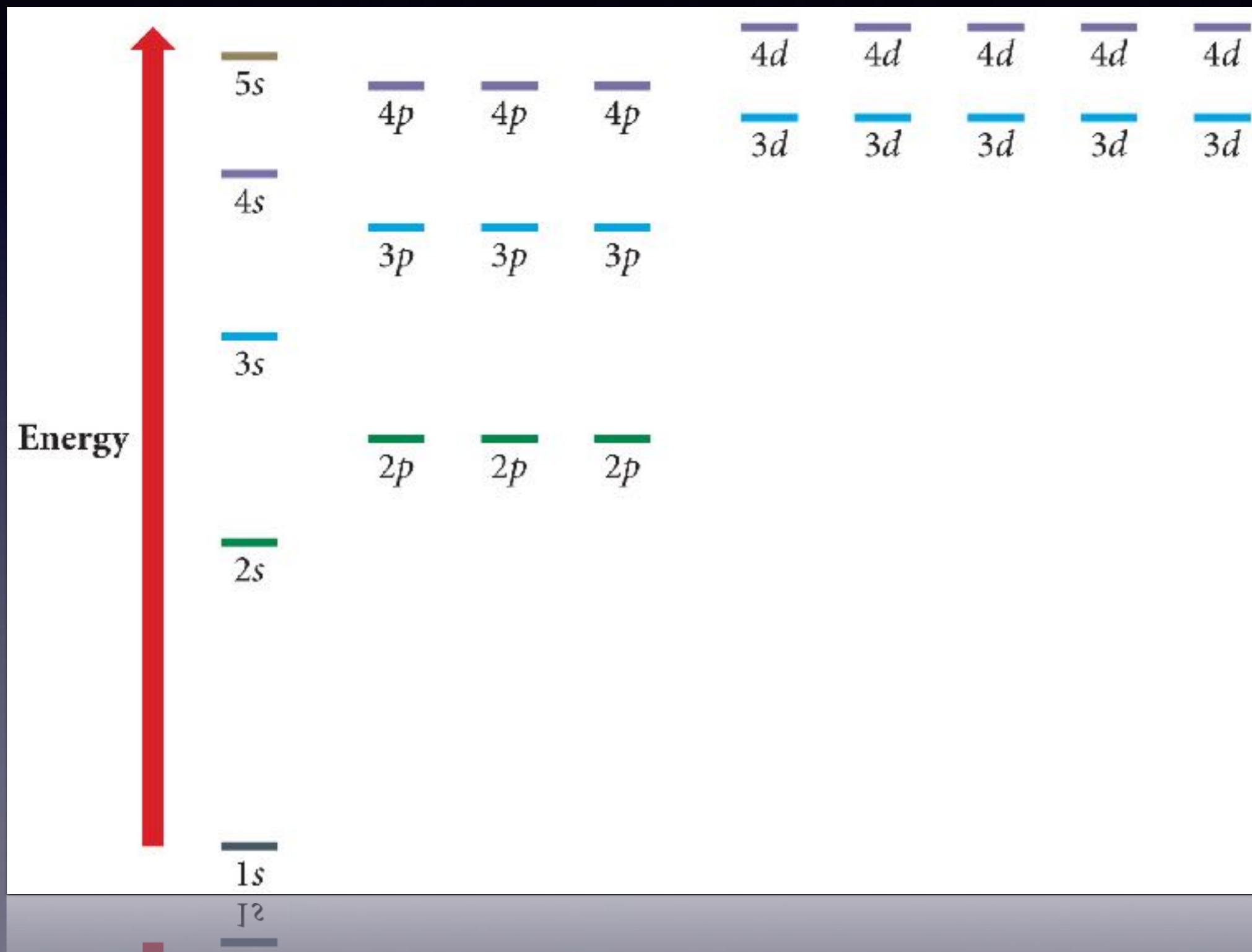


Previously in Molecularity . . .

General energy ordering... why?



Tro
Fig. 8.5

A photograph of a silver fork standing upright in a field of lavender. The fork's tines are pointing downwards, and its handle is pointing upwards. In the background, there is a paved road with a yellow dashed line, some trees, and a small building with a green roof.

Where are we going today?

