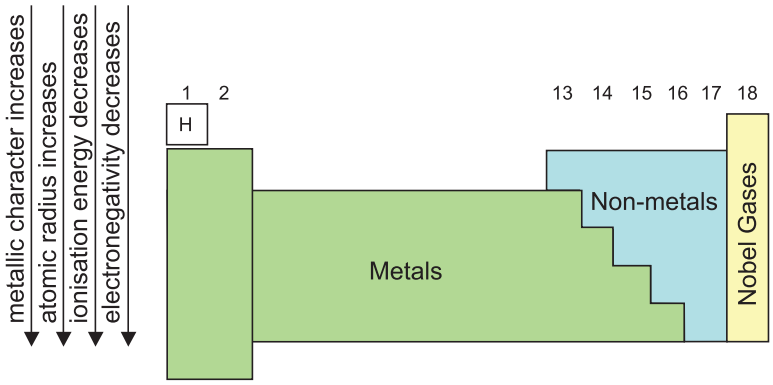
Problem solving and Calculations

SET 11: Periodic Trends-Answers

1. As you go down a group in the periodic table the following trends are observed:



The metallic character increases.

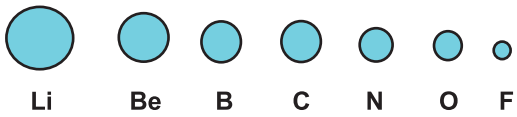
They have the same number of electrons.

The first ionisation energy decreases.

The electronegativity decreases.

The atomic radius increases.

2. a)

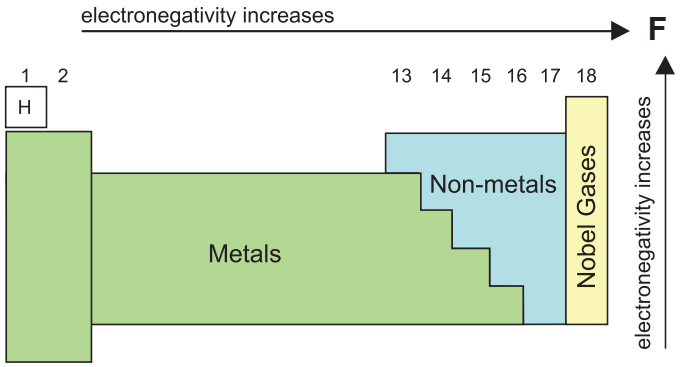


This diagram tells us that as you move across the period from left to right, the atomic radii gets smaller despite the fact that there is an increase in the number of electrons present. This is due to the increase in the positive charge of the nucleus attracting the electrons more closely.

b)

As sodium loses an electron, the size of its ion is much smaller in diameter; the reverse is true for chlorine. The reason for this change is that as sodium loses the electron it also loses the only electron in the third energy level hence the size of the ion is smaller than the atom. The chlorine on the other hand as it gains the electron completes its third energy level and the size of its ion as a consequence is larger.

3.



a) The electronegativity increases as you move to the right across a period of the table since the number of protons in the nucleus is increasing and the electrons are attracted more closely.
b) Only fluorine is shown on the table as it is the most electronegative element on the table.

4. It could possibly be placed in group 2. It would tend to lose two electrons to form ions. As it has two valence electrons it is most likely a metallic element and would form ionic compounds. As it is a metal it would have metal properties eg:
   - Dense solid
   - High melting point
   - Conduct electricity and heat
   - Malleable & ductile.

5. Bonding changes as you move across the periodic table from metallic to covalent network to covalent molecular. Relating this to valence electrons;
   - 1-3 electrons Metallic
   - 3-4 electrons Covalent network
   - 5-7 electrons Covalent molecular