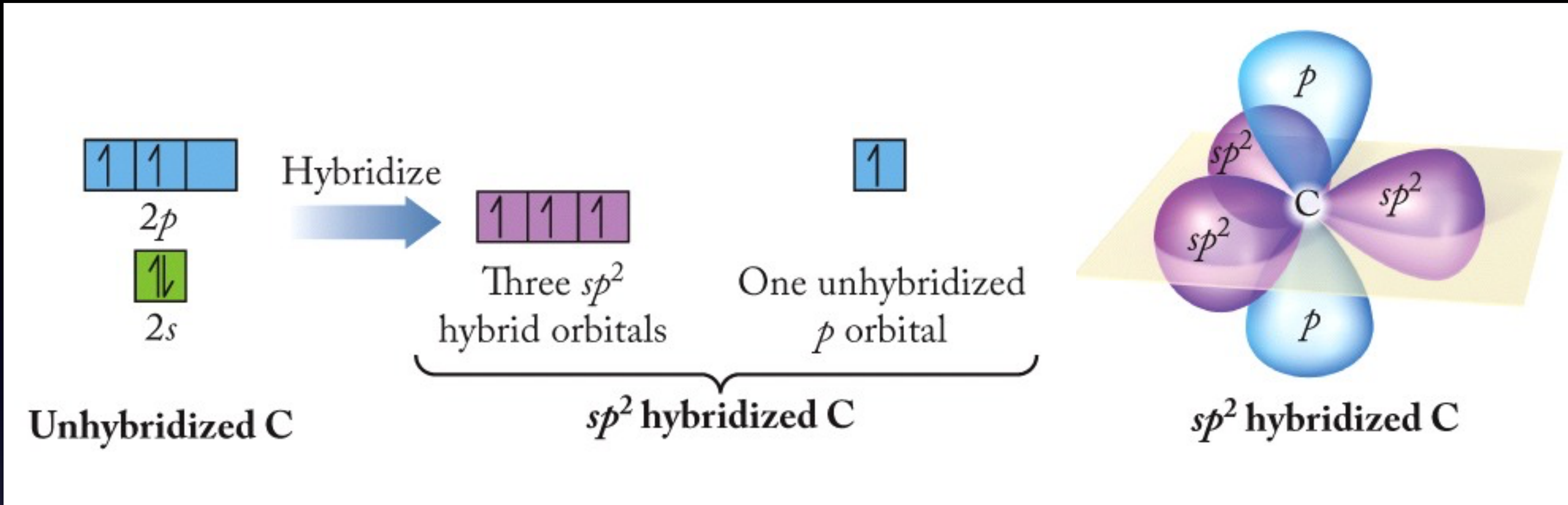
Why does one orbital remain unhybridized?

