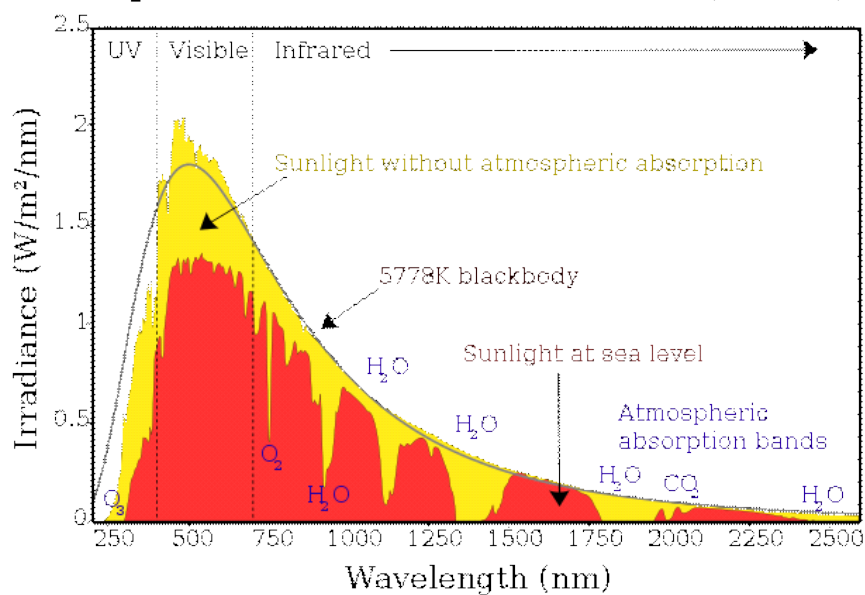


UV

Spectrum of Solar Radiation (Earth)



end point of polymers

Spectrum of Solar Radiation (Earth)

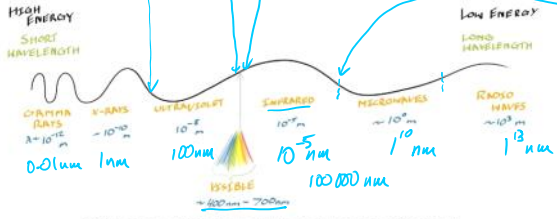
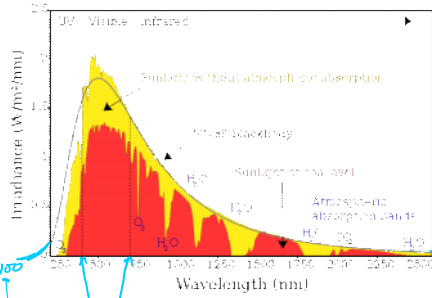
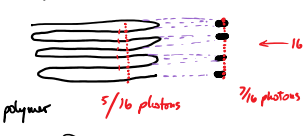
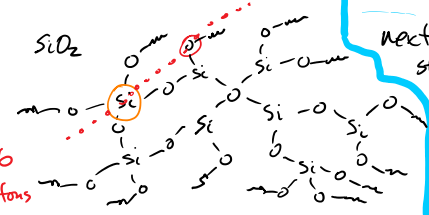
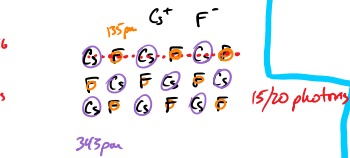


Figure 1. The electromagnetic spectrum. Visible light is only a tiny little bit of the spectrum.

"NaCl structure"



"Salt"



$$E = \frac{hc}{\lambda}$$

energy

$$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s} \quad \text{Planck constant}$$

$$c = 3 \times 10^8 \frac{\text{m}}{\text{s}} \quad \text{speed of "light"}$$

$$\lambda = \text{wavelength} = 650 \text{ nm} = 650 \times 10^{-9} \text{ m} = 6.50 \times 10^{-7} \text{ m}$$

$$= \frac{(6.626 \times 10^{-34} \text{ J}\cdot\text{s})(3 \times 10^8 \frac{\text{m}}{\text{s}})}{650 \times 10^{-9} \text{ m}}$$

