ELECTRONIC STRUCTURES OF IONS

You will need a copy of the Periodic Table for these questions.

1. Write down the electronic structures of the following ions, showing all the orbitals separately. For example, Ca^{2+} would be given as $1s^2\ 2s^2\ 2p_x^2\ 2p_y^2\ 2p_z^2\ 3s^2\ 3p_x^2\ 3p_y^2\ 3p_z^2$.

   a) Li^+
   b) Cl^-
   c) Al^{3+}
   d) S^{2-}
   e) Na^+
   f) Mg^{2+}
   g) F^-
   h) K^+
   i) O^{2-}
   j) N^{3-}

2. Write down the electronic structures of the following d block elements. To save time, you can use the notation [Ar] to represent the electronic structure of argon, so that Fe^{2+} would be [Ar] $3d^6$.

   a) Cr^{3+}
   b) Co^{2+}
   c) Fe^{3+}
   d) Ni^{2+}
   e) Cu^{2+}

3. Write down the outer electronic structures of the following ions. In each case, you need only show the electrons in the s and p orbitals in the outermost energy level. For example, Cs^+ would be $5s^2\ 5p_x^2\ 5p_y^2\ 5p_z^2$. Caesium atoms have the outer structure $6s^1$. If you remove the 6s electron in making the ion, the outer electrons are now in the 5s and 5p levels.

   a) Rb^+ (Rb atomic number: 37)
   b) Pb^{2+} (Pb atomic number: 82)
   c) I^- (I atomic number: 53)
   d) Sr^{2+} (Sr atomic number: 38)
   e) Sn^{4+} (Sn atomic number: 50)

4. The following structures may be atoms or ions. Write the symbol for the atom or ion. If it is an ion, don't forget to write the correct charge.

   a) Atomic number: 54; electronic structure: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p_x^2\ 5p_y^2\ 5p_z^2$
   b) Atomic number: 52; electronic structure: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p_x^2\ 5p_y^2\ 5p_z^2$
   c) Atomic number: 50; electronic structure: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2$