Today

Sections 1.1 – 1.3, 1.5
- atomic structure and isotopes
- electrons, valence vs core electrons and using the periodic table for help
- periodic trends
- metals and nonmetals
- octet rule
- Ionic Interactions, Polar Bonds, and Nonpolar Bonds

Next Class

Sections 1.4, 1.6
Different ways of representing molecules
An introduction to Molecular Orbital Theory

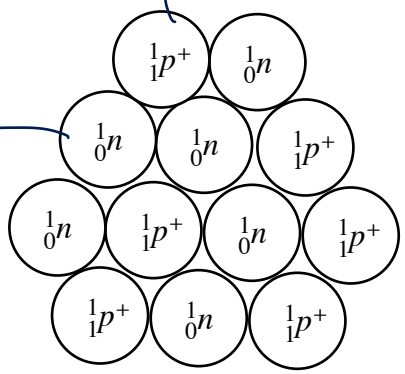
Mastering Chemistry Homework

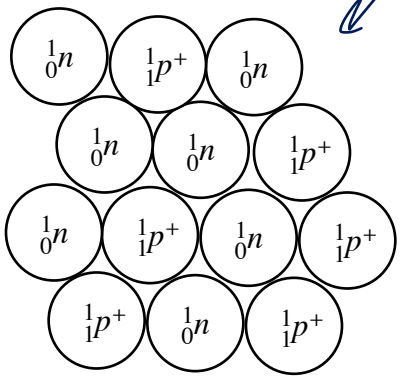
Due 9/13 at 11:59 pm Introduction to Mastering Chemistry — estimated time required 40 min

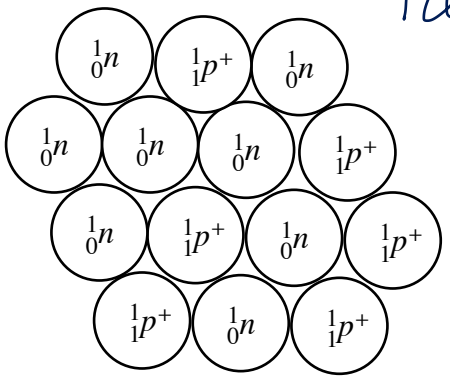
Due 9/17 at 11:59 pm Homework Chapter 01 — estimated time required 167 min

What Makes Carbon Carbon?

Sections 1.1 – 1.3







Big ones react more slowly

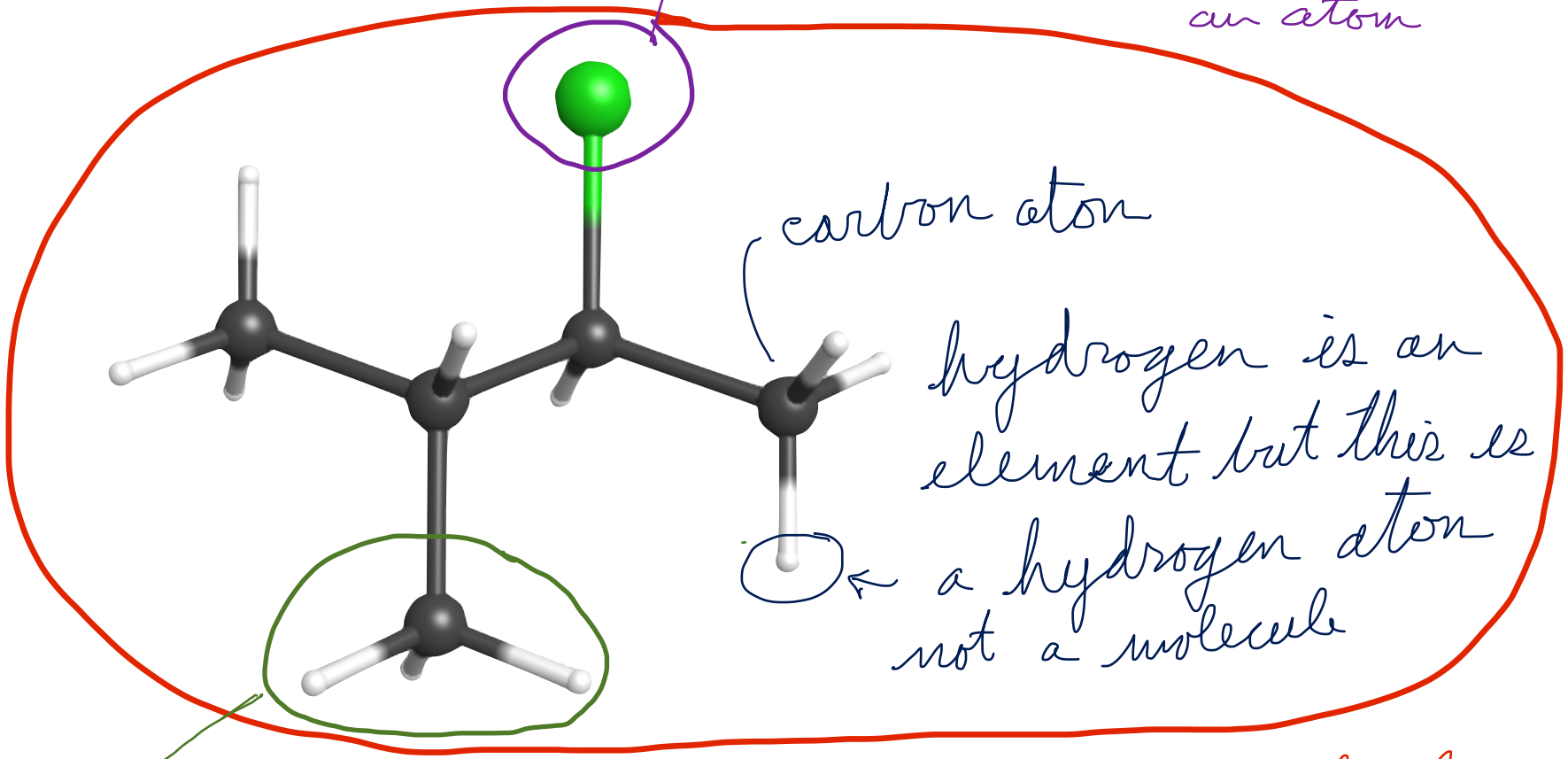
Remember atomic structure, meaning of isotope

