Today: Oct 3 sections 5.5 - 5.8

Friday: Oct 5 Finish ch 5

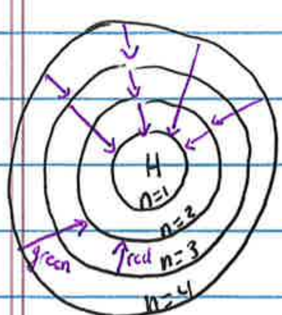
Warm up: The yellow color we saw in lab for the sodium flame test is due to an emission line with $\lambda = 589.0\,nm$. Convert this to kJ/mol.

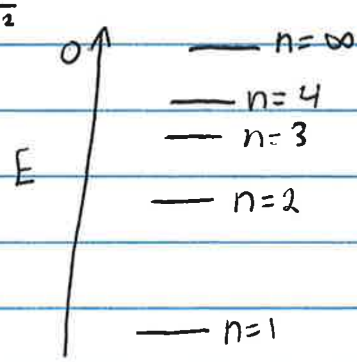
$$E = h\nu = \frac{h \cdot c}{\lambda} \qquad E_{photon} \xrightarrow{\times N_A} E_{mol}$$

$$E = \frac{6.626 \times 10^{-34}\,J \cdot s \;\Big|\; 3.0 \times 10^{8}\,m \;\Big|}{\;\Big|\; s \;\Big|\; 589 \times 10^{-9}\,m} = 3.37 \times 10^{-19}\,J$$

$$E_{mol} = \frac{3.37 \times 10^{-19}\,J \;\Big|\; 1\,kJ \;\Big|\; 6.02 \times 10^{23}}{\;\Big|\; 1000\,J \;\Big|\; mol} = \boxed{203\,kJ/mol}$$

$$E \propto \frac{-1}{n^2}$$





ground state = lowest energy

emission spectra

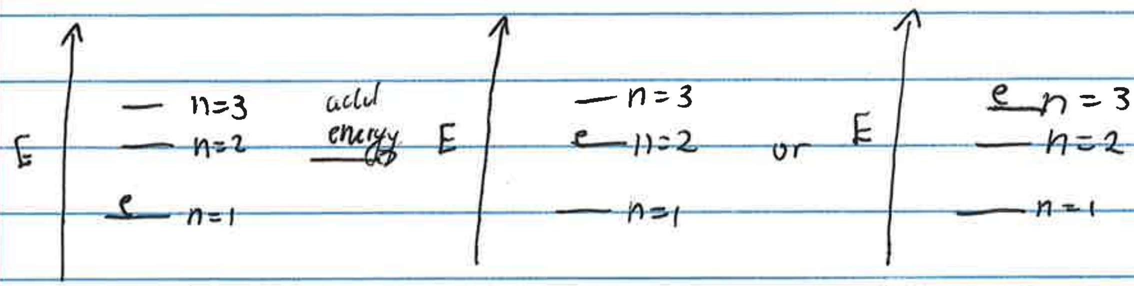
$n=3 \rightarrow n=2 \quad \lambda = 656.3\,nm$ red

$n=4 \rightarrow n=2 \quad \lambda = 486.1\,nm$ green

$n=5 \rightarrow n=2 \quad \lambda = 434.1\,nm$ blue

Quantum mechanics: Shrödinger model of atom

1. Electrons behave as waves
2. Electrons have energies given by $E \alpha \frac{1}{n^2}$ where n = integer
   ↳ n is called principal quantum number
3. Electrons are located in physical spaces called orbitals
4. The # of orbitals of each energy level is given by n^2. Each orbital can have 2 electrons

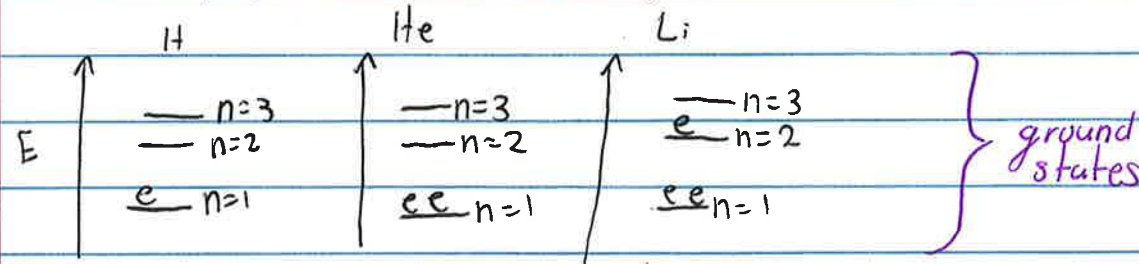


ground state

excited states

- excited state → ground state = emission and $E < 0$
- ground state → excited state = absorbtion and $E > 0$

if n=1, there is 1 orbital, 2 electrons max
if n=2, there is 4 orbitals, 8 electrons max
if n=3, there is 9 orbitals, 18 electrons max



- n = energy quantum number

shape quantum number, l

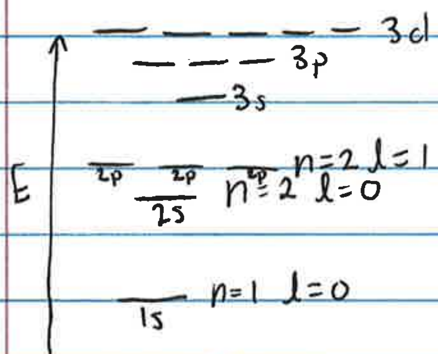
$l = 0$ spherical "s - orbital"

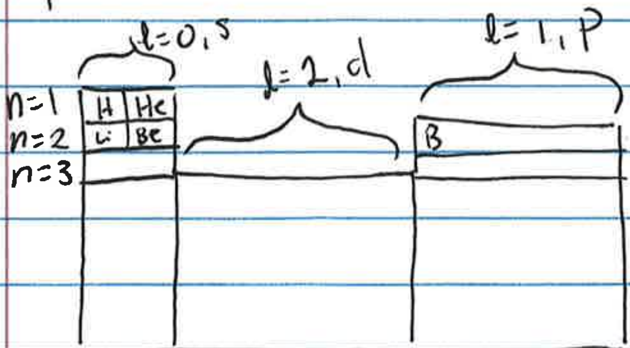
$l = 1$ three orbitals "p-orbital"

$l = 2$ five orbitals "d-orbital"

$l = 3$ seven orbitals "f-orbital"

n	l
1	0
2	0 or 1
3	0, 1, or 2





B: $1s^2 2s^2 2p^1$

C: $1s^2 2s^2 2p^2$

N: $1s^2 2s^2 2p^3$

Na: $1s^2 2s^2 2p^6 3s^1$

m_l