$$E = 3.06 \times 10^{-19} \text{ J} \quad \text{"electron charge energy"}$$

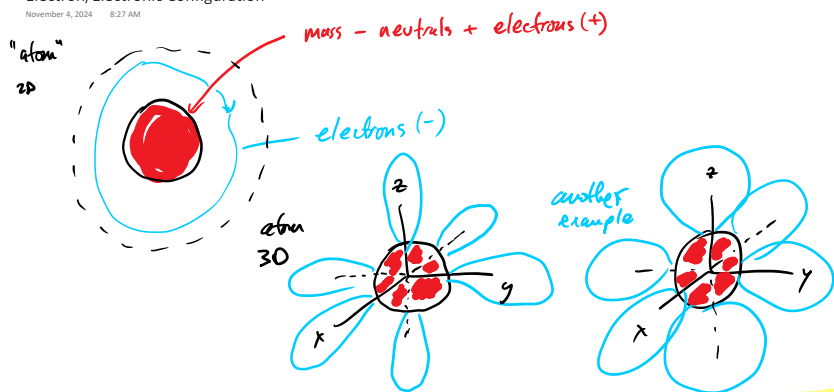
J - electron charge

next step $\rightarrow \text{eV}$

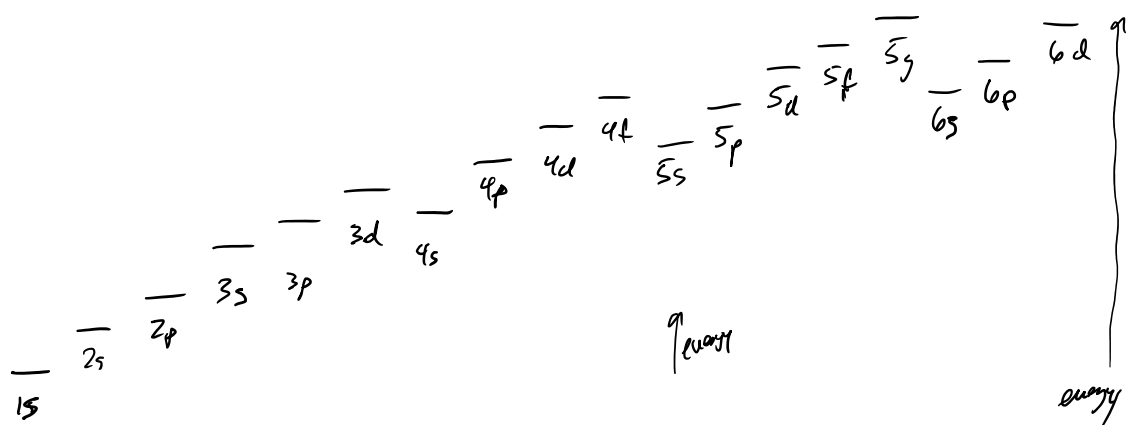
$$1 \text{ eV} = 1 \text{ volt}$$

$$1 \text{ eV} = E (1 \text{ e}^- \text{ through } V) = 1.602 \times 10^{-19} \text{ C} \cdot 1 \frac{\text{J}}{\text{C}} = 1.602 \times 10^{-19} \frac{\text{J}}{\text{eV}}$$

$$E = \frac{3.06 \times 10^{-19} \text{ J}}{1.602 \times 10^{-19} \frac{\text{J}}{\text{eV}}} = 1.91 \text{ eV}$$



1s			
2s	2p		
3s	3p	3d	
4s	4p	4d	4f
5s	5p	5d	5f
6s	6p	6d	6f
7s	7p	7d	7f
8s	8p	8d	8f
2	6	10	14



