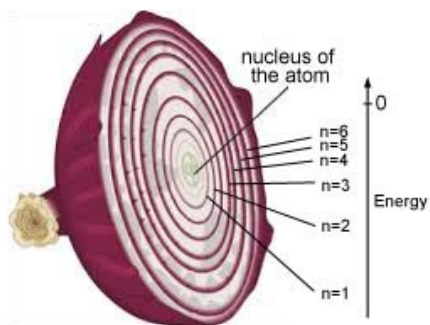


Bohr model / Quantum Mechanics Model of the atom



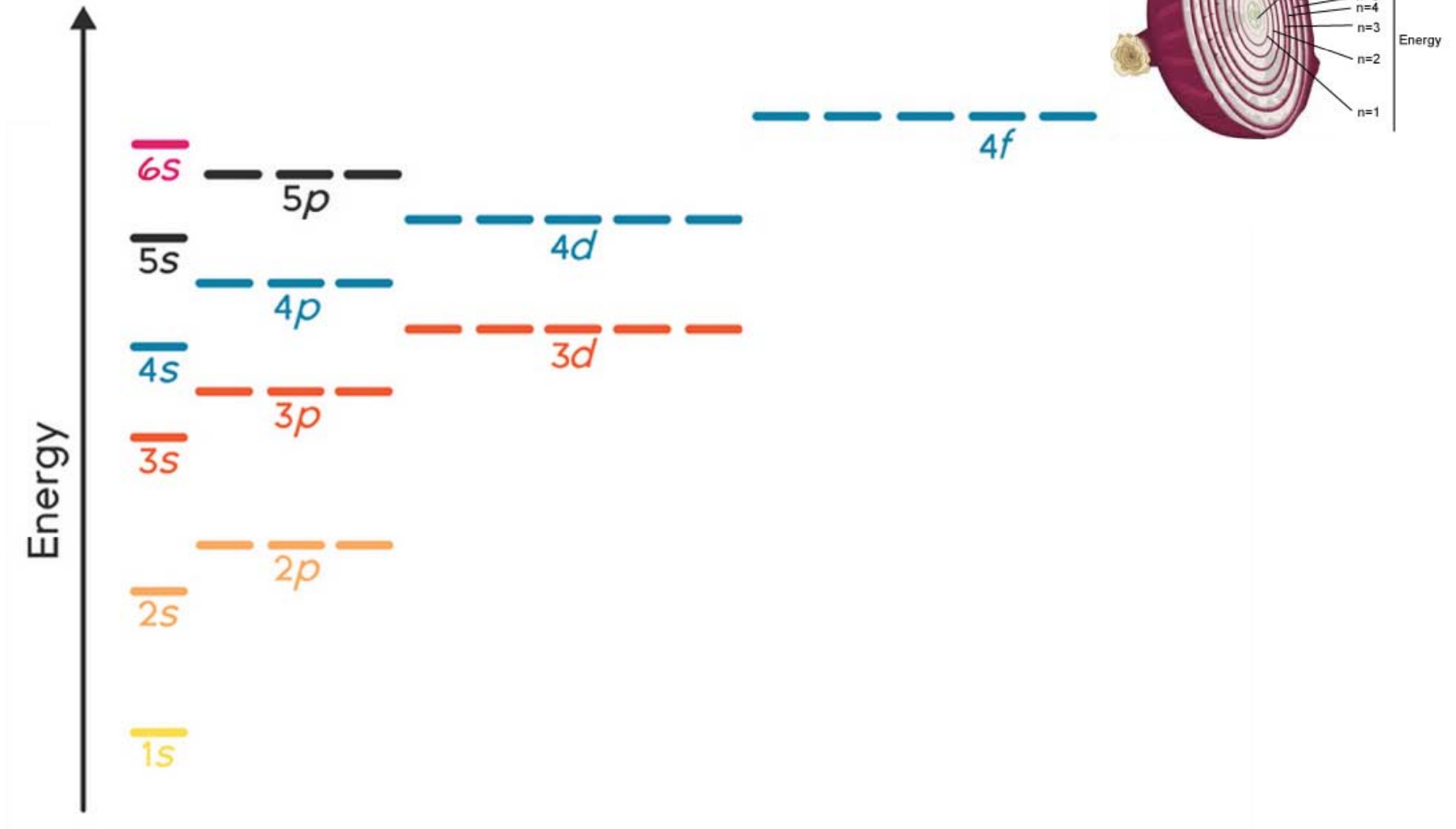
Maximum number of electrons in an energy level = $2n^2$

Quantum Mechanics Model tells us more ...

Energy Level	# of Sublevels	Types of atomic orbital	When the orbital is fully occupied, # of electrons is	$2n^2$	Max # of electrons
n=1	1	s	2	$2(1)^2 =$	2 electrons
n=2	2	s p	2 6 } 6	$2(2)^2 =$	8 electrons
n=3	3	s p d	2 6 10 } 10	$2(3)^2 =$	18 electrons
n=4	4	s p d f	2 6 10 14 } 14	$2(4)^2 =$	32 electrons

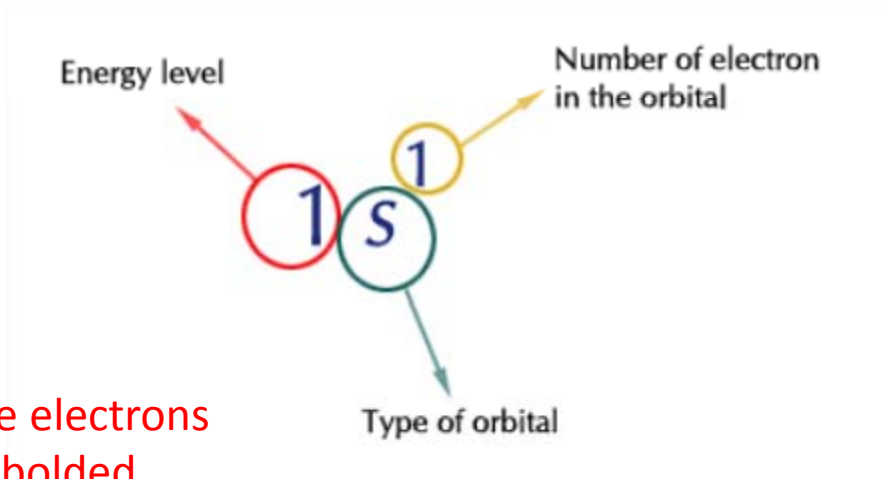
This is the structure of the atom. Let's fill this structure with electrons!

The Energy Level Diagram for an Atom



Write the Ground State Electron Configuration for the Elements

Hydrogen: 1 electron

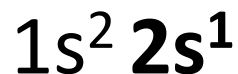


Valence electrons are bolded.

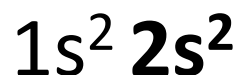
Helium: 2 electrons



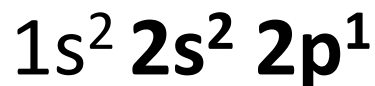
Lithium: 3 electrons



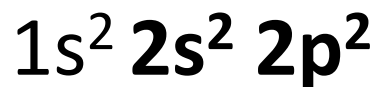
Beryllium: 4 electrons



Boron: 5 electrons



Carbon: 6 electrons



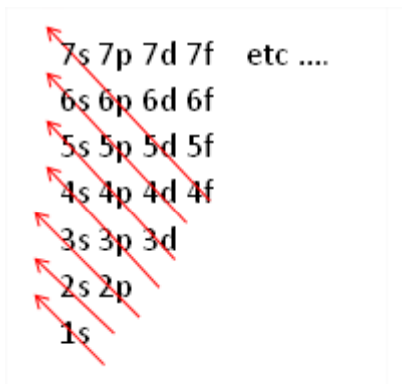
Period 1 elements



Period 1: n=1
1s-orbital completely filled

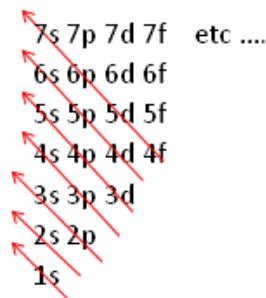
Period 2 elements

2s-orbital completely filled



Write the Ground State Electron Configuration for the Elements

Nitrogen: 7 electrons	➔	$1s^2 2s^2 2p^3$
Oxygen: 8 electrons	➔	$1s^2 2s^2 2p^4$
Fluorine: 9 electrons	➔	$1s^2 2s^2 2p^5$
Neon: 10 electrons	➔	$1s^2 2s^2 2p^6$
Sodium: 11 electrons	➔	$1s^2 2s^2 2p^6 3s^1$
Magnesium: 12 electrons	➔	$1s^2 2s^2 2p^6 3s^2$
Aluminum: 13 electrons	➔	$1s^2 2s^2 2p^6 3s^2 3p^1$
Silicon: 14 electrons	➔	$1s^2 2s^2 2p^6 3s^2 3p^2$
Phosphorus: 15 electrons	➔	$1s^2 2s^2 2p^6 3s^2 3p^3$
Sulfur: 16 electrons	➔	$1s^2 2s^2 2p^6 3s^2 3p^4$
Chlorine: 17 electrons	➔	$1s^2 2s^2 2p^6 3s^2 3p^5$
Argon: 18 electrons	➔	$1s^2 2s^2 2p^6 3s^2 3p^6$



