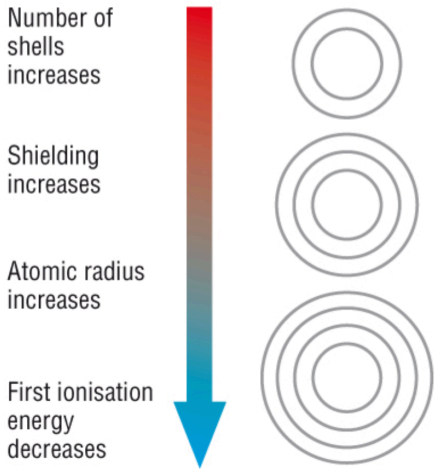
2nde int. Revision H/W

USE YOUR NOTES TO ANDWER THESE QUESTIONS

1)The reactivity of group 1 metals. Do they get more?less? reactive down a group?

Group 1 metals react by losing an electron to form a cation. $Na \rightarrow Na^+ + e^-$
The ionisation energy (energy required to remove an electron) decreases as we go down a group because the atomic radius increases and shielding from the positive nucleus by inner electrons increases.



Therefore group 1 metals get more reactive down a group.

2)The reactivity of halogens. Do they get more?less? reactive down a group?

Halogens react by gaining an electron to form an anion. $F + e^- \rightarrow F^-$
It is easier for a smaller atom to attract an electron because the pull of the positive nucleus is shielded by fewer shells of electrons than in a bigger atom. Therefore the halogens get less reactive down a group.

3)Use your answer to question 2 to explain whether the following reaction will happen and why:
$Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$

Using our answer to question 2, we see that chlorine has a stronger pull on the electrons than bromine because it is smaller. As such chlorine takes the electrons from the bromide ion, giving chloride ions and bromine.

4)What does first ionisation energy mean? How do we write a chemical equation to show the first ionisation energy of an element (remember to write the state symbols (s), (l), (g) or (aq) in your chemical equation)?

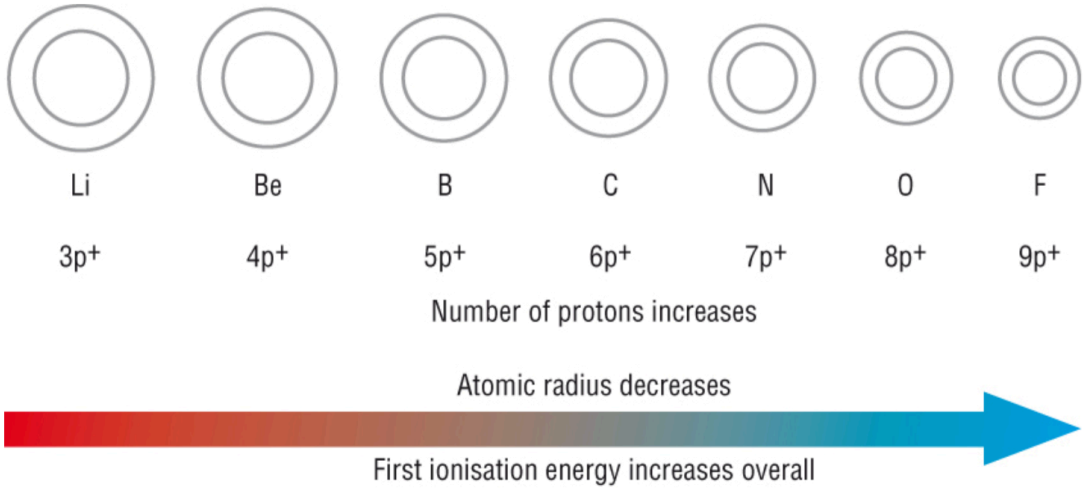
Word definition: The first ionisation energy is the energy required to remove one electron from each atom in 1 mole of gaseous atoms producing 1 mole of 1+

gaseous ions. for example, the 1st IE of lithium is: **Chemical equation** $Li(g) \rightarrow Li^{+}(g) + e^{-}$

5)How does **ionisation energy** change down a group and across a period (explain the trends in terms of *atomic radius* and *nuclear charge*)?

See question 1 for change down a group.

Ionisation energy increases across a group because the number of protons in the nucleus (nuclear charge) increases and the number of shells/shielding from inner electrons is the same The valence electrons are therefore held tighter.



6)Why is the ionic radius smaller than the atomic radius for an element that forms cations (+ve ions) such as group 1 elements or group 2 elements?

A cation has lost electrons and the charge is positive thus holding the remaining electrons tighter than in the atom. As such the radius of a cation is smaller than the atom.

7)Is the ionic radius for an anion (-ve ion) bigger than it's respective atomic radius? Why?

An anion has gained electrons. Since there are more electrons, there is increased electron-electron repulsion and the electrons are held less tightly. As such the ionic radius is bigger than the atomic radius.

8)What does group and period mean in the periodic table.

A group is a vertical row. Each element in a group has the same number of electrons in the outer shell and as such similar chemical properties. A period is a

horizontal row. The number of electrons in the atom increases by one from left to right across a period.

9)What is the formula for a compound formed between an element, X, from group 2 and an element, Y, from group 17?

XY, XY_2 or X_2Y

XY_2 because group 2 metals form X^{2+} ions and group 17 elements (halogens) form Y^- ions. As such 2 ions of Y^- are needed to balance the 2+ charge on one X^{2+} ion.

10)What is the formula for a compound formed between and element, X, from group 1 and an element, Y, from group 17? XY, XY_2 or X_2Y

XY because group 1 metals form X^+ ions and group 17 elements (halogens) form Y^- ions. As such 1 Y^- ion is needed to balance the 1+ charge on one X^+ ion.

11)How do group 1 metals react with water? Write a balanced equation to show this reaction (the product is alkali!)

Group 1 metals react violently with water to give an alkali solution.
Balanced chemical equation: $2K\ (s) + 2H_2O\ (l) \rightarrow 2KOH + H_2\ (g)$

12)A pH of 7 is neutral.
What is the pH of an alkali solution? Less than 7 or more than 7?
What is the pH of an acid solution? Less than 7 or more than 7?

13)Do metals have high or low melting points?

In general metals have high melting points.
However, the melting point increases across a period and decreases as we go down a group. As such the group 1 metals have low melting points for metals, especially those down the group such as rubidium and caesium.

14)Which molecular formula is also an empirical formula? H_2O or H_2O_2

H_2O

EXTRA TIPS FOR YOUR EXAM

-Know the difference between period and group
-Know the definition of first ionization energy
-Understand the origin of reactivity of group I and group XVII elements
-Be able to state the differences between the reactions of group I elements with water (including equations)
-Be able to explain the factors that influence the atomic AND ionic radius of elements.
-Be able to deduce the formula of an IONIC compound from the elements that make it.

-Review halogen displacement reactions
There will be no questions on periodic table history this time, but this will be covered in your compo groupé.

Understand the difference between empirical and molecular formulae and be able to find a molecular formula from and empirical formula (this is outlined here if it is not obvious:

https://www.youtube.com/watch?v=J_MtVs0aBdU

In the video the term "molar mass" is used. As far as we are concerned it is the same as RFM)

Good luck

Mr Osler