PERIODIC TABLE OF ELEMENTS

PubChem																		He																			
1 H Hydrogen 1s ¹		2 He																																			
3 Li Lithium [He] 2s ¹		4 Be Beryllium [He] 2s ²		5 B Boron [He] 2s ² 2p ¹		6 C Carbon [He] 2s ² 2p ²		7 N Nitrogen [He] 2s ² 2p ³		8 O Oxygen [He] 2s ² 2p ⁴		9 F Fluorine [He] 2s ² 2p ⁵		10 Ne Neon [He] 2s ² 2p ⁶																							
11 Na Sodium [Ne] 3s ¹		12 Mg Magnesium [Ne] 3s ²		13 Al Aluminum [Ne] 3s ² 3p ¹		14 Si Silicon [Ne] 3s ² 3p ²		15 P Phosphorus [Ne] 3s ² 3p ³		16 S Sulfur [Ne] 3s ² 3p ⁴		17 Cl Chlorine [Ne] 3s ² 3p ⁵		18 Ar Argon [Ne] 3s ² 3p ⁶																							
19 K Potassium [Ar] 4s ¹		20 Ca Calcium [Ar] 4s ²		21 Sc Scandium [Ar] 3d ¹ 4s ²		22 Ti Titanium [Ar] 3d ² 4s ²		23 V Vanadium [Ar] 3d ³ 4s ²		24 Cr Chromium [Ar] 3d ⁵ 4s ¹		25 Mn Manganese [Ar] 3d ⁵ 4s ²		26 Fe Iron [Ar] 3d ⁶ 4s ²		27 Co Cobalt [Ar] 3d ⁷ 4s ²		28 Ni Nickel [Ar] 3d ⁸ 4s ²		29 Cu Copper [Ar] 3d ¹⁰ 4s ¹		30 Zn Zinc [Ar] 3d ¹⁰ 4s ²		31 Ga Gallium [Ar] 3d ¹⁰ 4s ² 4p ¹		32 Ge Germanium [Ar] 3d ¹⁰ 4s ² 4p ²		33 As Arsenic [Ar] 3d ¹⁰ 4s ² 4p ³		34 Se Selenium [Ar] 3d ¹⁰ 4s ² 4p ⁴		35 Br Bromine [Ar] 3d ¹⁰ 4s ² 4p ⁵		36 Kr Krypton [Ar] 3d ¹⁰ 4s ² 4p ⁶			
37 Rb Rubidium [Kr] 5s ¹		38 Sr Strontium [Kr] 5s ²		39 Y Yttrium [Kr] 4d ¹ 5s ²		40 Zr Zirconium [Kr] 4d ² 5s ²		41 Nb Niobium [Kr] 4d ⁴ 5s ¹		42 Mo Molybdenum [Kr] 4d ⁵ 5s ¹		43 Tc Technetium [Kr] 4d ⁵ 5s ²		44 Ru Ruthenium [Kr] 4d ⁷ 5s ¹		45 Rh Rhodium [Kr] 4d ⁸ 5s ¹		46 Pd Palladium [Kr] 4d ¹⁰		47 Ag Silver [Kr] 4d ¹⁰ 5s ¹		48 Cd Cadmium [Kr] 4d ¹⁰ 5s ²		49 In Indium [Kr] 4d ¹⁰ 5s ² 5p ¹		50 Sn Tin [Kr] 4d ¹⁰ 5s ² 5p ²		51 Sb Antimony [Kr] 4d ¹⁰ 5s ² 5p ³		52 Te Tellurium [Kr] 4d ¹⁰ 5s ² 5p ⁴		53 I Iodine [Kr] 4d ¹⁰ 5s ² 5p ⁵		54 Xe Xenon [Kr] 4d ¹⁰ 5s ² 5p ⁶			
55 Cs Cesium [Xe] 6s ¹		56 Ba Barium [Xe] 6s ²		57 La Lanthanum [Xe] 5d ¹ 6s ²		58 Ce Cerium [Xe] 4f ¹ 5d ¹ 6s ²		59 Pr Praseodymium [Xe] 4f ³ 6s ²		60 Nd Neodymium [Xe] 4f ⁴ 6s ²		61 Pm Promethium [Xe] 4f ⁵ 6s ²		62 Sm Samarium [Xe] 4f ⁶ 6s ²		63 Eu Europium [Xe] 4f ⁷ 6s ²		64 Gd Gadolinium [Xe] 4f ⁷ 5d ¹ 6s ²		65 Tb Terbium [Xe] 4f ⁹ 6s ²		66 Dy Dysprosium [Xe] 4f ¹⁰ 6s ²		67 Ho Holmium [Xe] 4f ¹¹ 6s ²		68 Er Erbium [Xe] 4f ¹² 6s ²		69 Tm Thulium [Xe] 4f ¹³ 6s ²		70 Yb Ytterbium [Xe] 4f ¹⁴ 6s ²		71 Lu Lutetium [Xe] 4f ¹⁴ 5d ¹ 6s ²					
87 Fr Francium [Rn] 7s ¹		88 Ra Radium [Rn] 7s ²		89 Ac Actinium [Rn] 6d ¹ 7s ²		90 Th Thorium [Rn] 6d ² 7s ²		91 Pa Protactinium [Rn] 5f ² 6d ¹ 7s ²		92 U Uranium [Rn] 5f ³ 6d ¹ 7s ²		93 Np Neptunium [Rn] 5f ⁴ 6d ¹ 7s ²		94 Pu Plutonium [Rn] 5f ⁶ 7s ²		95 Am Americium [Rn] 5f ⁷ 7s ²		96 Cm Curium [Rn] 5f ⁷ 6d ¹ 7s ²		97 Bk Berkelium [Rn] 5f ⁹ 7s ²		98 Cf Californium [Rn] 5f ¹⁰ 7s ²		99 Es Einsteinium [Rn] 5f ¹¹ 7s ²		100 Fm Fermium [Rn] 5f ¹² 7s ²		101 Md Mendelevium [Rn] 5f ¹³ 7s ²		102 No Nobelium [Rn] 5f ¹⁴ 7s ²		103 Lr Lawrencium [Rn] 5f ¹⁴ 6d ¹ 7s ²					