Ch1010-A17-A03 Lecture 8

- §3.5: Relating filling to periodic table

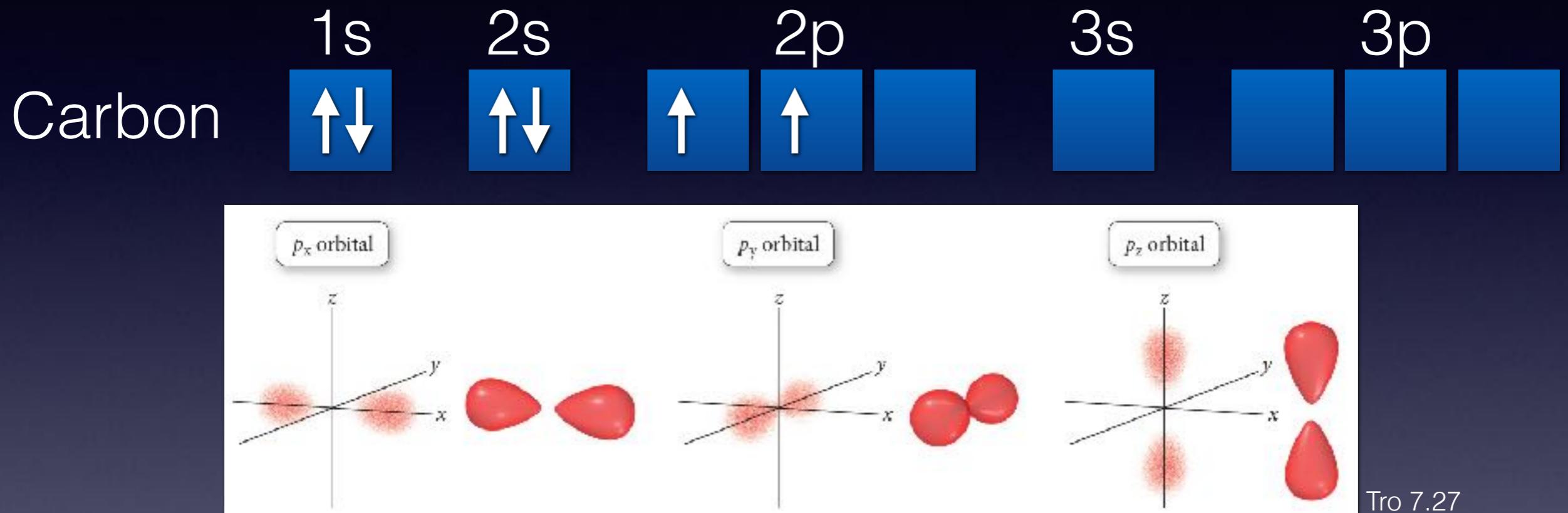
Practice with orbital filling



Hydrogen through argon

For a given atom can you give the electron configuration?

