Edexcel GCSE Chemistry

Topic 1: Key concepts in chemistry

The periodic table

Notes

1.13 Describe how Mendeleev arranged the elements, known at that time, in a periodic table by using properties of these elements and their compounds

- He ordered his table in order of atomic mass, but not always strictly – i.e. in some places he changed the order based on atomic weights.
- Left gaps for elements that he thought had not been discovered yet.

1.14 Describe how Mendeleev used his table to predict the existence and properties of some elements not then discovered

- Mendelev realised elements with similar properties belonged in the same groups in the periodic table so was able to leave gaps and place the discovered elements where they fit best
- Elements with properties predicted by Mendeleev were later discovered and filled the gaps

1.15 Explain that Mendeleev thought he had arranged elements in order of increasing relative atomic mass but this was not always true because of the relative abundance of isotopes of some pairs of elements in the periodic table

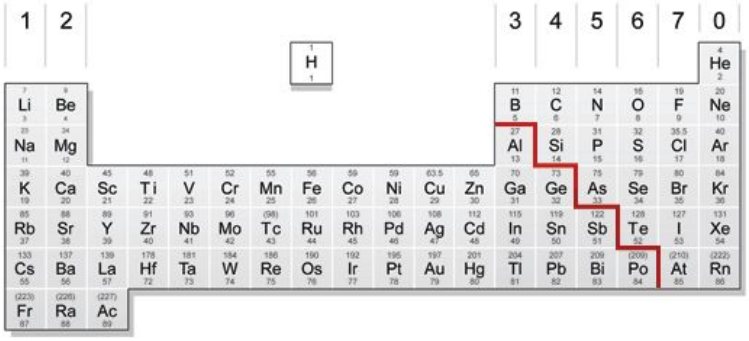
- Knowledge of isotopes made it possible to explain why the order based on atomic weights was not always correct, because some elements have a higher mass than others when isotopes are taken into account, but a lower one if you only look at one specific isotope.

1.16 Explain the meaning of atomic number of an element in terms of position in the periodic table and number of protons in the nucleus

- Elements are arranged in order of atomic (proton) number (bottom number) and so that elements with similar properties are in columns, known as groups.
- Elements in the same group have the same amount of electrons in their outer shell, which gives them similar chemical properties.

1.17 Describe that in the periodic table:
a) elements are arranged in order of increasing atomic number, in rows called periods and elements,
b) elements with similar properties are placed in the same vertical columns called groups
1.18 Identify elements as metals or non-metals according to their position in the periodic table, explaining this division in terms of the atomic structures of the elements

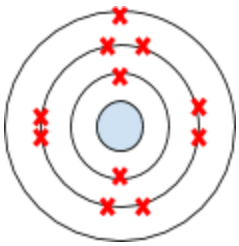
- Metals = elements that react to form positive ions.
  - Majority of elements are metals.
  - Found to the left and towards the bottom of the periodic table., because they lose electron(s) in order to form these positive ions, forming an electronic structure that is stable, like that of a noble gas
- Non-metals = elements that do not form positive ions.
  - Found towards the right and top of the periodic table, because they gain electron(s) in order to form these negative ions, forming an electronic structure that is stable, like that of a noble gas



The red line shows the divide between metals and nonmetals in the periodic table

1.19 Predict the electronic configurations of the first 20 elements in the periodic table as diagrams and in the form, for example 2.8.1

- the electronic configuration of an element tells you how many electrons are in each shell around an electron's nucleus
- for example, sodium has 11 electrons: 2 in its most inner shell, then 8, then 1 in its outermost shell.
  - you can represent sodium's electronic configuration as: 2.8.1
  - OR in a diagram:



1.20 Explain how the electronic configuration of an element is related to its position in the periodic table

- the group an electron is in tells you how many electrons are in its outermost shell aka group 1 elements have 1 electron in their outer shell
- the period an electron is in tells you which number shell an element's outermost electron is found in aka period 3 elements have their outermost electrons in shell 3
- remember all the shells up until the shell will be full (for the 1st shell this means 2 electrons and for shells 2 and 3 this means 8 electrons)