

5.111 Principles of Chemical Science: Week 3

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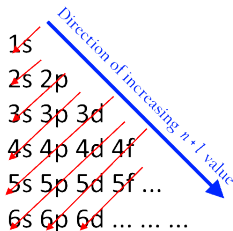
Progress Update

Over the past week I have:

- 1 Completed lectures 7 and 8.
- 2 Completed exam 1.

The Aufbau principle

In multi electron atoms, electrons fill like a diagonal ladder along the list of orbitals:



Notice that the purpose of this is to fill each $n + l$ level (each red line) before moving on to the next diagonal.

Electron configuration

To write an electron configuration, one first abides by the Aufbau principle; then, find the highest instance of where $n - l = 1$ in the long configuration, and insert a corresponding noble gas; consider **Problem:** Provide the ground state electron configuration expected for Ca.

Solution: Ca has $z = 20$, so we see by the Aufbau principle that 2 electrons go into the 1s, 2 into the 2s, 6 into the 2p, 2 into the 3s, 6 into the 3p, 2 into the 4s, and no electrons are left.

Problem: 43. What is the electron configuration of the Al^{3+} ion?

- ① (A) $1s^2 2s^2 2p^6$
- ② (B) $1s^2 2s^2 2p^6 3s^2 3p^1$
- ③ (C) $1s^2 2s^2 2p^6 3s^2 3p^4$
- ④ (D) $1s^2 2s^2 2p^6 3s^2 3p^6$

Solution: