

Worksheet 1.4: Solutions

Periodic table trends

No.	Answer
1	$N(\text{Na}) = \frac{1 \times 10^{-2}}{186 \times 2 \times 10^{-12}} = 2.7 \times 10^7$
2	As atomic number increases, atomic radius decreases.
3	The increased core charge (due to the increased number of protons in the nucleus) draws the electrons in closer.
4	Yes. As the number of protons increases across period 2, the radii will decrease.
5	If the valence electrons are further from the nucleus, they will be more easily lost, so sodium (with the larger radius) is more reactive than magnesium.
6	Melting point generally increases and then decreases.
7	Magnesium ions carry a +2 charge, sodium ions only a +1 charge. The greater charge on the ions (and the larger number of delocalised electrons in magnesium) results in a stronger metallic bond, and hence a higher melting point.
8	Gas, since both its melting and boiling points are below 25°C (assuming atmospheric pressure).
9	The argon atoms must be very weakly attracted to one another.
10	The silicon atoms must be very strongly bonded together.
11	As the atomic number increases, electronegativity increases.
12	Electronegativity is a measure of the electron-attracting power of an atom when bonded to another atom. Argon does not react with other elements; that is, it does not form bonds with other atoms. Its electronegativity can therefore not be determined.
13	Silicon and sodium are in the same period. Silicon is a much smaller atom, with more protons in the nucleus, so it will attract electrons more effectively than sodium.
14	Fluorine (electron configuration 2, 7) is a smaller atom than chlorine (2, 8, 7), so it will be able to attract electrons more effectively (both atoms have the same core charge of +7). The force of attraction between the positively charged nucleus and an electron is inversely related to the distance between them.
15	As atoms become larger (yet the core charge remains the same), electronegativity will decrease due to the inverse relationship between the distance between the nucleus and the electron, and the attraction between them.