1s²

Neon - Ne
[He] 2s² 2p⁶ = 1s² 2s² 2p⁶

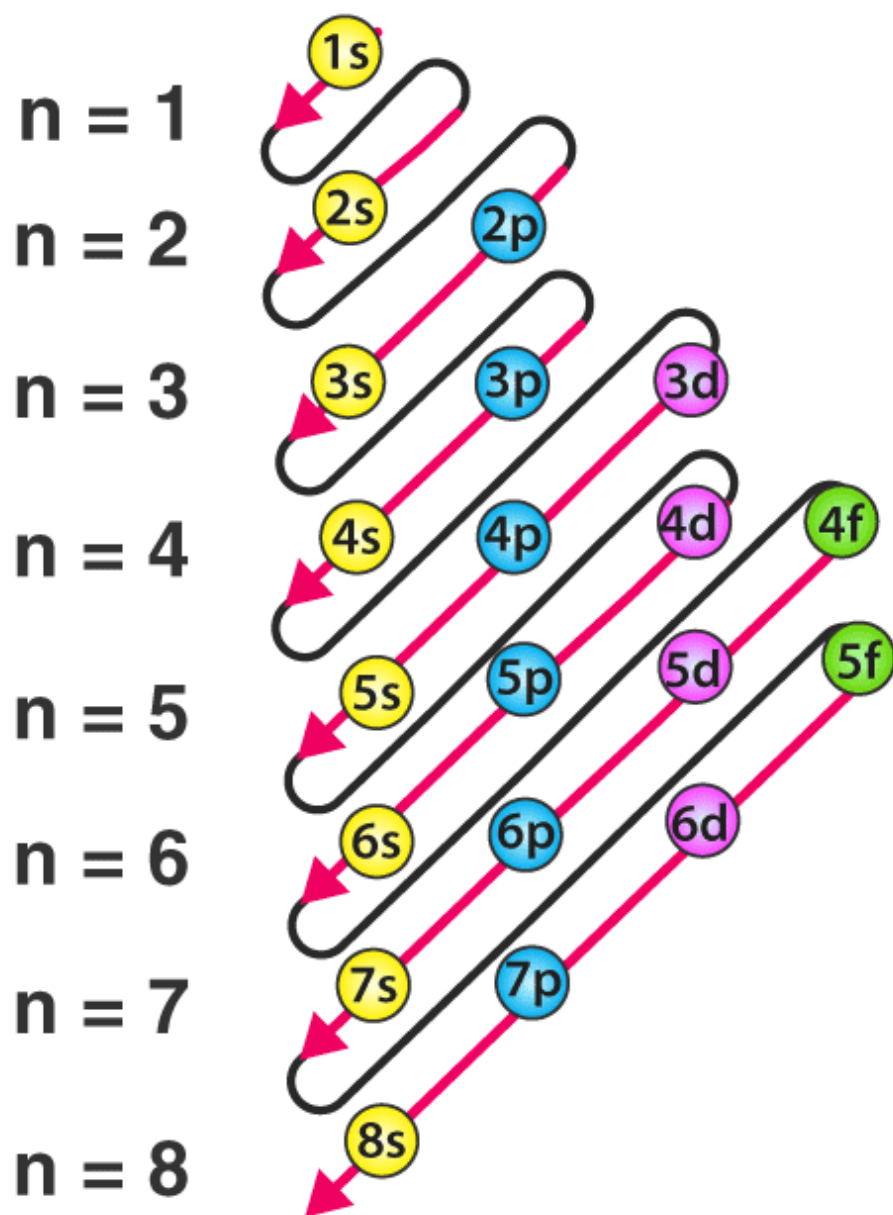
Oxygen [He] 2s² 2p⁴
Argon - Ar [Ne] 3s² 3p⁶ = 1s² 2s² 2p⁶ 3s² 3p⁶

