Atomic structure

What are all substance made from?

Atoms, elements and compounds

Atomic structure

What is an atom?

Atoms, elements and compounds

Atomic structure

Approximately how many elements are there?

Atoms, elements and compounds

Atomic structure

What is the periodic table?

Atoms, elements and compounds

Atomic structure

How are compounds formed?

Atoms, elements and compounds

Atomic structure

What do chemical reactions involve?

Atoms, elements and compounds

Atomic structure

What is a compound?

Atoms, elements and compounds

Atomic structure

How can the elements in a compound be separated?

Atoms, elements and compounds

Atomic structure

What is a mixture?

Mixtures

Atomic structure

Name five physical processes which can be used to separate mixtures.

Mixtures

The smallest part of an element that can exist.

Atoms.

An arrangement of all the elements based on their atomic number

100

Chemical reactions always involve the formation of one or more new substances and often involve a detectable change in energy (e.g. temperature change)

Compounds are formed from elements by chemical reactions

Compounds can only be separated into elements by chemical reactions.

Compounds contain two or more elements chemically combined in fixed proportions

Filtration, crystallisation, simple distillation, fractional distillation and chromatography.

A mixture consists of two or more elements or compounds not chemically combined together.

Atomic structure

What physical process would be used to separate a mixture of liquids with different boiling points?

Mixtures

Atomic structure

What physical process would be used to separate an insoluble salt from a solution?

Mixtures

Atomic structure

What physical process would be used to separate a solvent from a solution?

Mixtures

Atomic structure

What physical processes would be used to separate copper sulfate crystals from a mixture of copper sulfate solution and copper oxide?

Mixtures

Atomic structure

Why might a scientific model be changed or replaced?

The development of the model of the atom

Atomic structure

How did Democritus describe the atom?

The development of the model of the atom

Atomic structure

What did J.J. Thomson discover and what model did he suggest as a result?

The development of the model of the atom

Atomic structure

Describe Thomson's model.

The development of the model of the atom

Atomic structure

Describe the alpha particle scattering experiment.

The development of the model of the atom

Atomic structure

What were the results of the alpha particle scattering experiment.

The development of the model of the atom

Filtration

Fractional distillation

Filtration, evaporation and crystallisation.

Simple distillation

Tiny spheres that could not be divided.

New experimental evidence.

Thomson described the plum pudding model where a ball of positive charge is embedded with negatively charged electrons.

The electron.

Although most of the alpha particles passed through some were deflected and a few even bounced back.

Alpha particles (helium nuclei) were fired at a thin gold sheet. If the plum pudding was correct the alpha particles would pass straight through.

Atomic structure

What conclusion did Rutherford make from the results of the alpha particle scattering experiment.

The development of the model of the atom

Atomic structure

How did Bohr adapt Rutherford's model.

The development of the model of the atom

Atomic structure

What sub-atomic particle did Rutherford discover in 1920 to explain the positive charge in an atom?

The development of the model of the atom

Atomic structure

What sub-atomic particle did James Chadwick discover which explained isotopes?

The development of the model of the atom

Atomic structure

What is the relative charge of a proton?

Relative electrical charges of subatomic particles

Atomic structure

What is the relative charge of a neutron?

Relative electrical charges of subatomic particles

Atomic structure

What is the relative charge of an electron?

Relative electrical charges of subatomic particles

Atomic structure

In all atoms how many electrons are there compared to protons?

Relative electrical charges of subatomic particles

Atomic structure

What electrical charge do atoms have?

Relative electrical charges of subatomic particles

Atomic structure

What is the atomic number of an element?

Relative electrical charges of subatomic particles

Bohr suggested that the electrons orbit the nucleus at specific distances.

Rutherford concluded that the mass of the atom was concentrated at the centre in a nucleus.

The neutron.

The proton.

0

+1

The number of electrons in an atom is equal to the number of protons.

-1

The number of protons in the atom.

Atoms are neutral.

Atomic structure

What is the radius of an atom in m?

Size and mass of atoms

Atomic structure

What is the radius of a nucleus of an atom in m?

Size and mass of atoms

Atomic structure

How is the mass of an atom distributed in the atom?

Size and mass of atoms

Atomic structure

What is the relative mass of a proton?

Size and mass of atoms

Atomic structure

What is the relative mass of a neutron?

Size and mass of atoms

Atomic structure

What is the relative mass of an electron?

