Trends in electronegativity and electron affinity

1) Define electronegativity.

2) State and explain the trend in electronegativity across a period.

3) State and explain the trend in electronegativity down a group.

4) Define first electron affinity.

5) State and explain the trend in electron affinity down a group.

6) Explain why the second electron affinity of oxygen is endothermic.

Answers

1) Electronegativity is a measure of the attraction of an atom for a bonding pair of electrons. Electronegativity is measured on the Pauling scale, which assigns fluorine the highest value and francium the lowest.

2) Electronegativity increases across a period (from left to right) because of increasing nuclear charge which results in an increased electrostatic attraction between the nucleus and bonding electrons.

3) Electronegativity decreases down a group because the bonding electrons are further from the nucleus (decreased electrostatic attraction).

4) The first electron affinity is the energy released when one mole of electrons is added to one mole of gaseous atoms to form one mole of 1^- ions.

$$X_{(g)} + e^- \rightarrow X^-_{(g)}$$

5) The greater the distance between the nucleus and the outer energy level, the weaker the electrostatic attraction and the less energy is released when an electron is added to the atom. The second factor is increased electron shielding as the number of occupied energy levels increases.

6) The second electron affinity of oxygen is positive (endothermic) because of the repulsion when an electron is added to a negative ion.