

Chemguide – answers

ELECTRONEGATIVITY

1. a) Electronegativity is a measure of the tendency of an atom to attract a bonding pair of electrons.
- b) In both cases, the bonding electrons are in the 2-level and screened from the nucleus by the 1s electrons. But fluorine has 9 protons in the nucleus whereas carbon only has 6. A bonding pair will experience more attraction from the fluorine's nucleus than from carbon's, and so the electronegativity of fluorine is greater.
- c) Chlorine's bonding electrons are in the 3-level and are shielded from the 17 protons in the nucleus by a total of 10 electrons in the 1- and 2-levels. The outer electrons therefore experience a net pull from the nucleus of 7+.

With fluorine, the bonding electrons are at the 2-level, and the 9 protons in the nucleus are shielded by the 2 electrons in the 1s orbital. Again, there is a net pull of 7+ from the nucleus.

However, the bonding electrons in the fluorine are closer to the nucleus, and so the attraction is greater. So fluorine is more electronegative than chlorine.

2. a) F-F (electronegativity difference = 0)
C-Br (electronegativity difference = 0.3)
C-Cl (electronegativity difference = 0.5)
N-H (electronegativity difference = 0.9)
C-O (electronegativity difference = 1.0)
H-F (electronegativity difference = 1.9)

- b)
- $\delta^+ \quad \delta^-$
C — O
- $\delta^+ \quad \delta^-$
C — Cl
- $\delta^+ \quad \delta^-$
C — Br
- $\delta^+ \quad \delta^-$
C — N
- C — C
- $\delta^- \quad \delta^+$
N — H
- $\delta^+ \quad \delta^-$
H — Br
- $\delta^- \quad \delta^+$
O — H