GKF 5.26

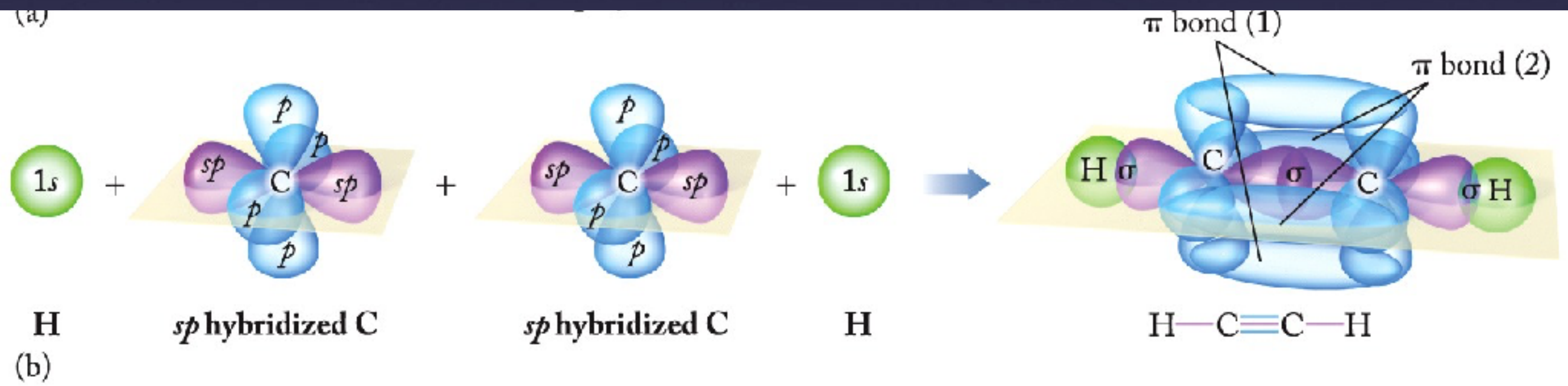


- Objective is to maximize bonding and minimize steric repulsion!

