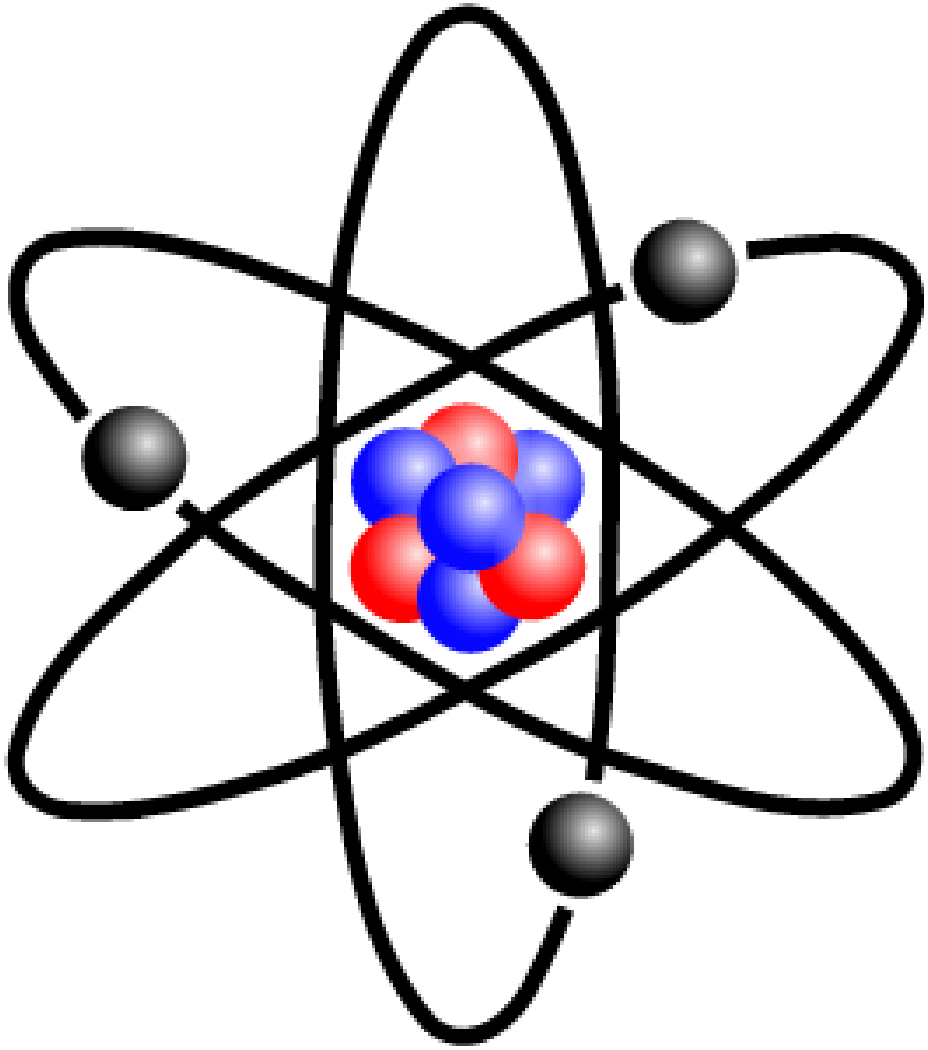
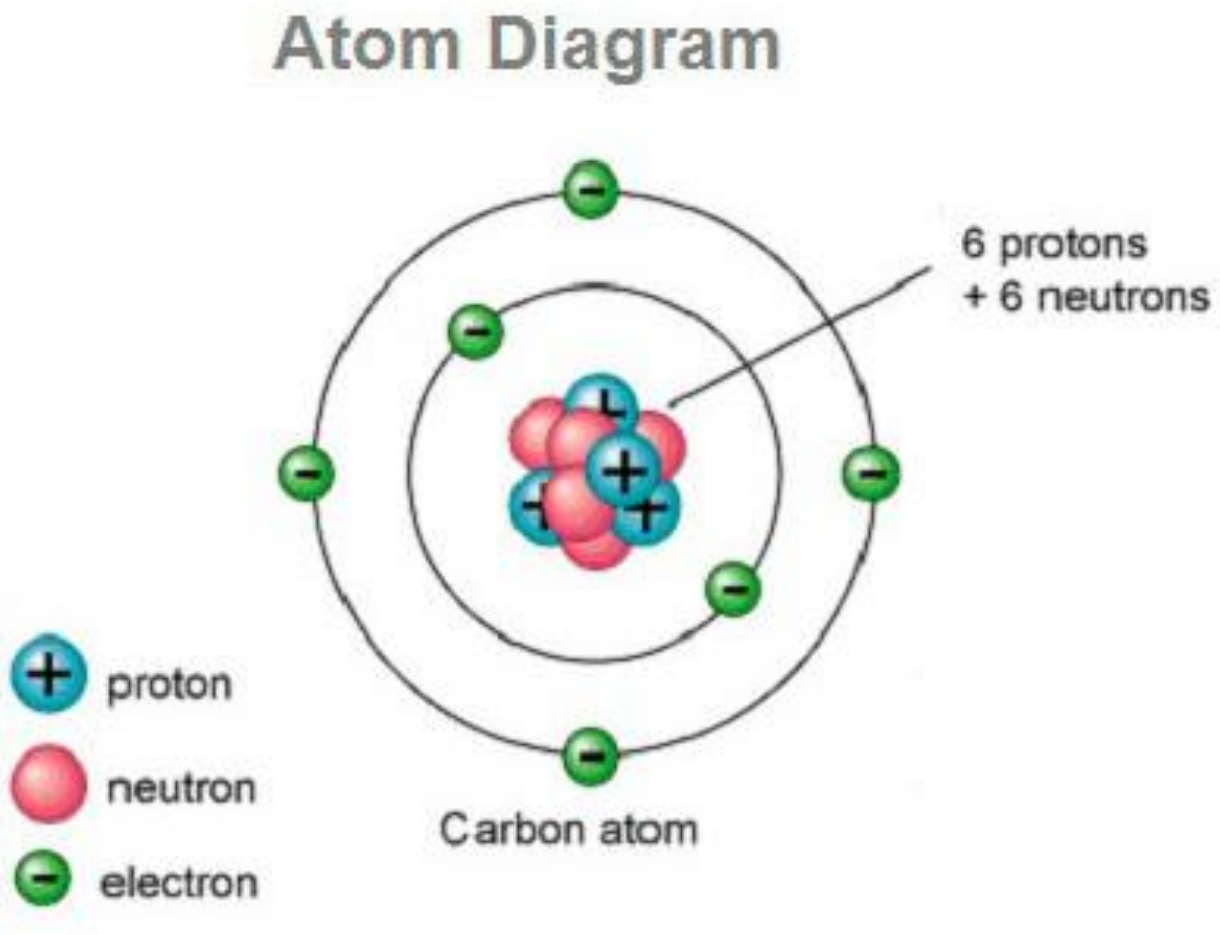