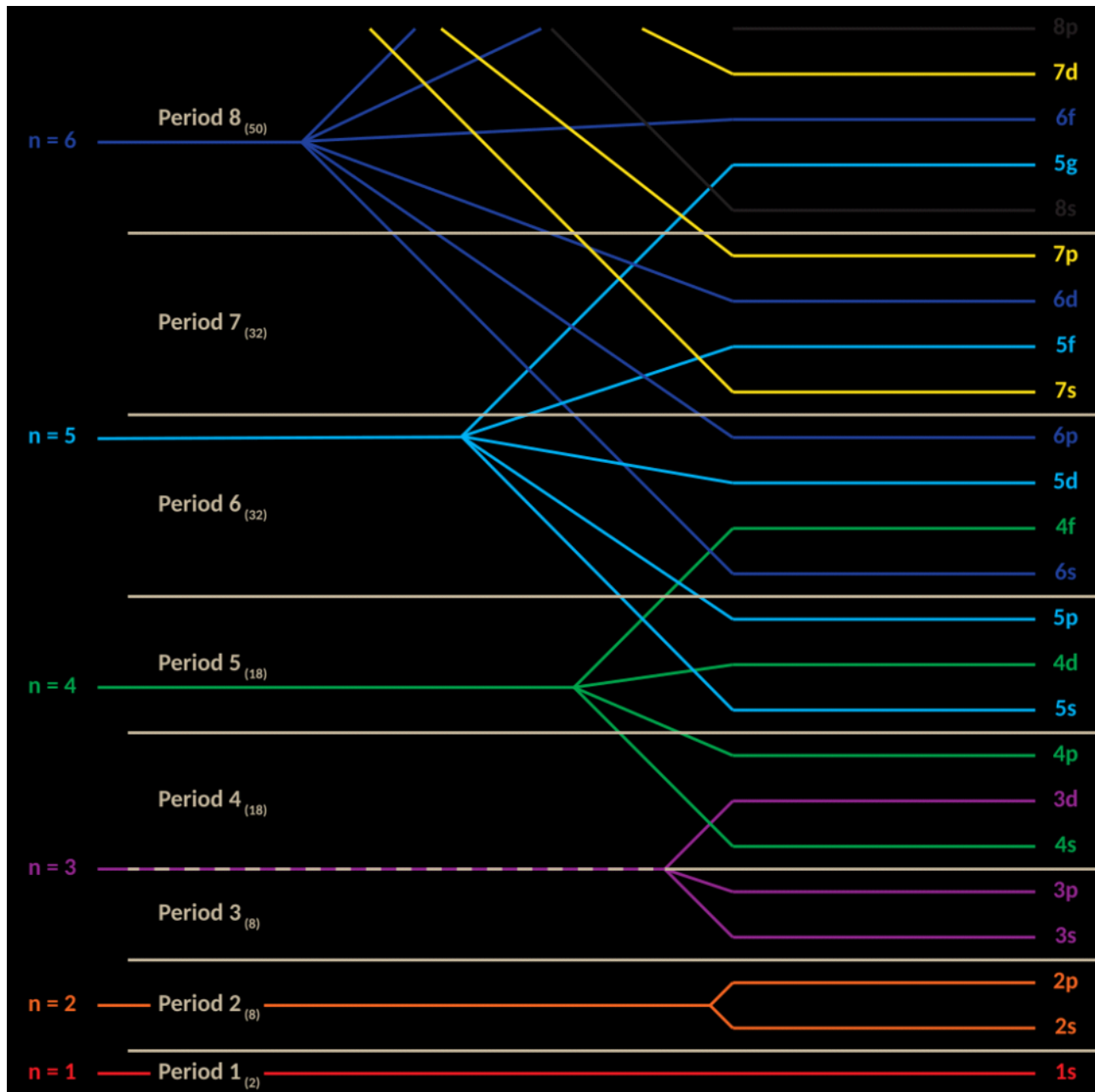
Krypton - Kr [Ar] 4s² 3d¹⁰ 4p⁶ = 1s² 2s² 2p⁶ 3s² 3p⁶ 4s² 3d¹⁰ 4p⁶