Atoms, Elements, Molecules, and Substituents or Groups

What to call stuff

A diversion into the language of chemistry…

"In chemistry, an element is a pure substance consisting only of atoms that all have the same numbers of protons in their atomic nuclei."[1]



[1] https://en.wikipedia.org/wiki/Chemical_element

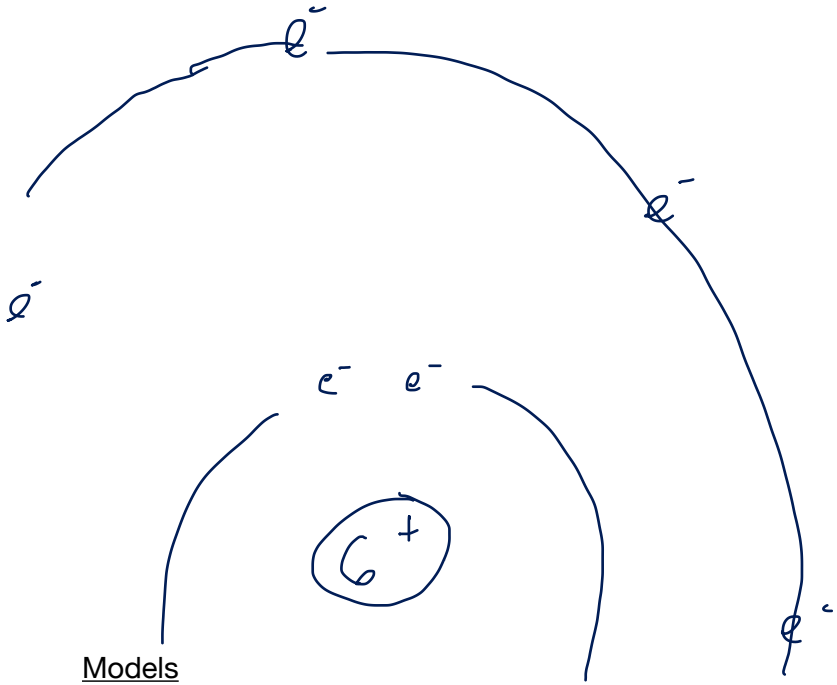
e⁻ exist in e⁻ clouds, shells, orbitals, energy levels

ground state e⁻ configuration = $1s^2$ / core e⁻ | $2s^2 2p^2$ valence e⁻

é repulsion

↑ ↑ ~~↑~~ $\ell = 1$ p

$n = 2$ ↑↓ $\ell = 0$ s



$n = 1$ ↑↓ $\ell = 0$ is an s orbital

6^+

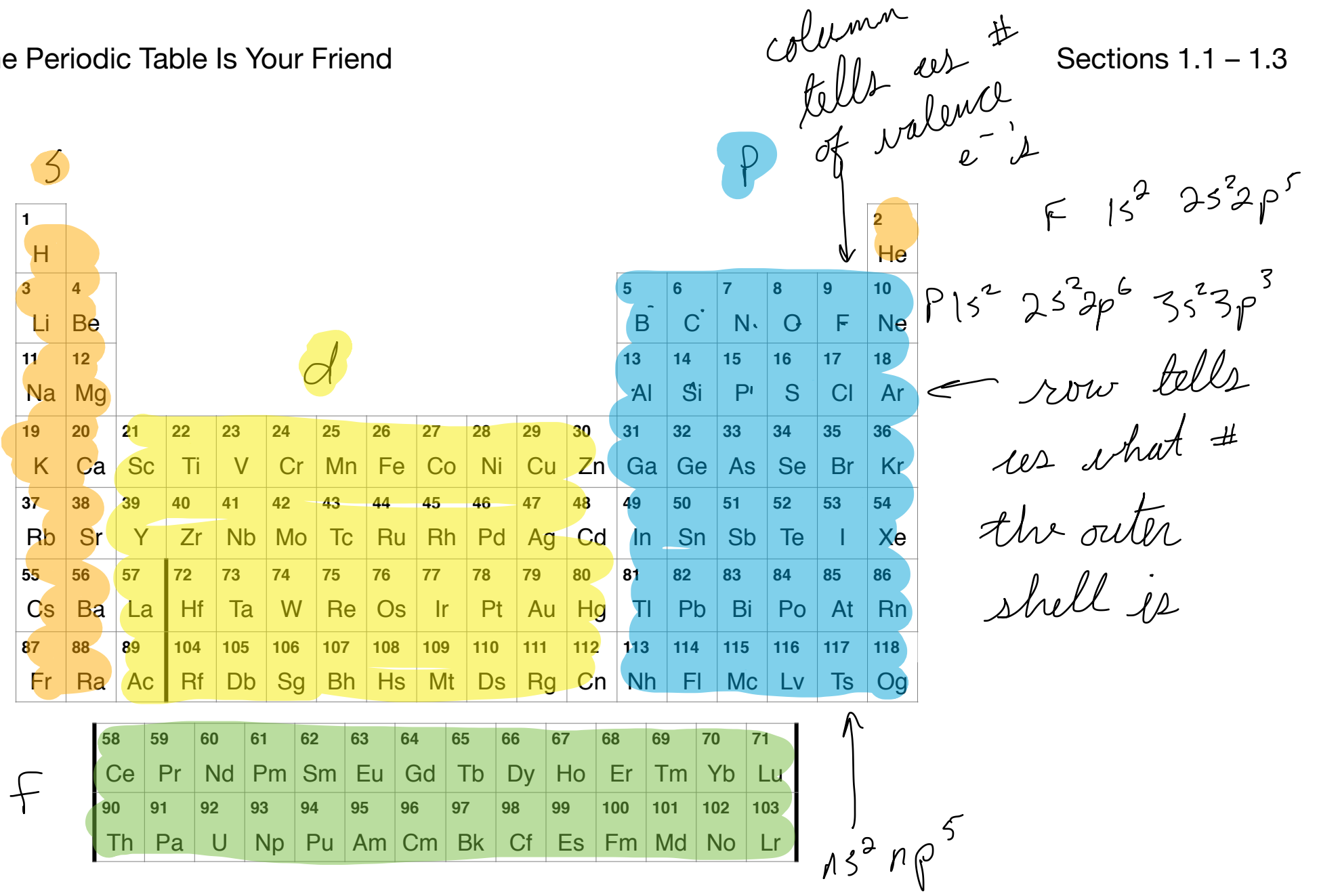
$n = 1$ is the first principle energy level