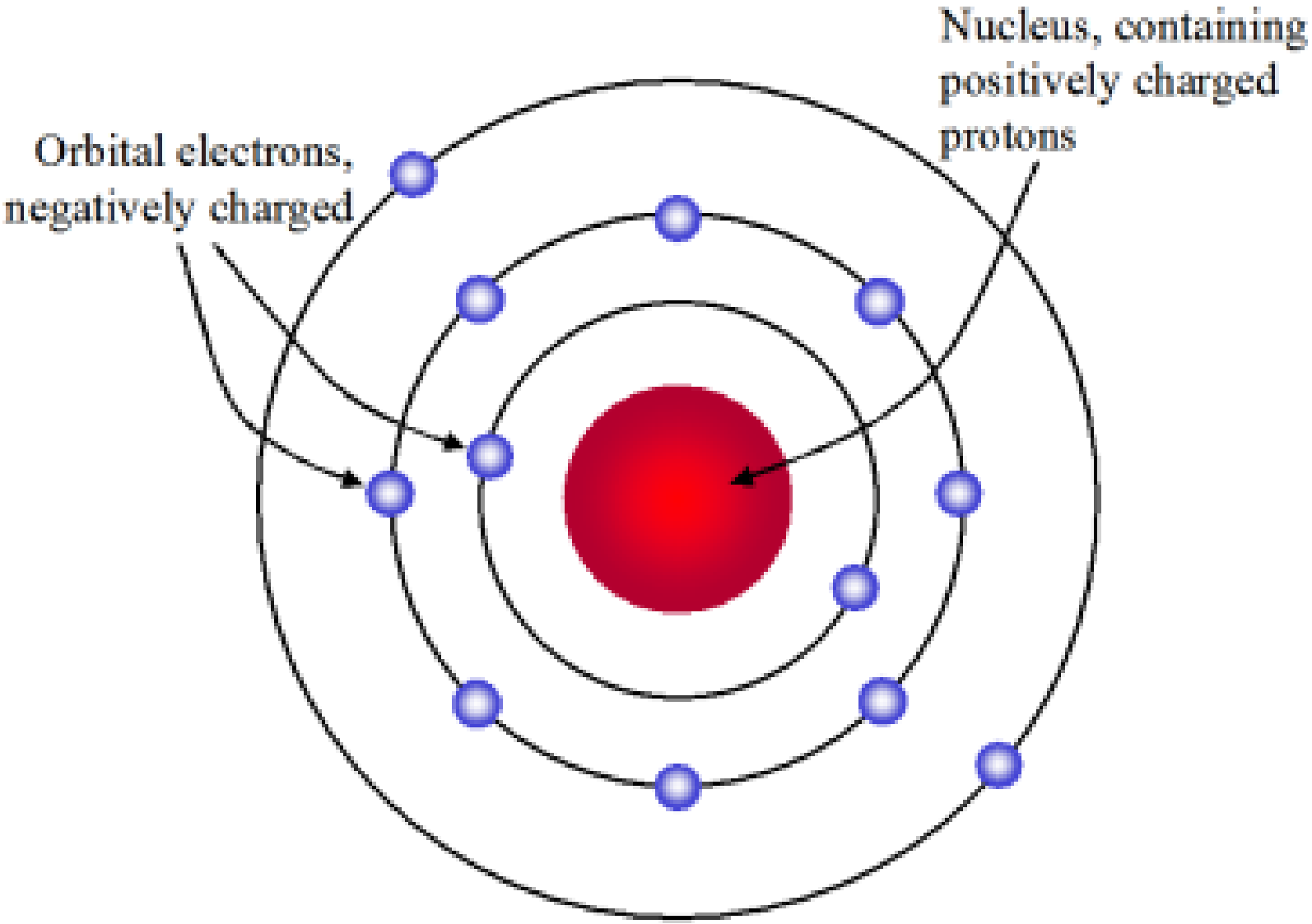
# Electron Orbitals and Electron Configuration

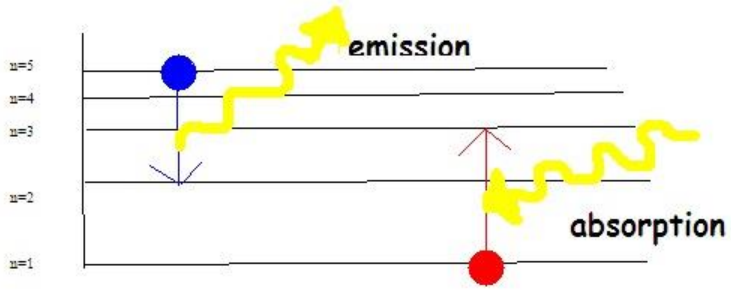
# Rutherford Model



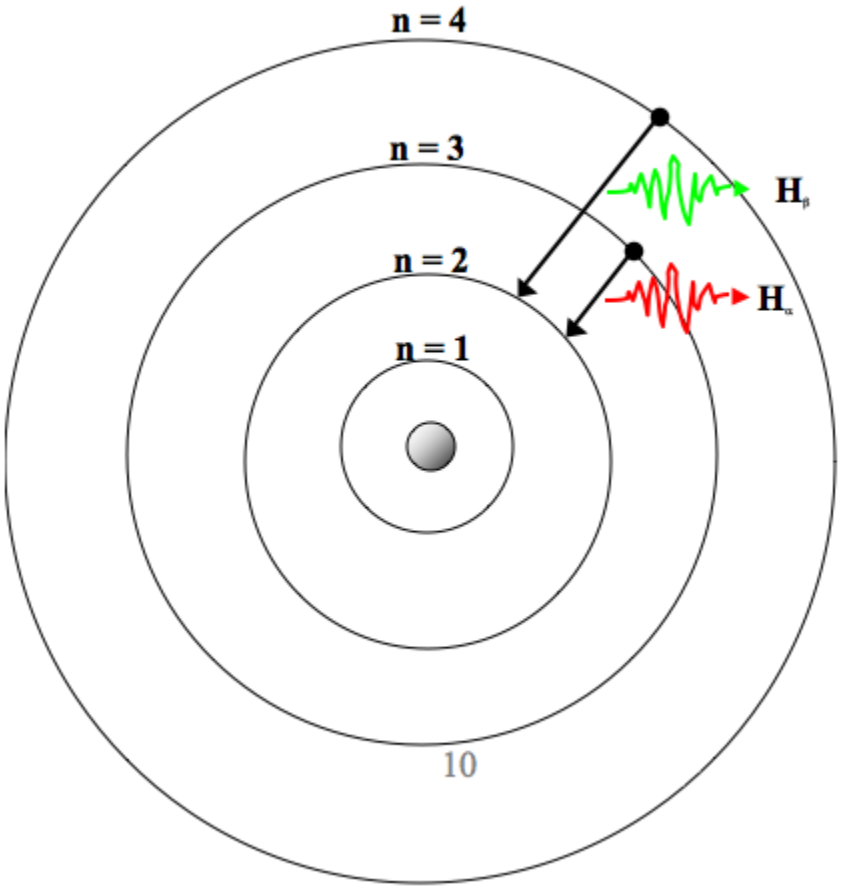
# Bohr Model


Atom Diagram
6 protons
+ 6 neutrons
proton
neutron
electron
Carbon atom


Nucleus, containing positively charged protons
Orbital electrons, negatively charged

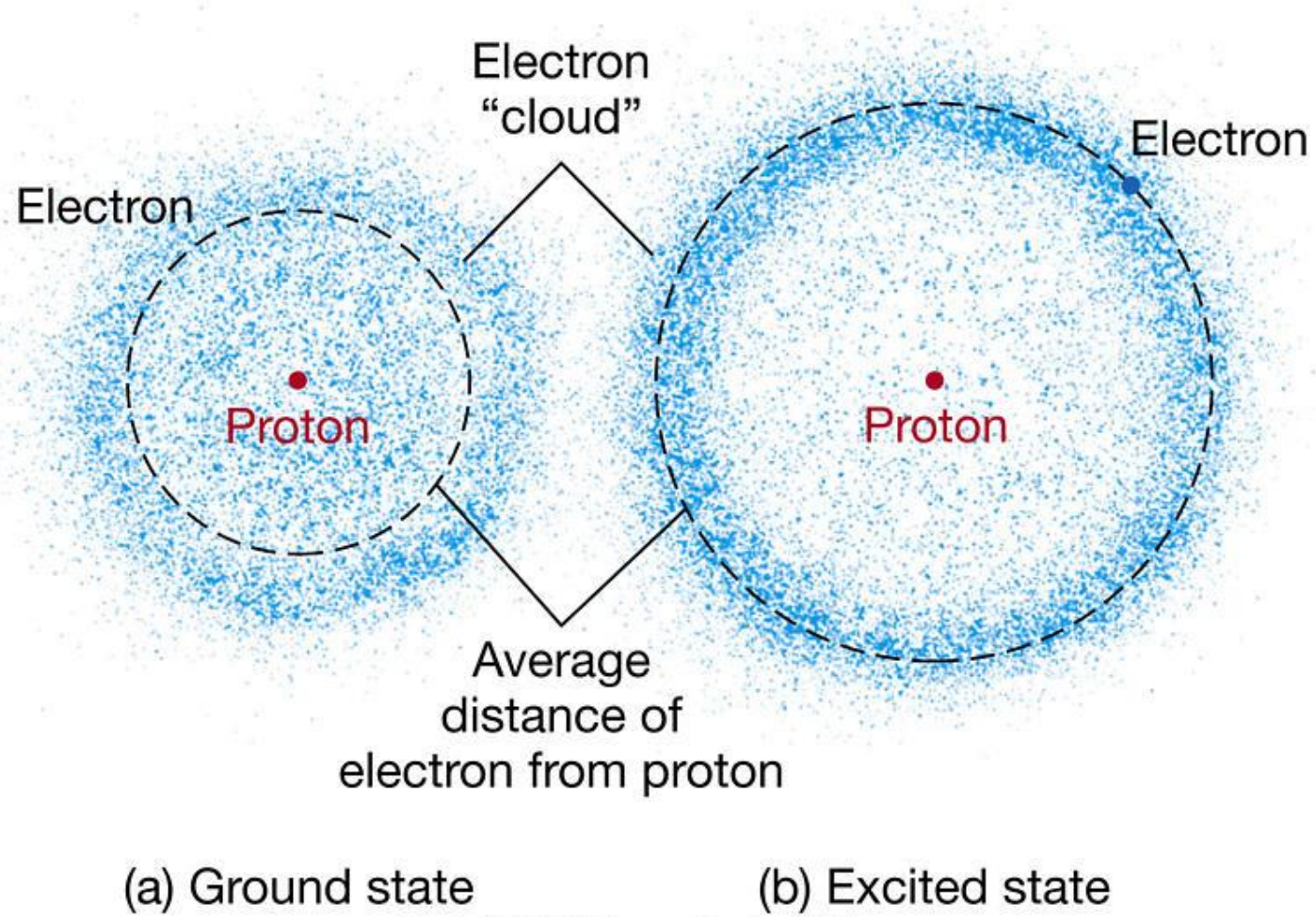



Absorption and emission of photons as a result of energy level change of electrons