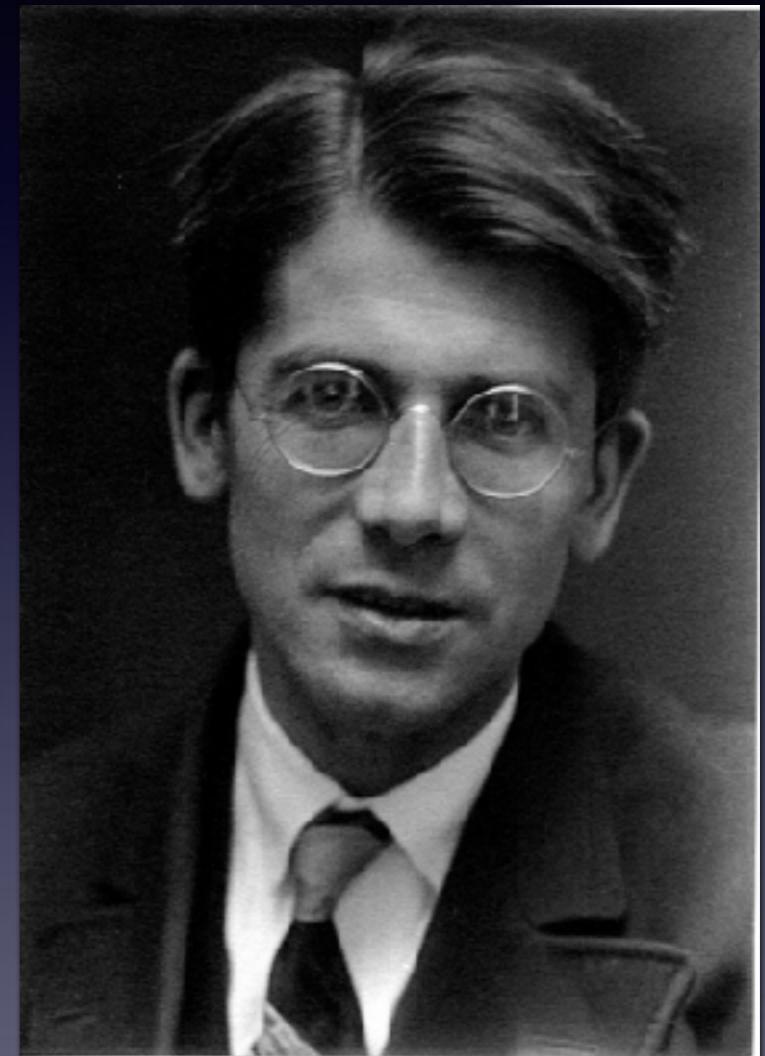
Practice with orbital filling



Electrons “spread out” among different m_l orbitals before pairing up in a particular orbital

Guides for electron filling

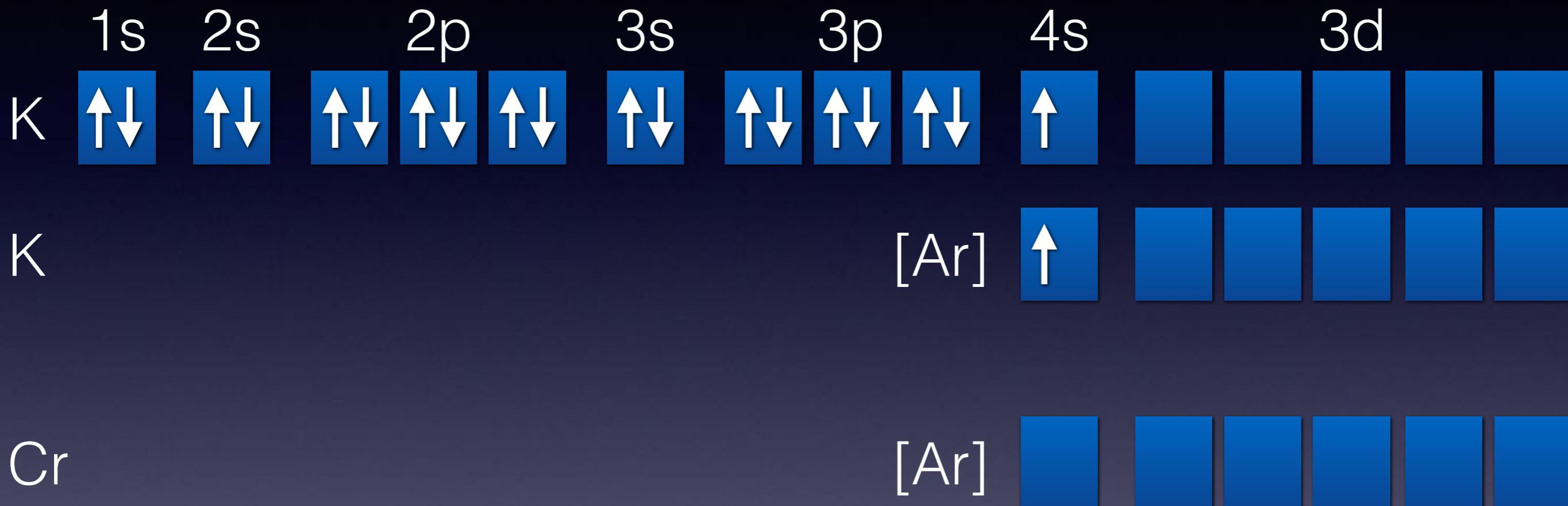
- Electrons “spread out” in p, d, f orbitals before pairing up.
- Completely filled shells and sub-shells are particularly stable.
- Half-filled shells and sub-shells are particularly stable.