1 is an e⁻ $m_s = +\frac{1}{2}$

Models

Remember how electrons are distributed

Remember the importance of valence electrons

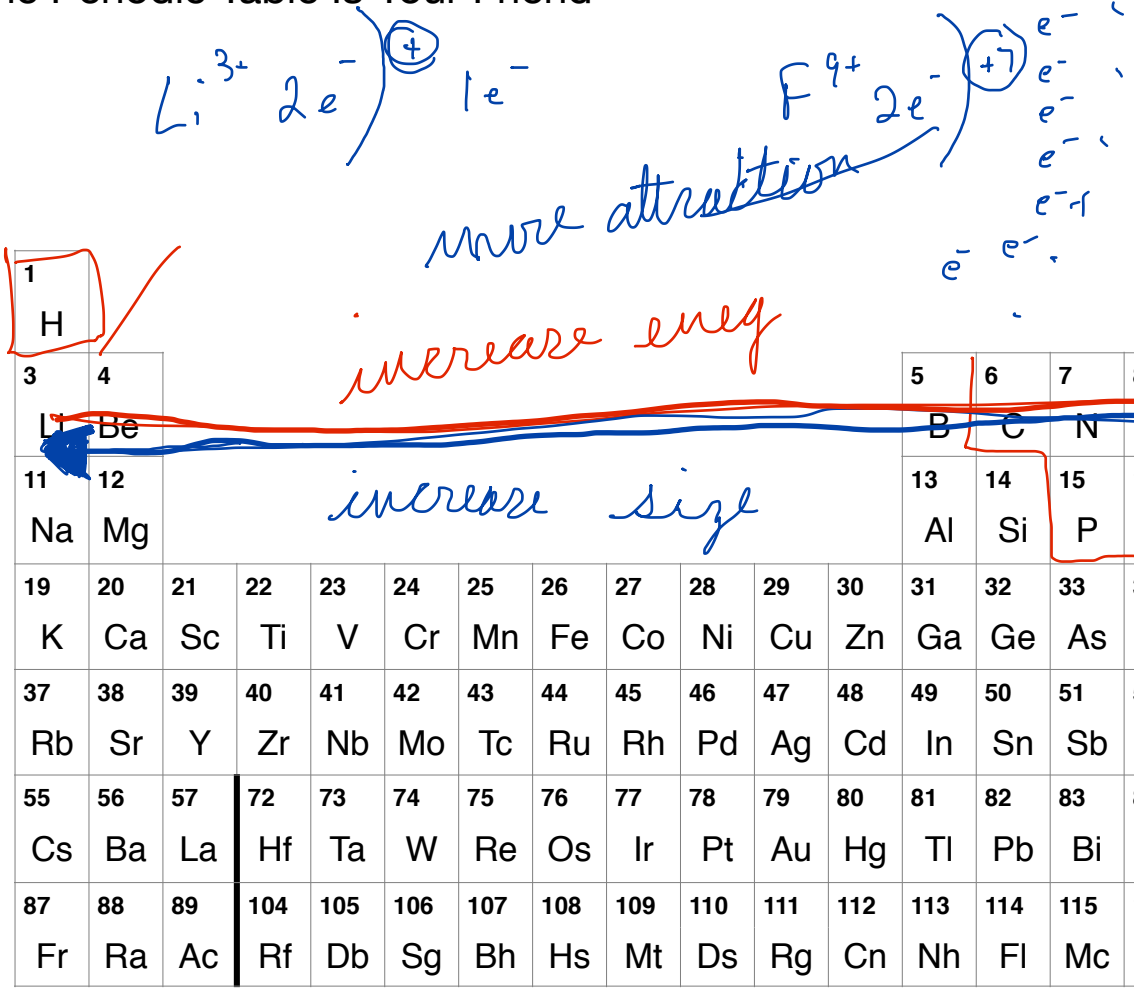


Remember how electrons are distributed
Remember the importance of valence electrons

The Periodic Table Is Your Friend

Sections 1.1 – 1.3

F > O > N ≈ Cl > C > H



1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

electronegativity

An atom's ability to attract an election in a bond

size increases from right to left and from top to bottom

size differences from row to row are significant... within a row... not so much

Remember periodic trends

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metals tend to lose e⁻

non-metal tend to gain electrons or share e⁻

metal + non-metal = ionic

non metals can combine and form ions

NH_4^+ SO_4^{2-}

NH_4^+

we can make ionic compounds with non metals

Identify metals and non-metals

H_2O $H-\overset{\oplus}{O}-H$ $^{\ominus}C-H$

H

2 or 2 bonds

+1 ions

-1 ion ... also tend to make 1 bond

4 3

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Cl^- not Cl^{2-}

$3s^2 3p^5$ Cl

$3s^2 3p^6$ Cl^-

$17^{\oplus}$ 16e$^-$) $3s^2 3p^6$) $4s^1$ Cl^0

+7

(-1)

Predict the number of electrons or bonds needed for an element to form a stable compound