Modern Physics

Multi-electron atoms

Problem 1.- Write down the electronic configuration of the aluminum atom. Use the *nl* format.

Solution: aluminum: $1s^2 2s^2 2p^6 3s^2 3p^1$

Problem 2.- Explain why the third electron of lithium in the ground state occupies the 2s state and not the 2p state.

Solution: The 2s and 2p states are degenerate in the case of the hydrogen atom, but in lithium the first two electrons shield the charge of the nucleus, so the 2s state has less energy than the 2p state.

Problem 3.- What electronic configuration would you expect for the first excited state of helium and neon? Give your answer using the *nl* notation.

Solution: helium in the ground state has the configuration $1s^2$, in the first excited state we expect one electron to be promoted to the 2s state (not the 2p which has more energy), so it will have the configuration: $1s^1 2s^1$.

Neon in the ground state has the configuration $1s^2 2s^2 2p^6$, in the first excited state we expect one electron to be promoted from the 2p state (which are the electrons with highest energy) to the 3s state (not the 3p which has more energy, neither 3d for same reason), so it will have the configuration: $1s^2 2s^2 2p^5 3s^1$.