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Practice with orbital filling

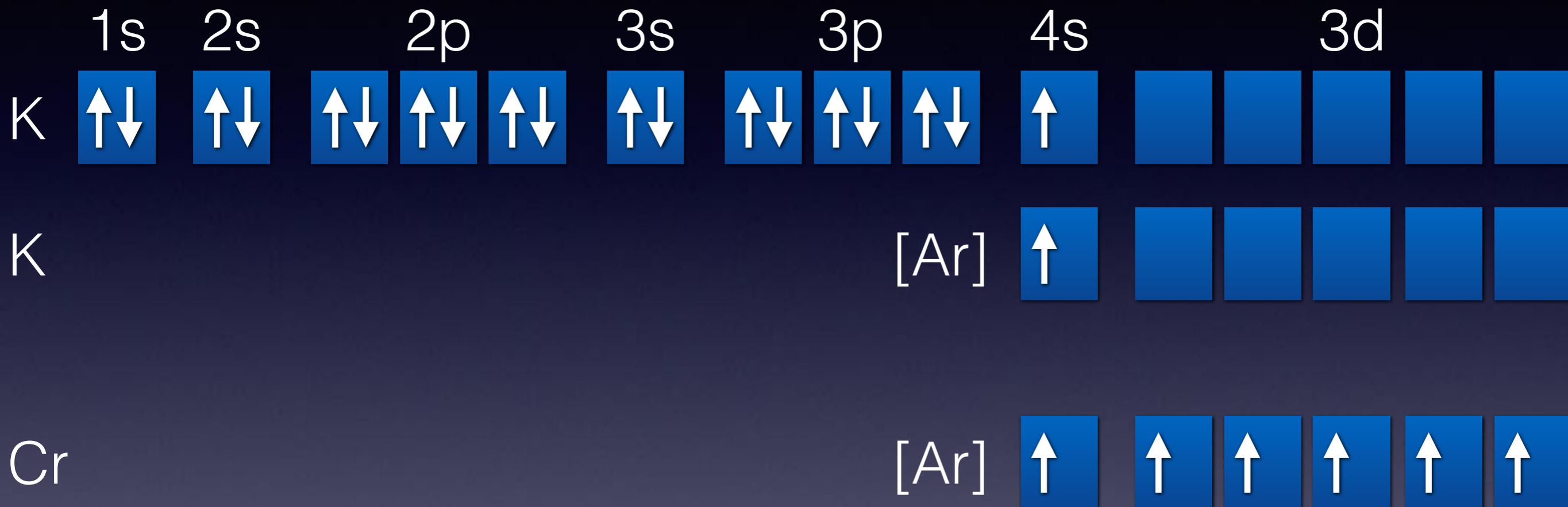


How does chromium fill?

Hint:



Practice with orbital filling



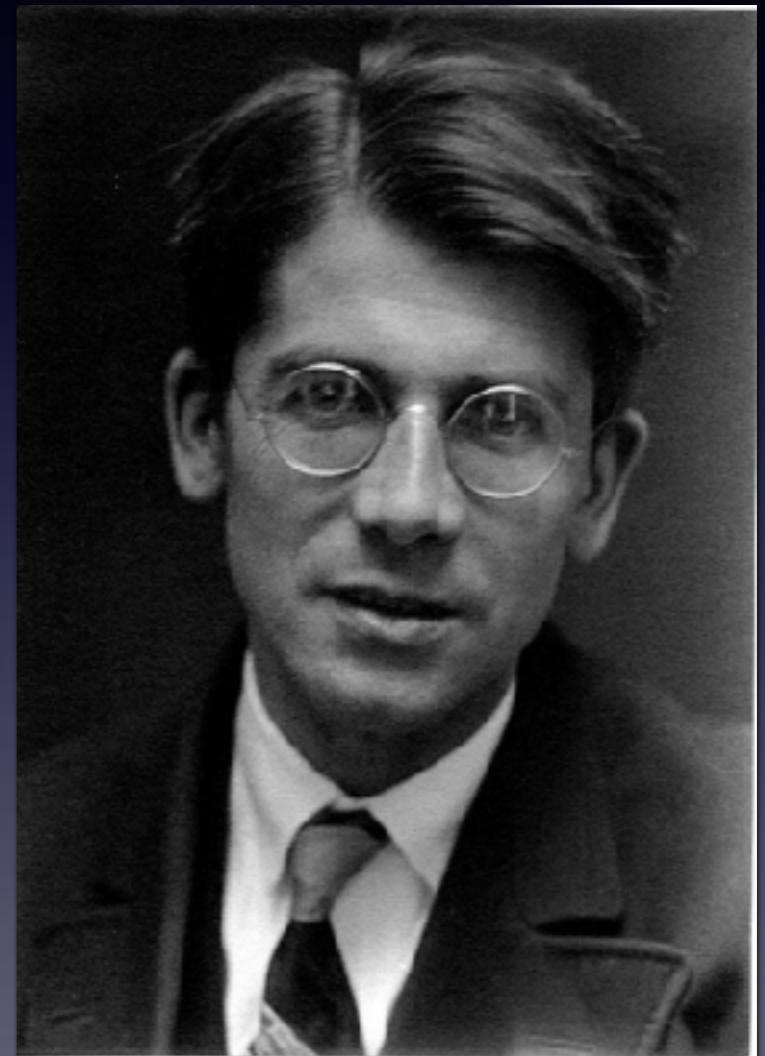
How does chromium fill?

Hint:



Practice with orbital filling

- *On your own:* what is the next atom to demonstrate an exception to the “normal” electron filling of orbitals?
- What you are responsible for that I’m not going to teach:
 - Electron configuration of ions
Hint: transition metals are funky!



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Blocks in the periodic table

