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Chemistry 343

- Molecular Model kits for sale in lobby + bookstore
- One handout

- Review notes within 24 hrs of lectures
- Model kit is essential for 2D $\rightarrow$ 3D Translation

Why does organic chemistry only care about carbon?

- Carbon forms complex skeletons of compounds associated with life
- Early scientists quickly realized mineral elements had simple compositions; living organisms' materials (hair, skin, etc) were complex but mostly carbon
- Created distinction between inorganic/organic

Bonding properties of Carbon

*Ch 1 Rec. Problems: 1, 3-10, 12-15, 18-22, 24-29, 31, 33, 34, 41, 42, 45

Carbon valence = 4 (ie, C likes to form 4 bonds)

Carbon = 6e's 2e's in 1s

4e's in 2s/p $\leftarrow$ valence orbitals - involved in bonding

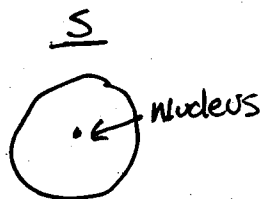
General for bonding:

Atomic orbitals (AO) $\xrightarrow{\text{combine}}$ Molecular orbitals (MO)

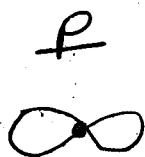
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4 AO's in valence shell

$2s, 2p_x, 2p_y, 2p_z$



vs.



spherically symmetric
about the nucleus

Note: • Directional

• Node at the nucleus
(zero e^- density)

- Electrons in s orbital are closer to nucleus, therefore s orbitals more stable "home" for e^-

Prototypical organic molecules (carbon bonding patterns)

1. Methane CH_4

• Carbon must form 4 equivalent bonds
↳ Requires hybridization (hybrid orbitals)

Electronic Configurations of C
Isolated Atom

($1s^2 = 1e^-$)

ET $2s \uparrow\downarrow$ $2p \uparrow \uparrow \uparrow$

Hybridize AO's
to form equiv
AO's

$\uparrow \uparrow \uparrow \uparrow$

$2sp^3$ hybrid orbitals

↓

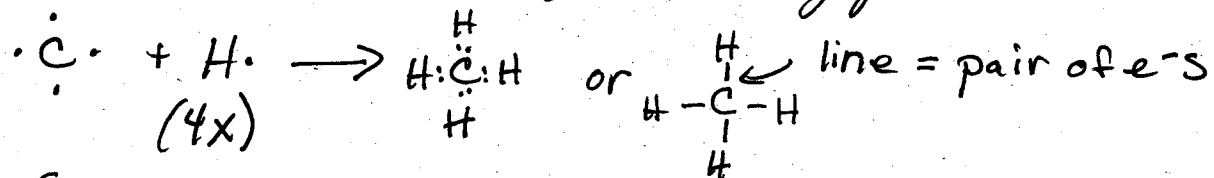
$2s^2 2p^2$

• Ground state; lowest E

configuration of valence e^- ($4e^-$)

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• The 4 sp^3 AO's have equal energy



• Each C-H bond forms from combination of 2 AOs
1s of H and $2sp^3$ of C

(AO's $\rightarrow$ MO's) $\Rightarrow$ Consider 2 graphical conventions...

① Bond energy diagram

- Focus on energy...

ET