Xenon - Xe [Kr] 5s² 4d¹⁰ 5p⁶

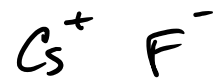
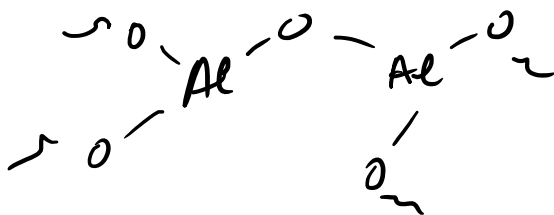
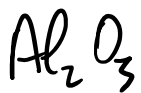
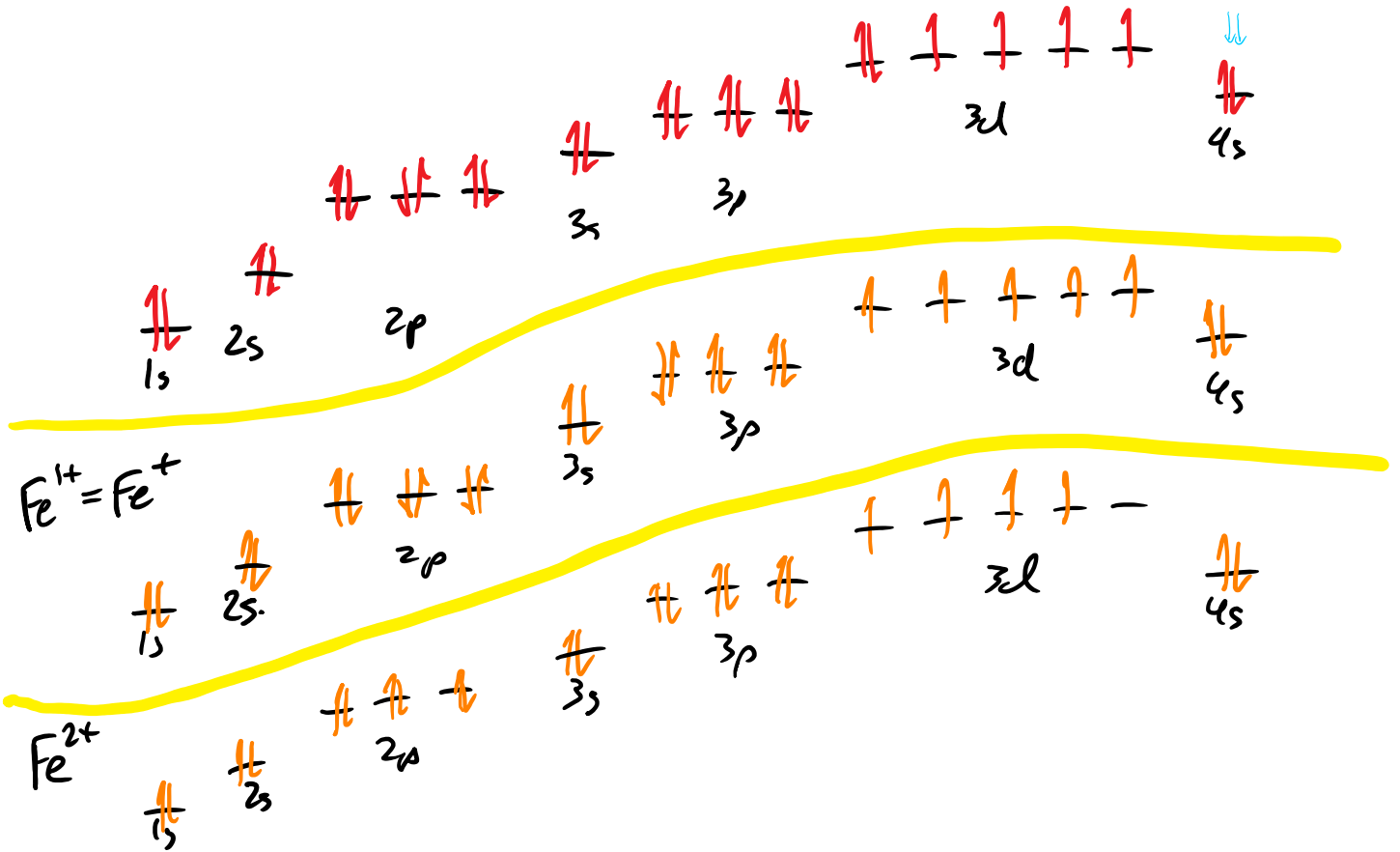
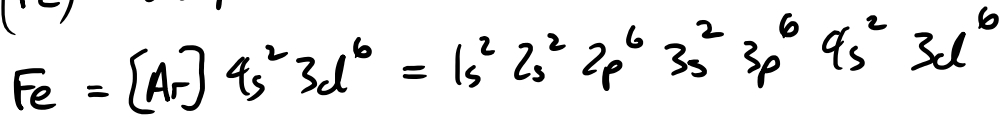
Radon - Rn [Xe] 6s² 4f¹⁴ 6d¹⁰ 6p⁶