Size and mass of atoms

Atomic structure

What is the mass number of an element?

Size and mass of atoms

Atomic structure

What is an isotope?

Size and mass of atoms

Atomic structure

What is the relative atomic mass of an element?

Relative atomic mass

Atomic structure

How would you calculate the relative atomic mass of an atom?

Relative atomic mass

1×10^{-14} m (1/10000 the size of the atom)

1×10^{-10} m

1

Almost all the mass is in the nucleus.

0

1

Atoms of the same element which have the same number of protons but different numbers of neutrons.

The sum of the protons and the neutrons.

(Abundance of isotope 1 x atomic mass of isotope 1) + (Abundance of isotope 2 x atomic mass of isotope 2) / 100.

It is the average atomic mass that takes into account the abundance of isotopes of the element.

Atomic structure

What is the maximum number of electrons that can fit in the first shell?

Electronic structure

Atomic structure

What is the maximum number of electrons that can fit in the second shell?

Electronic structure

Atomic structure

What is the maximum number of electrons that can fit in the third shell?

Electronic structure

Atomic structure

Which electron shell has the lowest energy level?

Electronic structure

Atomic structure

In what order are the electron shells filled with electrons?

Electronic structure

Atomic structure

What is the electronic structure of sodium?

Electronic structure

Atomic structure

What is the electronic structure of fluorine?

Electronic structure

Atomic structure

What is the electronic structure of sulfur?

Electronic structure

Atomic structure

What is the electronic structure of hydrogen?

Electronic structure

Atomic structure

What is the electronic structure of neon?

Electronic structure

8

2

The innermost shell.

8

2,8,1

The electrons occupy the lowest available energy shells (inside shells to outside shells).

2,8,6

2,7

2,8

1

Atomic structure

Describe how the position of an element on a periodic table can be found from the electronic structure. Use chlorine as an example.

Electronic structure

Atomic structure

How are the elements in the periodic table arranged?

The periodic table

Atomic structure

How are elements with similar properties arranged?

The periodic table

Atomic structure

Why is it called a periodic table?

The periodic table

Atomic structure

Explain why elements in the same group have similar chemical properties?

The periodic table

Atomic structure

Before the discovery of sub-atomic particles, how did scientists arrange elements in the periodic table?

Development of the periodic table

Atomic structure

How did Mendeleev organise the elements in his periodic table?

Development of the periodic table

Atomic structure

Why did Mendeleev leave gaps in his periodic table?

Development of the periodic table

Atomic structure

What discovery showed why the order based on atomic weight was not always correct?

Development of the periodic table

Atomic structure

Which elements react to form positive ions?

Metals and non-metals

They are arranged by atomic number.

The number of electrons in the outer shell gives the group number. The number of shells is the period. Chlorine has 7 electrons in its outer shell so it is found in group 7. Chlorine has electrons in 3 shells so it is found in period 3.

Because similar properties occur at regular intervals.

Elements with similar properties are arranged in groups.

By atomic weight.

Because they have the same number of electrons in their outer shell.

For undiscovered elements.

He organised the elements by atomic weight and by similar properties.

Metals

The discovery of isotopes.

Atomic structure

Which elements do not form positive ions when they react?

Metals and non-metals

Atomic structure

What are the majority of elements in the periodic table?

Metals and non-metals

Atomic structure

Where are metals found in the periodic table.

Metals and non-metals

Atomic structure

Where are non-metals found in the periodic table?

Metals and non-metals

Atomic structure

What does malleable mean?

Metals and non-metals

Atomic structure

Malleable is a property of metals. Name four other properties of metals.

Metals and non-metals

Atomic structure

What does brittle mean?

Metals and non-metals

Atomic structure

Brittle is a property of non-metals.

Metals and non-metals

Atomic structure

Explain why metals form positive ions in reactions?

Metals and non-metals

Atomic structure

Explain why non metals do not form positive ions in reactions.

Metals and non-metals

Metals

Non-metals

To the right and towards the top

To the left and towards the bottom.

Conductors of heat, conductors of electricity, High melting and boiling points, shiny, usually solid at room temperature.

Malleable is the ability the bend and hammer metal.

Name four other properties of non-metals.

Generally do not conduct electricity, Are not always solid at room temperature, often have a lower density, dull.

The substance will shatter if struck.

Non metals usually have more electrons in their outer shell. It is easier for them to gain electrons or share electrons to get a full outer she

Metals usually have only a few electrons in the outer shell. It is easier for them to lose electrons to get a full outer shell.

Atomic structure

What is another name for group 0?

Group 0

Atomic structure

Describe the reactivity of group 0 elements.

Group 0

Atomic structure

How many electrons do elements of group 0 have in their outer shell?

Group 0

Atomic structure

Describe the change in boiling point as you go down (increase relative atomic mass) group 0.

Group 0

Atomic structure

What is another name for group 1?

Group 1

Atomic structure

How many electrons do elements in group 1 have in their outer shell?

Group 1

Atomic structure

What are the products of the reaction between lithium and water?

Group 1

Atomic structure

What are the products of the reaction between sodium and chlorine?

Group 1

Atomic structure

What are the products of the reaction between potassium and oxygen?

Group 1

Atomic structure

How does the reactivity of elements in group 1 change as you go down the group?

Group 1

The halogens

Reactions occur because of the electrons in the outer shell. As you go down the group the electron shells increase. The further away the outer electron is from the nucleus, the easier it is to lose.

Fluorine and chlorine.

They are non-metals and they form molecules made from two atoms e.g. Cl_2.

Iodine and Astatine (technically you could say tennessine, but only six atoms have ever existed)!

Bromine.

Halogens form simple covalent compounds when they react with non-metals.

Halogens form ionic compounds when they react with metals.

The reactivity decrease as you go down the group (increase atomic mass).

As you go down the group (increase the atomic mass) the melting point and boiling point increases.

Atomic structure

Explain, in terms of electrons, why does reactivity change as you go down the group.

Group 1

Atomic structure

What is another name for group 7?

Group 7

Atomic structure

Describe the general properties of group 7 elements.

Group 7

Atomic structure

Name two gases found group 7.

Group 7

Atomic structure

Name a liquid found in group 7.

Group 7

Atomic structure

Name two solids found in group 7.

Group 7

Atomic structure

Describe the nature of the compounds formed when halogens react with metals.

Group 7

Atomic structure

Describe the nature of the compounds formed when halogens react with other non-metals.

Group 7

Atomic structure

Describe how the melting points and boiling points change in group 7.

Group 7

Atomic structure

Describe how the reactivity of the elements in group 7 change as you go down the group.

Group 7

Elements in group 0 are unreactive.

The noble gases.

The boiling point of group 0 increases as you go down the group (increase atomic mass).

Elements in group 0 have 8 electrons in their outer shell except helium which has 2 electrons.

1

The alkali metals.

Sodium chloride.

Lithium hydroxide + hydrogen.

The reactivity increases as you go down the group (increase atomic mass).

Potassium oxide.

Atomic structure

Explain, in terms of electrons, why does reactivity change as you go down the group.

Group 7

Atomic structure

Describe the reaction between a more reactive halogen and a less reactive halogen which is in an aqueous solution of its salt.

Group 7

Atomic structure

Complete the following equation and balance: $Cl_2 + KI \rightarrow$

Group 7

Atomic structure

Complete the following equation and balance: $I_2 + KBr \rightarrow$

Group 7

Atomic structure

Complete the following equation and balance: $F_2 + KCl \rightarrow$

Group 7

Bonding, structure and the properties of matter

Name three types of strong chemical bonds.

Chemical bonds

Bonding, structure and the properties of matter

Describe the role of electrons in an ionic bond.

Chemical bonds

Bonding, structure and the properties of matter

Describe the role of electrons in a covalent bond.

Chemical bonds

Bonding, structure and the properties of matter

Describe the role electrons in a metallic bond.

Chemical bonds

Bonding, structure and the properties of matter

Which bonding occurs in compounds formed from non-metals?

Chemical bonds

A displacement reaction will occur where the more reactive halogen will displace the least reactive halogen and bind with the salt.

Reactions occur because of the electrons in the outer shell. As you go down the group the electron shells increase. The further away the outer shell is from the nucleus, the harder it is to attract an extra electron.

$I_2 + KBr \rightarrow I_2 + KBr$ (no reaction because Iodine is less reactive than bromine)

$Cl_2 + 2KI \rightarrow 2KCl + I_2$

Ionic, covalent and metallic.

$F_2 + 2KCl \rightarrow 2KF + Cl_2$

Electrons are shared.

Electrons are either donated or received.

Covalent.

Outer shell electrons are delocalised.