Period 2: $n=2$
 $2p$ -orbitals
 completely filled

Period 3 elements

$3s$ -orbital
 completely filled

Period 3: $n=3$
 $3p$ -orbitals
 completely filled

H: $1s^1$

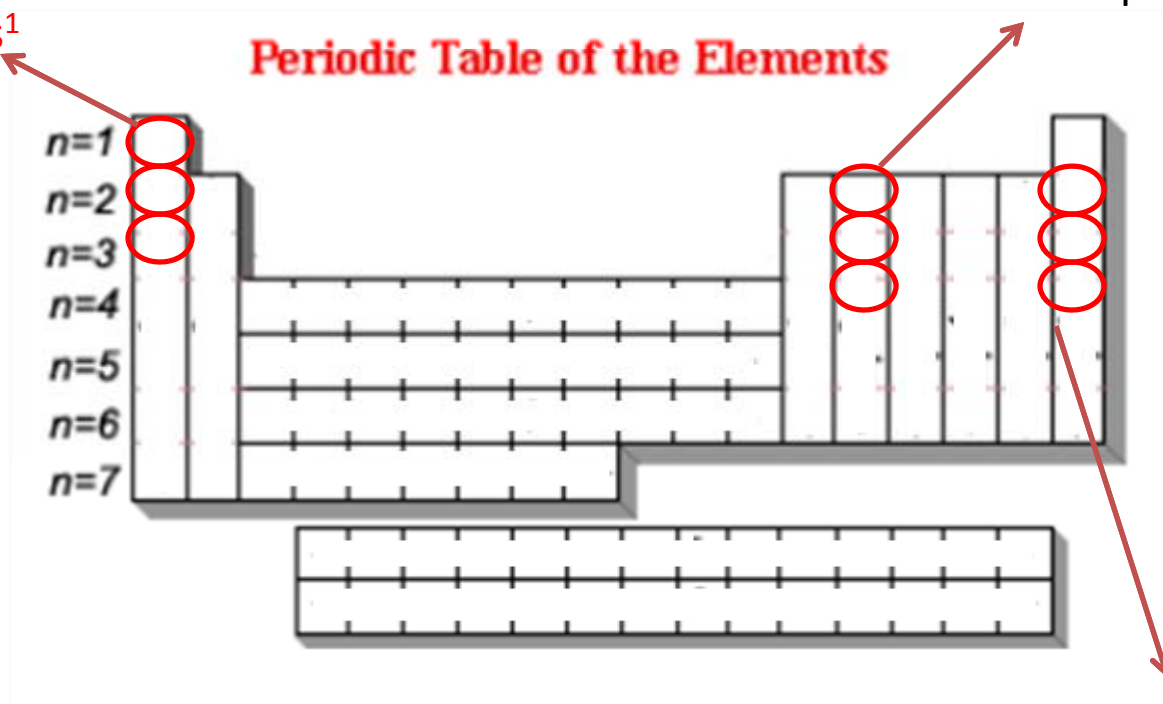
Li: $1s^2 2s^1$

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

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

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

Ge: $1s^2 2s^2 2p^6 \dots 4p^2$

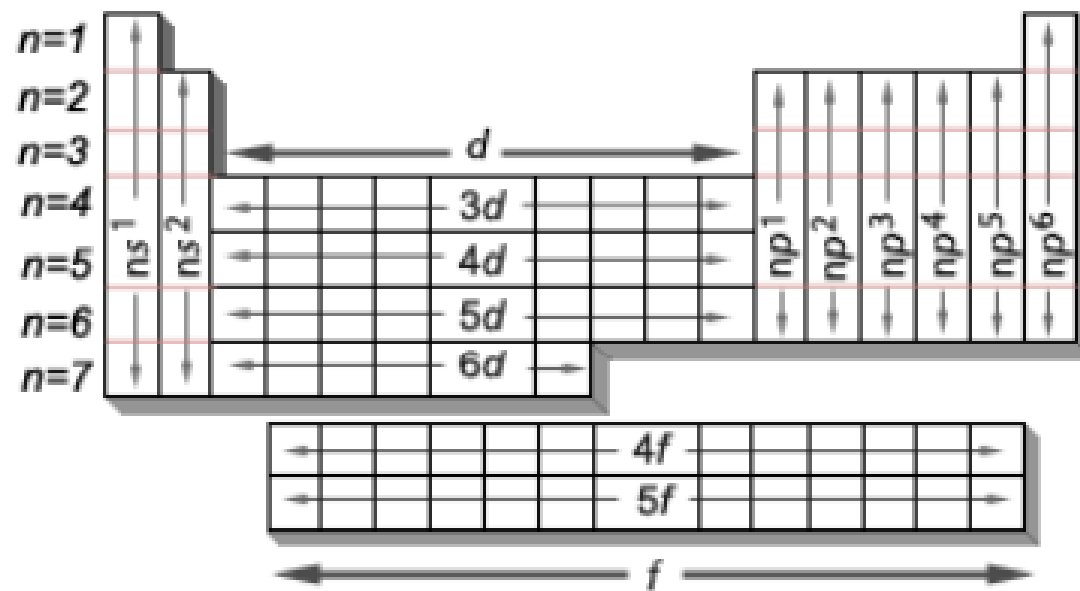


Ne: $1s^2 2s^2 2p^6$

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

Kr: $1s^2 2s^2 2p^6 \dots 4p^6$

Periodic Table of the Elements



Write the Ground State Electron Configuration for the following elements:

~~7s 7p 7d 7f etc ...~~
~~6s 6p 6d 6f~~
~~5s 5p 5d 5f~~
~~4s 4p 4d 4f~~
~~3s 3p 3d~~
~~2s 2p~~
~~1s~~

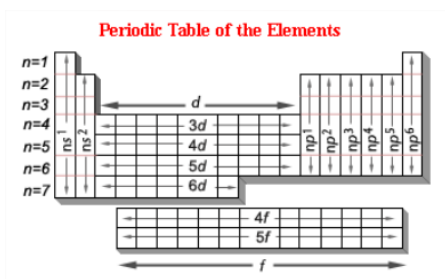
Periodic Table of Elements

PERIODS	GROUPS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	IA	IIA	IIIB	IVB	VB	VIB	VII B	VIII			IB	II B	IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1.008 H 1																	4.003 He 2
2	6.941 Li 3	9.012 Be 4											10.811 B 5	12.011 C 6	14.007 N 7	15.999 O 8	18.998 F 9	20.179 Ne 10
3	22.990 Na 11	24.305 Mg 12											26.982 Al 13	28.0855 Si 14	30.9738 P 15	32.06 S 16	35.453 Cl 17	39.948 Ar 18
4	39.0983 K 19	40.08 Ca 20	44.956 Sc 21	47.88 Ti 22	50.9415 V 23	51.996 Cr 24	54.938 Mn 25	55.847 Fe 26	58.933 Co 27	58.71 Ni 28	63.546 Cu 29	65.37 Zn 30	69.72 Ga 31	72.59 Ge 32	74.922 As 33	78.96 Se 34	79.904 Br 35	83.80 Kr 36