Oganesson - Og [Rn] 7s² 7p⁶ 5f¹⁴ 6d¹⁰



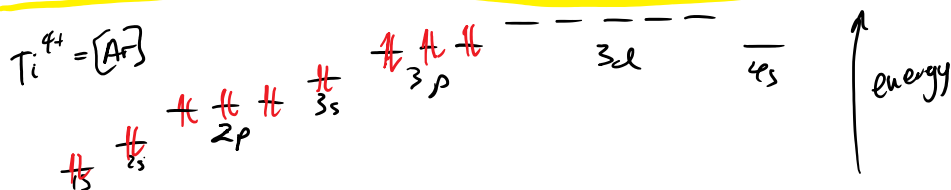
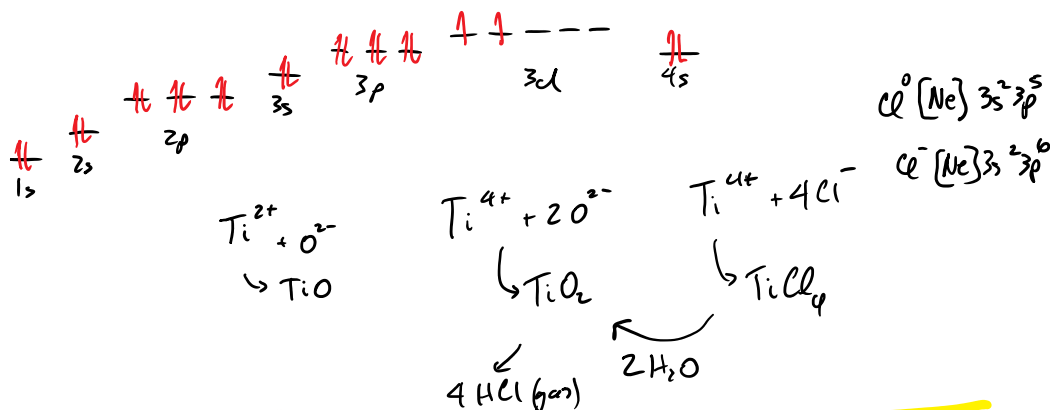


