OCR (A) Chemistry A-level

Topic 2.1.1 - Atomic Structure and Isotopes
Topic 2.1.2 - Compounds, Formula and Equations

Flashcards

What was stated in Dalton's atomic theory? (4)

What was stated in Dalton's atomic theory?

- Atoms are tiny particles made of elements
- Atoms cannot be divided
- All the atoms in a element are the same
- Atoms of one element are different to those of other elements

What did Thompson discover about electrons? (3)

What did Thompson discover about electrons?

- They have a negative charge
- They can be deflected by magnet and electric field
- They have very small mass

Explain the plum pudding model

Explain the plum pudding model

Atoms are made up of negative electrons moving around in a sea of positive charge

What were Rutherford's proposal after the gold leaf experiment? (4)

What were Rutherford's proposal after the gold leaf experiment?

- Most of the mass and positive charge of the atom are in the nucleus
- Electrons orbit the nucleus
- Most of atom's volume is the space between the nucleus and the electrons
- Overall positive and negative charges must balance

Explain the current model of the atom

Explain the current model of the atom

- Protons and neutrons are found in the nucleus
- Electrons orbit in shells
- Nucleus is tiny compared to the total volume of atom
- Most of atom's mass is in the nucleus
- Most of the atom is empty space between the nucleus and the electrons

What is the charge of a proton?

What is the charge of a proton?

1+

What is the charge an electron?

What is the charge of an electron?

1-

Which particle has the same mass as proton?

Which particle has the same mass as proton?

Neutron

Which two particles make up most of atom's mass?

Which two particles make up most of atom's mass?

Protons and neutrons

Which letter is used to represent the atomic number of an atom?

Which letter is used to represent the atomic number of an atom?

Z

What does the atomic number tell about an element?

What does the atomic number tell about an element?

Atomic number = number of protons in an atom

Which letter represents the mass number?

Which letter represents the mass number?

A

How is mass number calculated?

How is mass number calculated?

Mass number = number of protons + number of neutrons

How to calculate the number of neutrons?

How to calculate the number of neutrons?

Number of neutrons = mass number - atomic number

Define isotope

Define isotope

Atoms of the same element with different number of neutrons

Why does different isotopes of the same element react in the same way? (2)

Why does different isotopes of the same element react in the same way?

- Neutrons have no impact on the chemical reactivity
- Reactions involve electrons, isotopes have the same number of electrons in the same arrangement

What are ions?

What are ions?

Charged particles that is formed when an atom loses or gains electrons

What is the charge of the ion when electrons are gained?

What is the charge of the ion when electrons are gained?

Negative

N.B - positive charge when electrons are lost

E.g. 3^+ ion has lost 3 electrons

What is the unit used to measure atomic masses called?

What is the unit used to measure atomic masses called?

Unified atomic mass unit, u

Define relative atomic mass

Define relative atomic mass

The weighted mean mass of an atom of an element compared with one twelfth of the mass of an atom of carbon -12

What is the unit of relative atomic mass?

What is the unit of relative atomic mass?

No units

Define relative isotopic mass

Define relative isotopic mass

The mass of an atom of an isotope compared with one twelfth of the mass of an atom of carbon-12

The relative isotopic mass is same as which number?

The relative isotopic mass is same as which number?

Mass number

What two assumptions are made when calculating mass number?

What two assumptions are made when calculating mass number?

1. Contribution of the electron is neglected
2. Mass of both proton and neutron is taken as 1.0 u

How to calculate the relative molecular mass and relative formula mass?

How to calculate the relative molecular mass and relative formula mass?

Both can be calculated by adding the relative atomic masses of each of the atom making up the molecule or the formula

What are the uses of mass spectrometry? (3)

What are the uses of mass spectrometry?

- Identify unknown compounds
- Find relative abundance of each isotope of an element
- Determine structural information

How does a mass spectrometer work?

How does a mass spectrometer work?

- The sample is made into positive ions.
- They pass through the apparatus and are separated according to mass to charge ratio.
- A computer analyses the data and produces mass spectrum.

How is the group number related to the number of electrons?

How is the group number related to the number of electrons?

Group number = number of electrons in the outer shell

Does the group number indicates horizontal or vertical column in the periodic table?

Does the group number indicates horizontal or vertical column in the periodic table?

Vertical column

Do metals usually gain or lose electrons?

Do metals usually gain or lose electrons?

Lose electrons

N.B - non metals generally gain electrons

Which are the 4 elements that don't tend to form ions and why?

Which are the 4 elements that don't tend to form ions and why?

The elements are beryllium, boron, carbon and silicon

Requires a lot of energy to transfer outer shell electrons

What are molecular ions?

What are molecular ions?

Covalently bonded atoms that lose or gain electrons

What is the charge of an ammonium ion?

What is the charge of an ammonium ion?

$+1 \rightarrow NH_4^+$

What is the charge of a hydroxide ion?

What is the charge of a hydroxide ion?

$-1 \rightarrow OH^-$

What is the charge of a nitrate ion?

What is the charge of a nitrate ion?

$-1 \rightarrow NO_3^-$

What is the charge of a carbonate ion?

What is the charge of a carbonate ion?

$-2 \rightarrow CO_3^{2-}$

What is the charge of a sulfate ion?

What is the charge of a sulphate ion?

$-2 \rightarrow SO_4^{2-}$

What is an empirical formula?

What is an empirical formula?

Simplest whole number ratio of atoms of each element present in a compound

How to calculate empirical formula?

How to calculate empirical formula

- Divide the amount of each element by its molar mass
- Divide the answers by the smallest value obtained
- If there is a decimal, divide by a suitable number to make it into a whole number