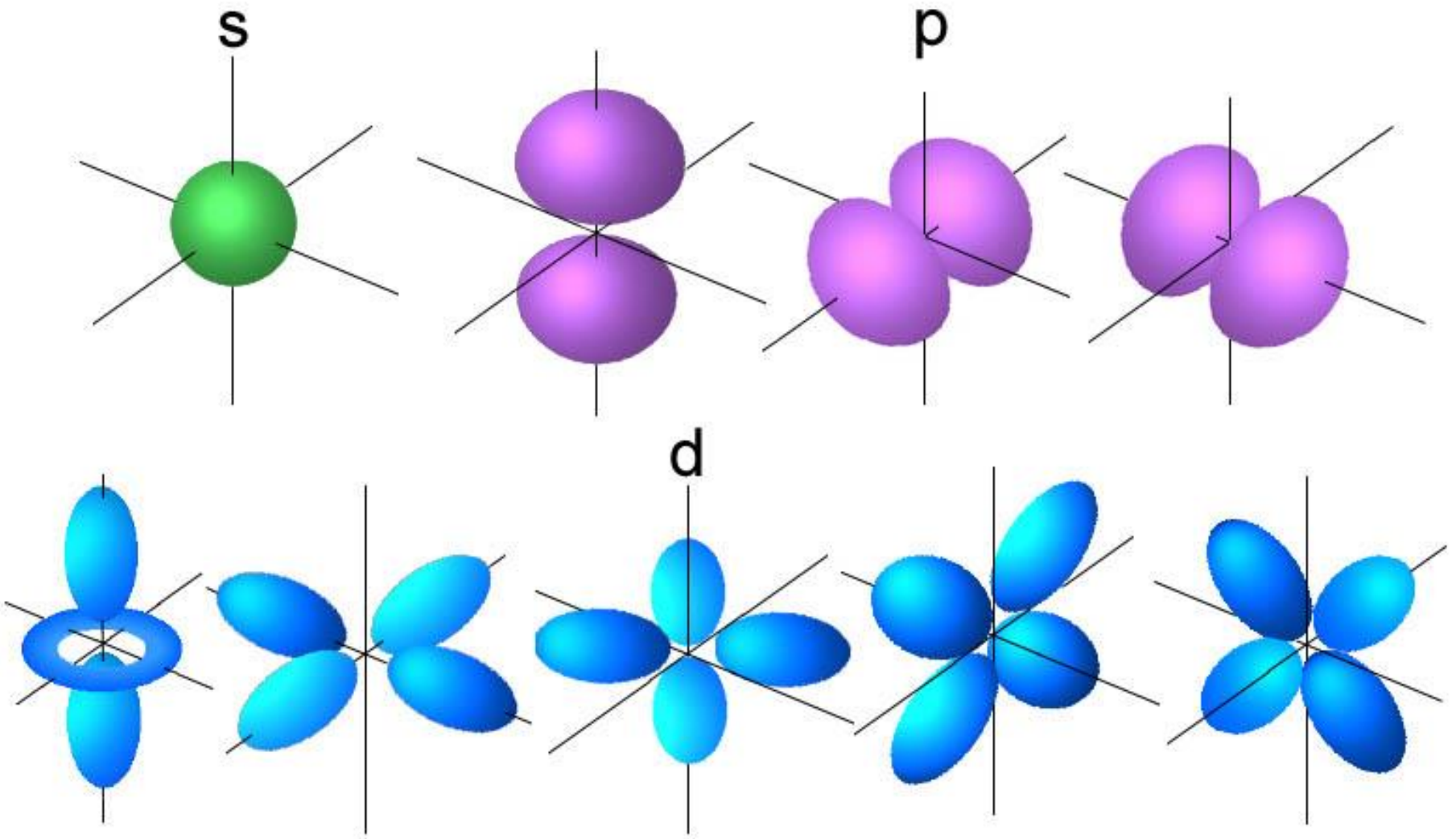


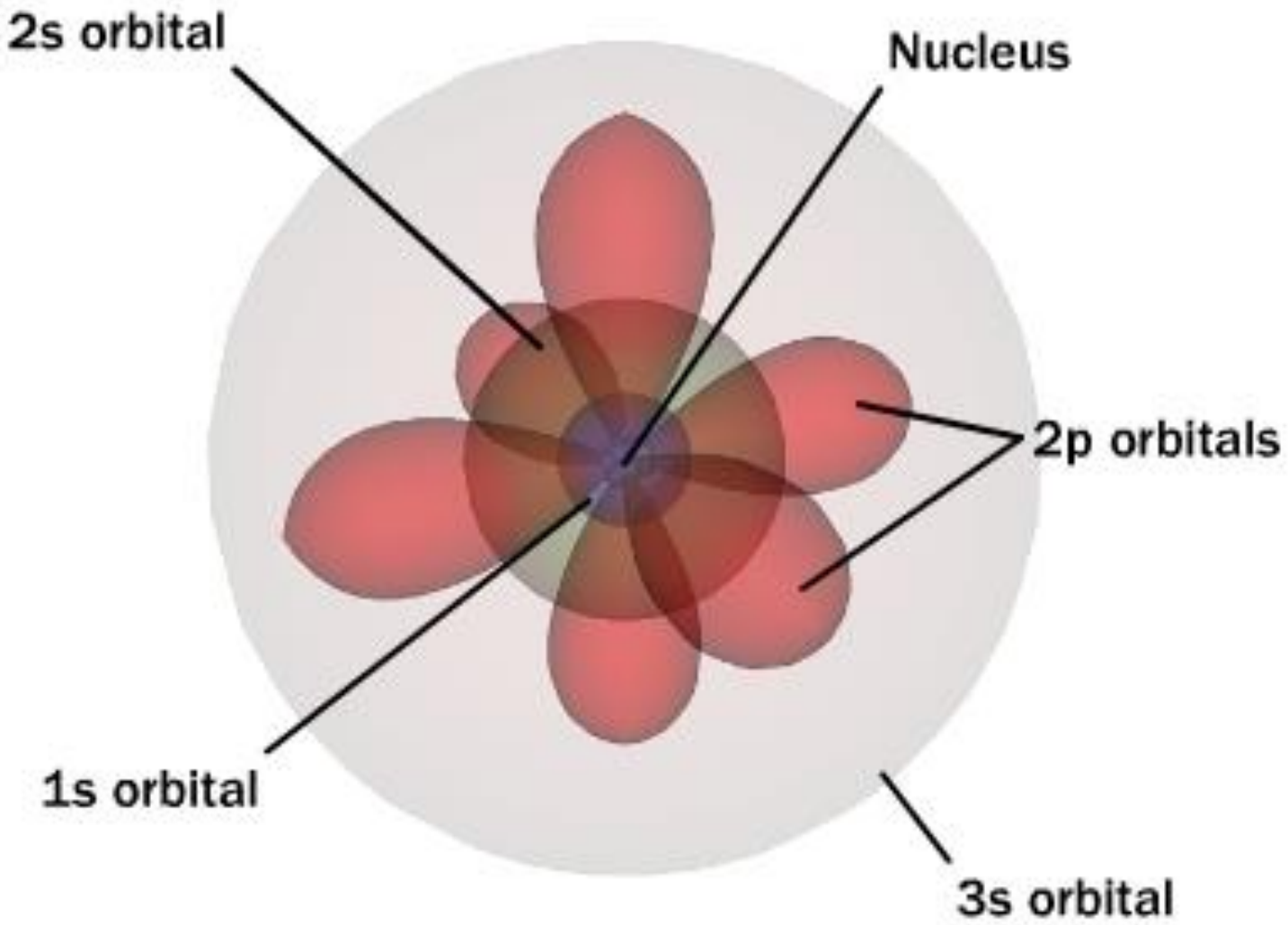

$$E_{n'} - E_{n''} = h\nu$$

Electrons inhabit probability distributions.
Heisenberg Uncertainty Principle – You can know location or direction/speed, but not both.

