Electron Configuration

1. Write the electron configuration for the following neutral atoms.

Nitrogen  \[ 1s^2 \, 2s^2 \, 2p^3 \]
Oxygen  \[ 1s^2 \, 2s^2 \, 2p^4 \]
Arsenic  \[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 4s^2 \, 3d^{10} \, 4p^3 \]
Krypton  \[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 4s^2 \, 3d^{10} \, 4p^6 \]
Bromine  \[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 4s^2 \, 3d^{10} \, 4p^5 \]
Copper  \[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 4s^1 \, 3d^{10} \]

2. Write the electron configuration for the following neutral atoms: helium, neon, argon and krypton. What is the similarity in the configurations for these elements?

He  \[ 1s^2 \]
Ne  \[ 1s^2 \, 2s^2 \, 2p^6 \]
Ar  \[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \]
Kr  \[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 4s^2 \, 3d^{10} \, 4p^6 \]

Similarity: all have a filled outermost orbital.

3. For each of the following electron configurations of neutral atoms, determine the name of the element listed and determine if the configuration as written is in the ground state or the excited state.

\[ 1s^2 \, 2s^2 \, 2p^6 \]  ground
\[ 1s^2 \, 2s^2 \, 2p^5 \, 3s^2 \]  excited
\[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 4s^2 \, 3d^3 \]  ground
\[ 1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 5s^1 \]  excited
4. For each of the following electron configurations of neutral atoms, determine if the configurations as written is the ground state, the excited state, or if it is an impossible configuration:

- N \(1s^2 2s^2 2p^3\) ground
- Na \(1s^2 2s^2 2p^6 4s^2\) impossible
- Ne \(1s^2 2s^3 2p^5\) impossible
- V \(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2 4p^1\) excited

5. Predict the outermost orbital filled for: (based on the table above)
   e.g. K \(4s^1\)
   - Ba \(6s^2\)
   - Br \(4s^2 3d^{10} 4p^5\)
   - S \(3s^2 3p^4\)

6. Identify the elements whose atoms have the following electron configurations.
   a) \(1s^2 2s^2\) Be
   b) \(1s^2 2s^2 2p^5\) F
   c) \(1s^2 2s^2 2p^6 3s^1\) Na
   d) \(1s^2 2s^2 2p^6 3s^2 3p^4\) S

7. Without writing out the electron configuration for the following neutral atoms, use their position in the periodic table to determine how many electrons they have in their outermost orbitals.
   e.g. Ni \(3d^8\)
   - Sc \(3d^1\)
   - Si \(3p^2\)
   - Rb \(5s^1\)
   - Fr \(7s^1\)