1	H Hydrogen 1.008	Atomic Number Symbol Name Atomic Mass																	2	He Helium 4.003															
3	Li Lithium 6.941	4	Be Beryllium 9.012	5	B Boron 10.811	6	C Carbon 12.011	7	N Nitrogen 14.007	8	O Oxygen 15.999	9	F Fluorine 18.998	10	Ne Neon 20.180																				
11	Na Sodium 22.990	12	Mg Magnesium 24.305	13	Al Aluminum 26.982	14	Si Silicon 28.090	15	P Phosphorus 30.974	16	S Sulfur 32.066	17	Cl Chlorine 35.453	18	Ar Argon 39.948																				
19	K Potassium 39.098	20	Ca Calcium 40.078	21	Sc Scandium 44.956	22	Ti Titanium 47.88	23	V Vanadium 50.942	24	Cr Chromium 51.986	25	Mn Manganese 54.938	26	Fe Iron 55.933	27	Co Cobalt 58.933	28	Ni Nickel 58.693	29	Cu Copper 63.546	30	Zn Zinc 65.39	31	Ga Gallium 69.732	32	Ge Germanium 72.61	33	As Arsenic 74.922	34	Se Selenium 78.09	35	Br Bromine 79.904	36	Kr Krypton 84.80
37	Rb Rubidium 84.468	38	Sr Strontium 87.62	39	Y Yttrium 88.906	40	Zr Zirconium 91.224	41	Nb Nobium 92.906	42	Mo Molybdenum 95.94	43	Tc Technetium 98.907	44	Ru Ruthenium 101.07	45	Rh Rhodium 102.908	46	Pd Palladium 106.42	47	Ag Silver 107.898	48	Cd Cadmium 112.411	49	In Indium 114.818	50	Sn Tin 118.71	51	Sb Antimony 121.780	52	Te Tellurium 127.6	53	I Iodine 126.904	54	Xe Xenon 131.29
55	Cs Cesium 132.905	56	Ba Barium 137.327	57-71	Hf Hafnium 178.49	72	Ta Tantalum 180.948	73	W Tungsten 183.85	74	Re Rhenium 186.207	75	Os Osmium 190.23	76	Ir Iridium 192.22	77	Pt Platinum 195.08	78	Au Gold 196.967	79	Hg Mercury 200.59	80	Tl Thallium 204.383	81	Pb Lead 207.2	82	Bi Bismuth 208.980	83	Po Polonium [208.982]	84	At Astatine 209.987	85	Rn Radiane 222.018		
87	Fr Francium 223.020	88	Ra Radium 226.025	89-103	104 Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [263]	107 Bh Bohrium [264]	108 Hs Hassium [265]	109 Mt Moltneium [266]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [273]	113 Uut Ununbium unknown	114 Fl Flerovium [289]	115 Uup Ununpentium unknown	116 Lv Livermorium [298]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown	10	Lu Lutetium 174.957														
88	Bg Bogusium 88	89-103	104 Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [263]	107 Bh Bohrium [264]	108 Hs Hassium [265]	109 Mt Moltneium [266]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [273]	113 Uut Ununbium unknown	114 Fl Flerovium [289]	115 Uup Ununpentium unknown	116 Lv Livermorium [298]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown	10	Lu Lutetium 174.957																
1	El Einsteinium 200.525	2	Bg Bogusium 88	3	La Lanthanum 138.906	4	Ce Cerium 140.115	5	Pr Praseodymium 140.908	6	Nd Neodymium 144.24	7	Pm Promethium 144.913	8	Sm Samarium 150.936	9	Eu Europium 151.988	10	Gd Gadolinium 157.25	11	Tb Terbium 158.925	12	Dy Dysprosium 162.50	13	Ho Holmium 164.930	14	Er Erbium 187.28	15	Tm Thulium 169.904	16	Yb Ytterbium 173.04	17	Lu Lutetium 174.957		
29	Cs Cesium 132.905	30	Bg Bogusium 88	31-41	42 Ac Actinium 227.028	43	Th Thorium 232.038	44	Pa Protactinium 231.036	45	U Uranium 238.029	46	Np Neptunium 237.048	47	Pu Plutonium 244.064	48	Am Americium 243.051	49	Cm Curium 247.070	50	Bk Berkelium 247.070	51	Cf Californium 251.080	52	Es Einsteinium [254]	53	Fm Fermium 257.085	54	Md Mendelevium 258.1	55	No Nobelium 259.101	56	Lr Lawrencium [262]		
88	Fr Francium 223.020	89	Ac Actinium 227.028	90	Th Thorium 232.038	91	Pa Protactinium 231.036	92	U Uranium 238.029	93	Np Neptunium 237.048	94	Pu Plutonium 244.064	95	Am Americium 243.051	96	Cm Curium 247.070	97	Bk Berkelium 247.070	98	Cf Californium 251.080	99	Es Einsteinium [254]	100	Fm Fermium 257.085	101	Md Mendelevium 258.1	102	No Nobelium 259.101	103	Lr Lawrencium [262]				
1	El Einsteinium 200.525	2	Bg Bogusium 88	3	La Lanthanum 138.906	4	Ce Cerium 140.115	5	Pr Praseodymium 140.908	6	Nd Neodymium 144.24	7	Pm Promethium 144.913	8	Sm Samarium 150.936	9	Eu Europium 151.988	10	Gd Gadolinium 157.25	11	Tb Terbium 158.925	12	Dy Dysprosium 162.50	13	Ho Holmium 164.930	14	Er Erbium 187.28	15	Tm Thulium 169.904	16	Yb Ytterbium 173.04	17	Lu Lutetium 174.957		
28	Fr Francium 223.020	29	Ac Actinium 227.028	30	Th Thorium 232.038	31	Pa Protactinium 231.036	32	U Uranium 238.029	33	Np Neptunium 237.048	34	Pu Plutonium 244.064	35	Am Americium 243.051	36	Cm Curium 247.070	37	Bk Berkelium 247.070	38	Cf Californium 251.080	39	Es Einsteinium [254]	40	Fm Fermium 257.085	41	Md Mendelevium 258.1	42	No Nobelium 259.101	43	Lr Lawrencium [262]				

Blocks in the periodic table



- Given an element, can you give its e⁻ config? (will only ask through Ba)
 - Do you understand the exceptions?

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Where did we go today?

Ch1010-A17-A03 Lecture 8

- §3.5: Relating filling to periodic table

Next time...

- §3.10: Periodic trends in atomic size
- §3.11 Ionization energy
- §3.12 Electron Affinity
- §4.4 Electronegativity