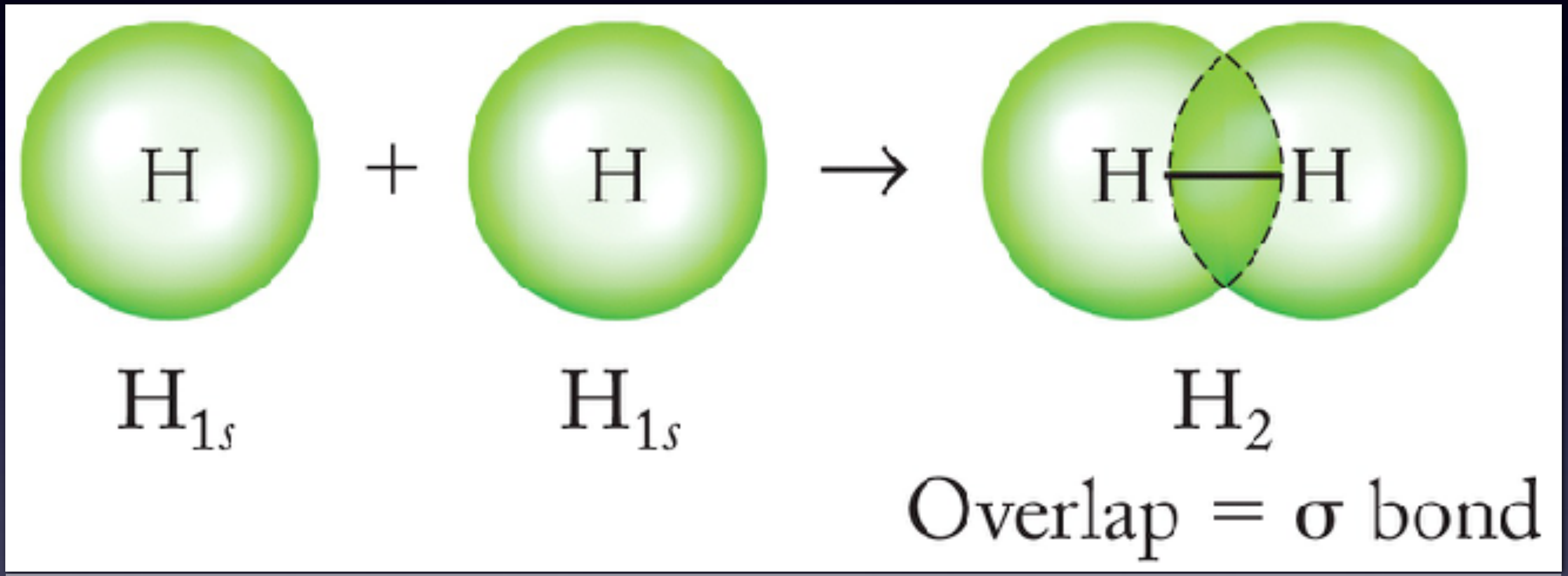
GKF 5.26



GKF 5.28

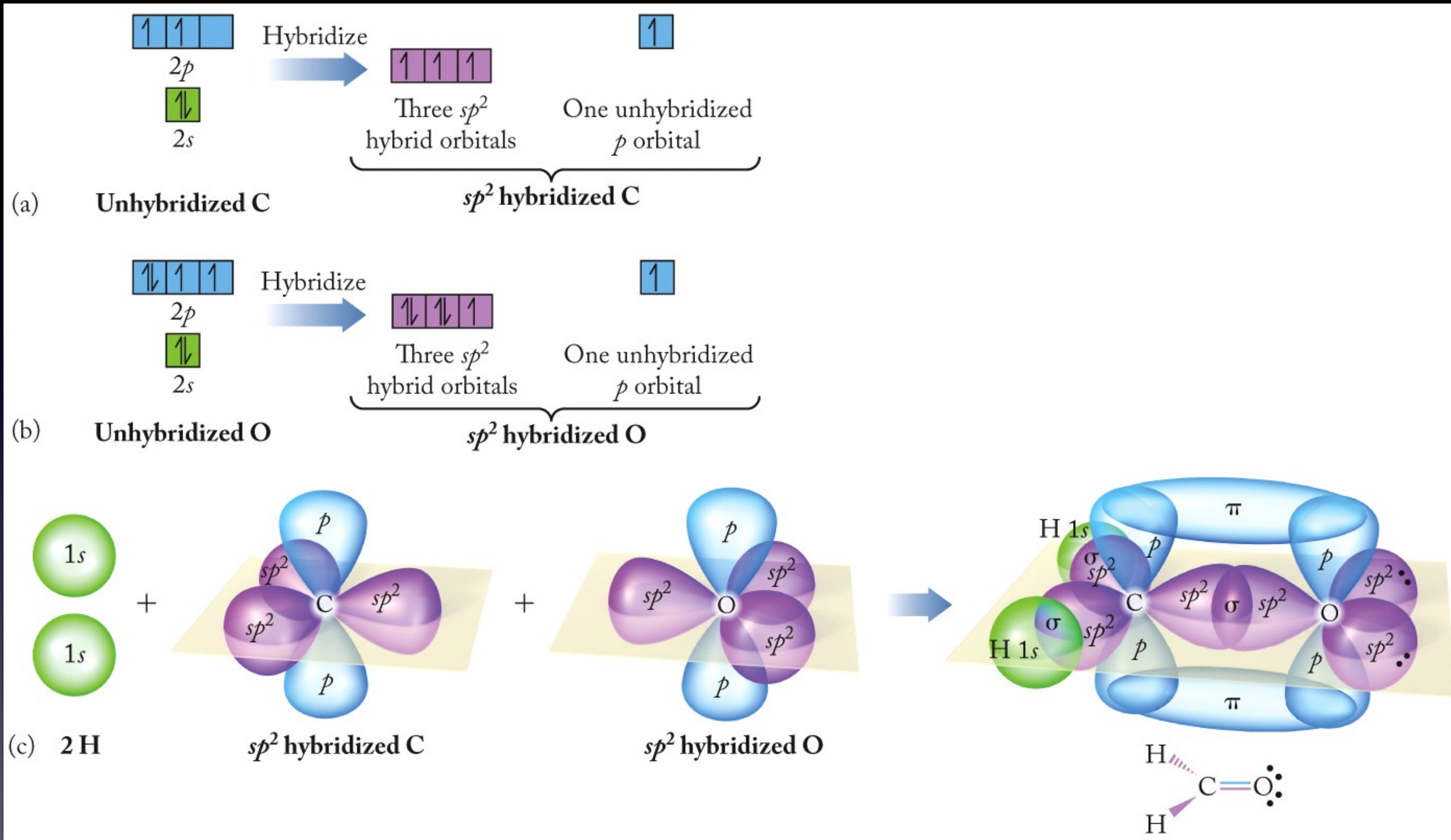


Valence bond theory

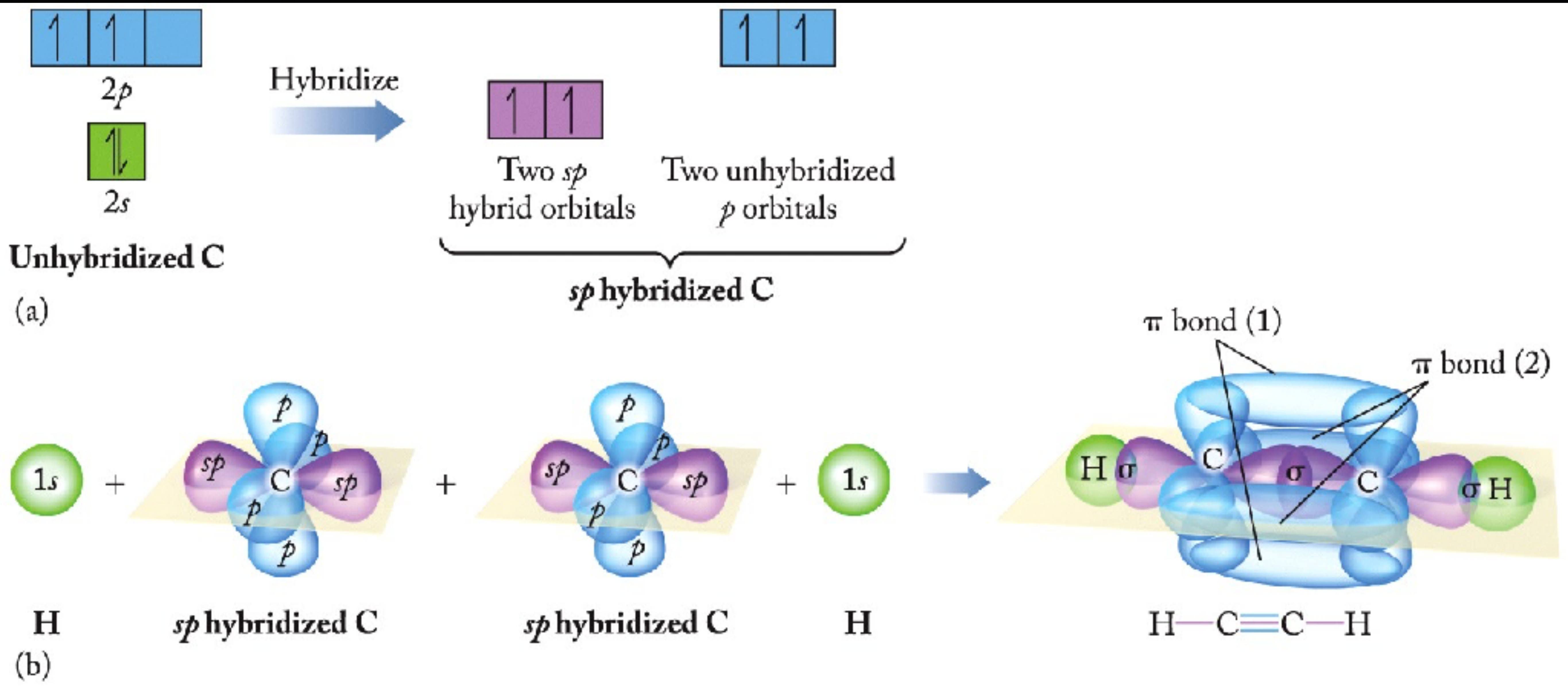


GKF 5.20

Sigma bonds have **zero** nodes between the atoms



Pi bonds have **one** node that is coplanar with the atoms



Pi bonds have **one** node that is coplanar with the atoms

How many different ways can you arrange four different atoms around carbon?

Where did we go today?

Ch1010-A17-A03 Lecture 19

- § 5.4 Valence bond theory
- Great problems at chapter's end: 5.67, 69, 71, 75–85

Next time…

- § 5.5 Atoms with multiple "centers"
- § 5.6 Chirality & molecular recognition

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