Iron (Fe) - example

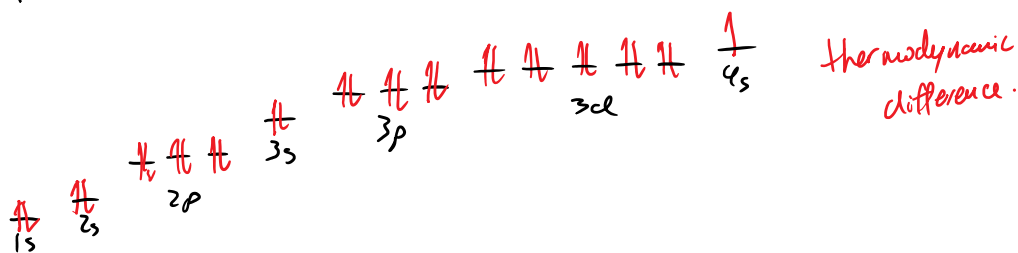


Electron/Electronic Configuration

Titanium (Ti) $[Ar] 4s^2 3d^2 = Ti^0$

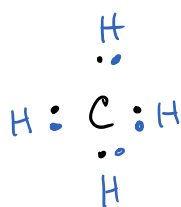
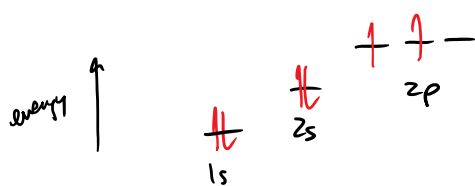


Copper (Cu) $[Ar] 4s^1 3d^{10}$



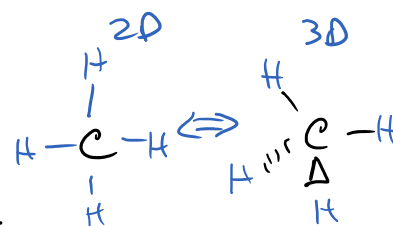
Carbon (C) $[He] 2s^2 2p^2$
 $= 1s^2 2s^2 2p^2$

+ Hydrogen $1s^1 H \cdot$



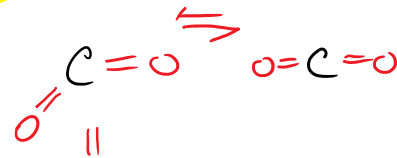
bonding

CH₄
methane.
(gas)

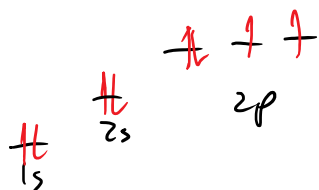


equilibrium

Carbon dioxide CO₂



Oxygen
 $[He] 2s^2 2p^4$



PERIODIC TABLE OF ELEMENTS

<div>PubChem</div>																		2																	
<div>1</div> <div>H</div> <div>Hydrogen</div> <div>1s¹</div>																		<div>Atomic Number</div> <div>Symbol</div> <div>Name</div> <div>Electron Configuration</div>																	
																		5	6	7	8	9	10												
																		B	C	N	O	F	Ne												
																		Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon												
																		13	14	15	16	17	18												
																		Al	Si	P	S	Cl	Ar												
																		Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon												
																		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
																		K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
																		Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
																		37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
																		Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
																		Rubidium	Strontium	Yttrium	Zirconium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon
																		55	56		72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
																		Cs	Ba	*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
																		Cesium	Barium		Hafnium	Tantalum	Tungsten	Rhenium	Osmium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polonium	Astatine	Radon
																		87	88	**	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
																		Fr	Ra		Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
																		Francium	Radium		Rutherfordium	Dubnium	Seaborgium	Bohrium	Hassium	Meitnerium	Darmstadtium	Roentgenium	Copernicium	Nihonium	Flerovium	Moscovium	Livermorium	Tennessine	Oganesson
																		57	58	59	60	61	62	63	64	65	66	67	68	69	70	71			
																		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
																		Lanthanum	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium			
																		89	90	91	92	93	94	95	96	97	98	99	100	101	102	103			
																		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			
																		Actinium	Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium			