AQA Chemistry A-level

Topic 1.1 - Atomic Structure

Flashcards

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

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Z

What does the atomic number tell us about an element?

What does the atomic number tell us about an element?

Atomic number = number of protons in an atom

What letter represents mass number?

What letter represents mass number?

A

How is the mass number calculated?

How is the mass number calculated?

mass number = number of protons + number of neutrons (total number of nucleons)

Define relative atomic mass

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Average mass of all isotopes of an element compared to $^{1}/_{12}$ the mass of an atom of Carbon 12 (C^{12})

What is are isotopes of an element?

What is are isotopes of an element?

Different forms of the same element, containing the same number of protons but different numbers of neutrons. They still have the same chemical properties

How many orbitals and electrons do these shells contain?

a) 1s b) 2p c) 3s d) 3d d) 4s

How many orbitals and electrons do these shells contain?

a) 1s- 1 orbital, 2 electrons
b) 2p- 3 orbitals, 6 electrons
c) 3s- 1 orbital, 2 electrons
d) 3d- 5 orbitals, 10 electrons
e) 4s- 1 orbital, 2 electrons

Does 3d or 4s have a higher energy?

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3d

What is an orbital?

What is an orbital?

A region around the nucleus that can hold up to two electrons

What would be the relationship between 2 electrons in the same orbital in terms of their spin?

What would be the relationship between 2 electrons in the same orbital in terms of their spin?

Have opposite spin as repel each other as both negative

Explain why chromium does not fit the trend for electronic configuration

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It only has one electron in its 4s orbital before filling 3d

$1s^2$ … $3p^6$ $4s^1$ $3d^5$

Explain why copper does not for the trend for electronic configuration.

Explain why copper does not for the trend for electronic configuration.

It only has one electron in its 4s orbital before filling 3d

$1s^2$ … $3p^6$ $4s^1$ $3d^{10}$

What are the two types of ionisation for a mass spectrometer? How do they differ?

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1. Electron impact: electron gun (hot wire filament with current through it emitting electrons) knocks off one electron from each particle to form 1+ MOLECULAR IONS (these ions fragment).
2. Electrospray: sample dissolved in volatile solvent (e.g. water or methanol) and injected through a fine hypodermic needle to give an aerosol. Needle attached to positive terminal of a high-voltage power supply and particles gain a proton from the solvent as they leave the needle, producing XH^+ ions (+1 charge and mass of Mr + 1). (ions rarely fragment)

When would you use the different types of ionisation in a mass spec?

When would you use the different types of ionisation in a mass spec?

Electron impact used for organic or inorganic molecules with a low formula mass.

Electrospray used for substances with a higher molecular mass including biological molecules, e.g. proteins.

Describe how a time of flight mass spectrometer works

Describe how a time of flight mass spectrometer works

Acceleration - positive ions attracted towards a negatively charged plate.

Ion Drift - ions pass through hole in plate, form a beam with constant kinetic energy, travel along tube to detector. Time of flight is therefore directly proportional to the square root of mass.

Detection - positive ions pick up electrons, current flows, m/z value and time of flight recorded. Largest current from most abundant ions

Define first ionisation energy

Define first ionisation energy

The energy required to remove one mole of electrons from one mole of gaseous atoms to form one mole of gaseous 1+ ions