

Pauli Exclusion Principle

Let's start building more complicated atoms to study the Periodic Table.
For atoms with many electrons (e.g., carbon: 6, iron: 26, etc.) ...
What energies do the electrons have?

“Pauli Exclusion Principle” (1925)

No two electrons can be in the same quantum state.

For example, in a given atom they cannot have the same set of quantum numbers n, l, m_l, m_s .

This means that each atomic orbital (n, l, m_l) can hold 2 electrons: $m_s = \pm 1/2$.

Important consequence:

- Electrons do not pile up in the lowest energy state.
It's more like filling a bucket with water.
- They are distributed among the energy levels according to the Exclusion Principle.
- Particles that obey this principle are called “fermions”.
Protons and neutrons are also fermions, but photons are not.