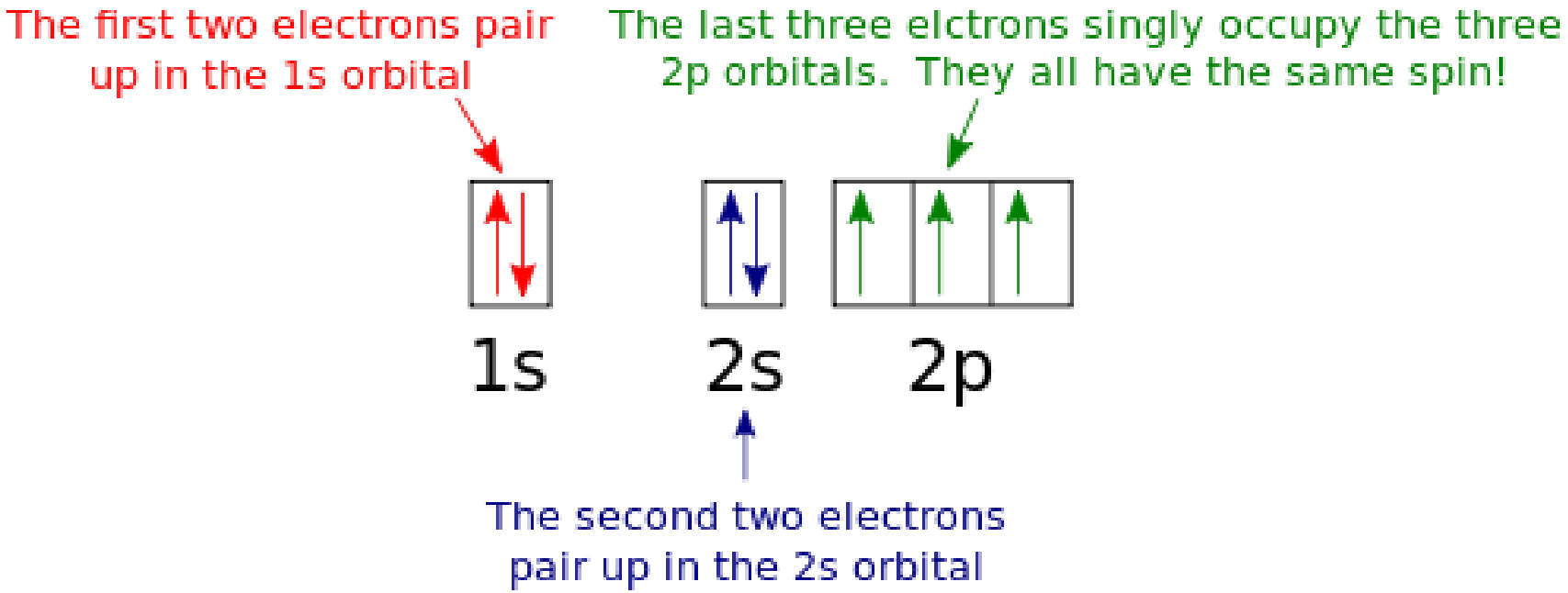


# Orbitals

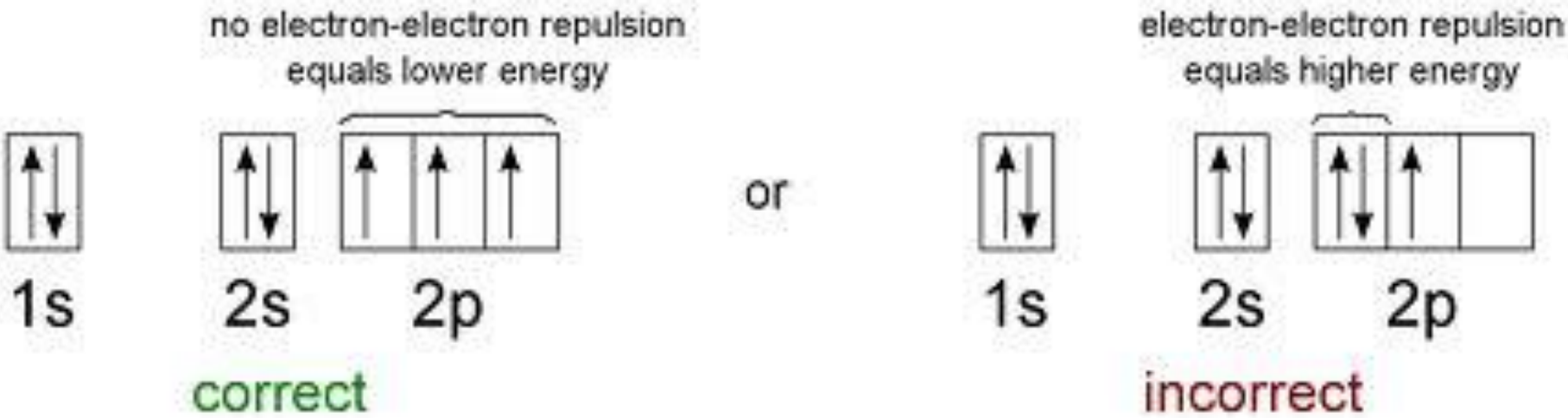



2s orbital
Nucleus
2p orbitals
1s orbital
3s orbital
©2001 How Stuff Works

# Electron Orbital Diagrams

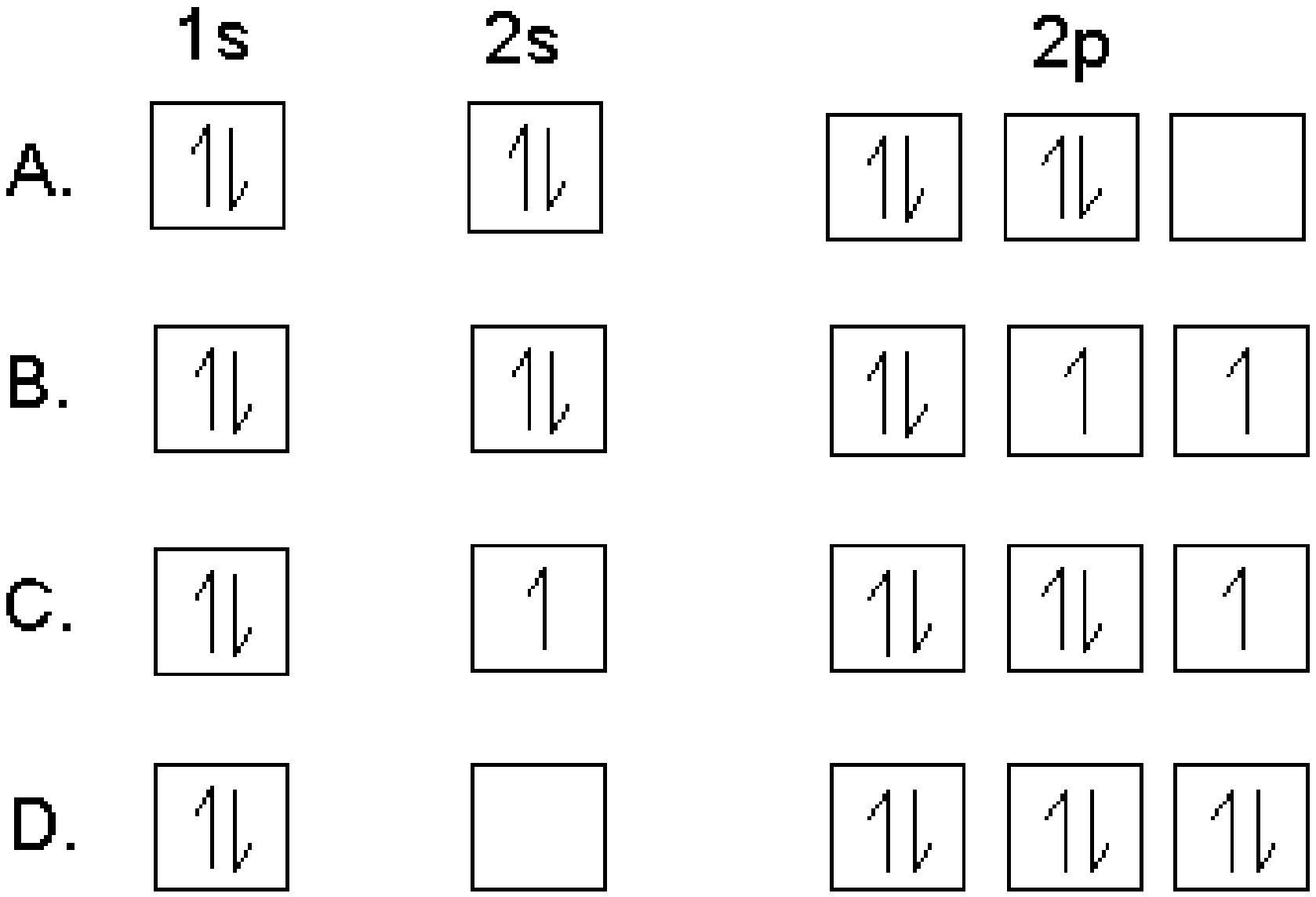


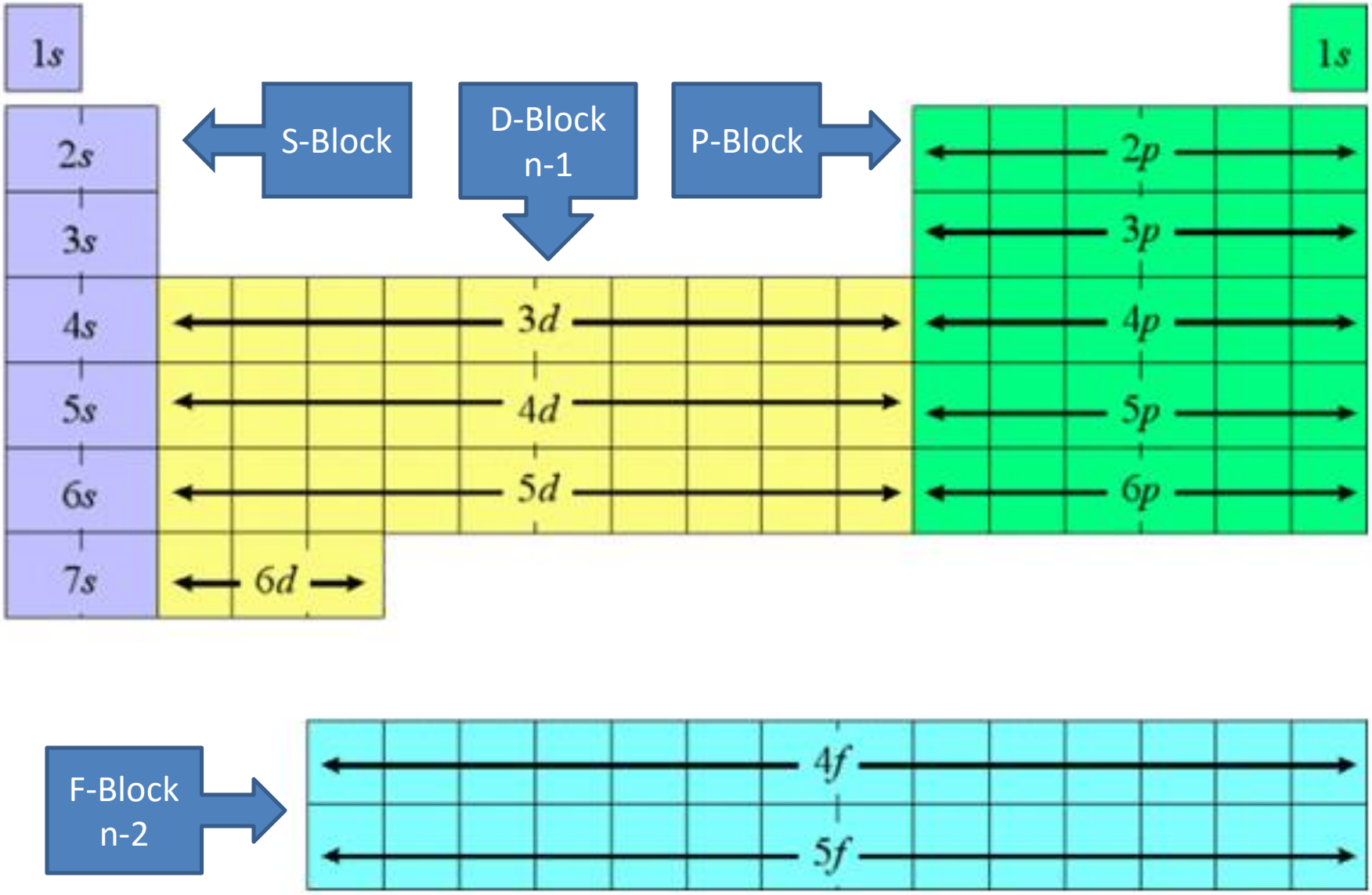
Hund's Rule – Electrons will occupy orbitals of equal energy one at a time with the same spin until each orbital is occupied. Further electrons then have no choice but to pair up (with opposite spin).