5	85.468 Rb 37	87.62 Sr 38	88.906 Y 39	91.22 Zr 40	92.9064 Nb 41	95.94 Mo 42	98.906 Tc 43	101.07 Ru 44	102.906 Rh 45	106.4 Pd 46	107.868 Ag 47	112.41 Cd 48	114.82 In 49	118.69 Sn 50	121.75 Sb 51	127.60 Te 52	126.905 I 53	131.30 Xe 54
6	132.905 Cs 55	137.33 Ba 56	138.906 La 57	178.49 Hf 72	180.948 Ta 73	183.85 W 74	186.2 Re 75	190.2 Os 76	192.22 Ir 77	195.09 Pt 78	196.967 Au 79	200.59 Hg 80	204.38 Tl 81	207.2 Pb 82	208.980 Bi 83	(209) Po 84	(210) At 85	(222) Rn 86
7	(223) Fr 87	(227) Ra 88	(227) Ac 89	(261) Rf 104	(263) Ha 105	(265) Sg 106	(267) Ns 107	(268) Hs 108	(269) Mt 109	(272) — 110	(272) — 111	(272) — 112	(272) — 113	(272) — 114	(272) — 115	(272) — 116	(272) — 117	(272) — 118

*Lanthanide series

140.12 58	140.908 59	144.24 60	(145) 61	150.4 62	151.96 63	157.25 64	158.925 65	162.50 66	164.930 67	167.26 68	168.934 69	173.04 70	174.967 71
232.038 90	231.036 91	238.029 92	237.048 93	(244) 94	(243) 95	(247) 96	(247) 97	(251) 98	(254) 99	(257) 100	(256) 101	(255) 102	(267) 103

**Actinide series



Element	# of e ⁻	End with:	Write the Electron Configuration
Iron, Fe	26	$3d^6$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
Bromine, Br	35	$4p^5$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$
Barium, Ba	56	$6s^2$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$
Titanium, Ti	22	$3d^2$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$
Rubidium, Rb	37	$5s^1$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$
Lead, Pb	82	$6p^2$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^2$

The sum of the superscripts = # of electrons