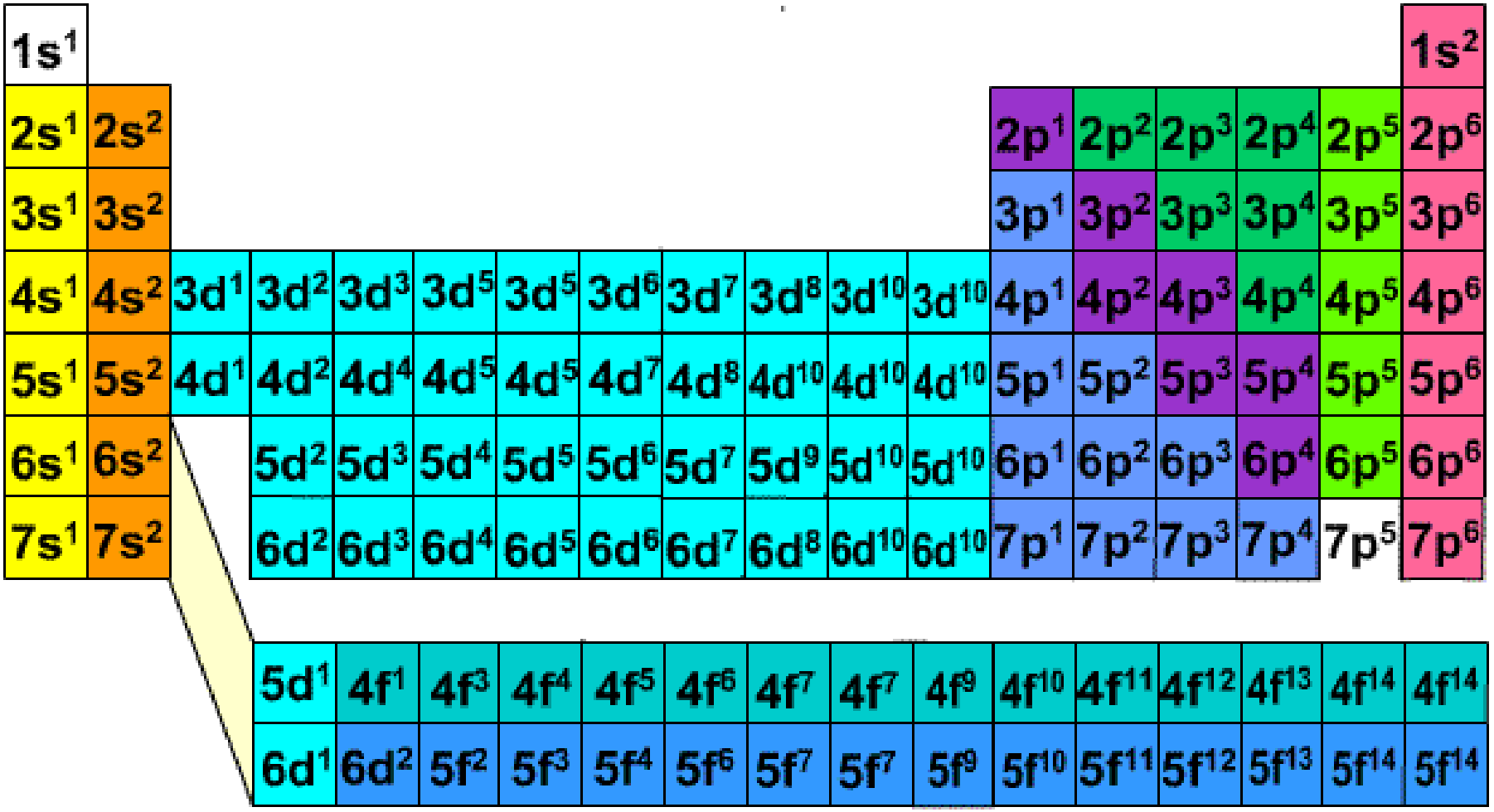



Pauli Exclusion Principle – Only electrons of opposite spin can inhabit the same orbital. This is due to the repulsion of electrons having the same spin (quantum state)

Which is the only valid orbital diagram and why?




1s
1s
S-Block
D-Block
n-1
P-Block
2s
3s
4s
5s
6s
7s
3d
4d
5d
6d
2p
3p
4p
5p
6p
F-Block
n-2
4f
5f


1s1
1s2
2s1 2s2
2p1 2p2 2p3 2p4 2p5 2p6
3s1 3s2
3p1 3p2 3p3 3p4 3p5 3p6
4s1 4s2 3d1 3d2 3d3 3d5 3d5 3d6 3d7 3d8 3d10 3d10 4p1 4p2 4p3 4p4 4p5 4p6
5s1 5s2 4d1 4d2 4d4 4d5 4d5 4d7 4d8 4d10 4d10 4d10 5p1 5p2 5p3 5p4 5p5 5p6
6s1 6s2 5d2 5d3 5d4 5d5 5d6 5d7 5d9 5d10 5d10 6p1 6p2 6p3 6p4 6p5 6p6
7s1 7s2 6d2 6d3 6d4 6d5 6d6 6d7 6d8 6d10 6d10 7p1 7p2 7p3 7p4 7p5 7p6
5d1 4f1 4f3 4f4 4f5 4f6 4f7 4f7 4f9 4f10 4f11 4f12 4f13 4f14 4f14
6d1 6d2 5f2 5f3 5f4 5f6 5f7 5f7 5f9 5f10 5f11 5f12 5f13 5f14 5f14