Paper 1 Chapter 1 — Atomic Structure and the Periodic Table

Relative Atomic Mass

Why is the relative atomic mass of copper 63.5 and not a whole number?

What is the relative atomic mass of copper when 25% of the atoms are an isotope with mass number 37 and 75% of the atoms are an isotope with mass number 35?

Atoms Elements and Compounds

Fill in the name or the symbol of the first 20 elements

H	Helium	Li	Beryllium
B	Carbon	N	Oxygen
F	Neon	Na	Magnesium
Al	Silicon	P	Sulfur
Cl	Argon	K	Calcium

New substances can be formed by c_____ r_____

Two or more elements chemically combined for a c_____

What is the difference between Co and CO?

Periodic Table Development and the Modern Periodic Table

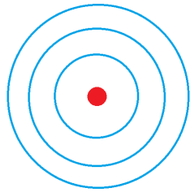
- Early scientists organised elements by their a_____ w_____.
- M_____ designed the first modern periodic table.
- His table l____ g____ for elements that he (correctly) thought would be discovered.
- He put elements with s_____ p_____ in the same column of his table.
- Knowledge of i_____ explains why atomic weights can cause errors in the order .
- Now scientists organise elements by their a_____ n_____ .
- Elements with similar properties are in columns, known as g_____.
- Elements in the same group in the periodic table have the same number of e_____ in their o_____ s_____.

Electronic Structure

Electrons in an atom occupy the _____ available energy levels.

What is the electronic structure on the Sodium Atom?

Draw the electron structure for Aluminium (13 electrons)



Subatomic Particles

$^{23}_{11}Na$

How many protons?

How many neutrons?

What is the mass number?

What is the atomic number?

How many electrons if it is an atom?

Name	Relative	Relative
Proton		
Neutron		
Electron		

Metals and Non-Metals

Add the word metal or non-metal to each

- Elements that form positive ions.
- Elements that do not form positive ions.
- Most of the elements.
- Found in left and bottom sections of periodic table.
- Found in top right section of periodic table.
- Poor conductors of heat and electricity.

Mixtures colour the sets (red set done)

Filtration	Separate solid form liquid	Use a column to condense vapours at different temperatures
Crystallisation	Separate mixtures of soluble substances	Small molecules pass through, large particles cannot
Simple Distillation	Separate dissolved solid from liquid	Solvent carries different substances different distances
Fractional Distillation	Separate solvent from solution	Solvent evaporated and then condensed
Chromatography	Separate different liquids from a mixture	Solvent evaporates, crystals remain

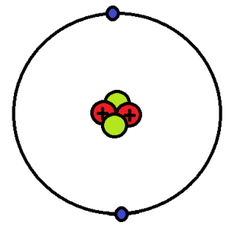
How do the chemical properties change when the mixtures are separated?

Size and Mass of Atoms

Atoms have a radius of about _____

The radius of a nucleus is about _____ times smaller than the atom.

Label the diagram



What is the…

Mass number

Atomic Number

Neutron Number

Charge

Is it an atom or an ion? How can you tell?

1 extra neutron would make a different…

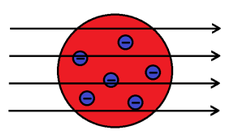
1 extra electron would make…

Group 0, Group 1, Group 7 Add the information to the correct column

Group 0	Group 1	Group 7

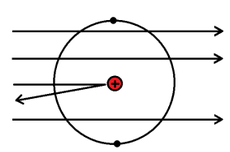
React with metals to form salts, Alkali Metals, 7 electrons in outer shell, Halogens, Unreactive, 1 electron in outer shell, Form negative ions, Reactivity increases going down the group, Found as single atoms, Reactivity decreases going down the group, Form positive ions, Full outer shell, React with non-metals to form salts, Found as 2 atom molecules, Noble Gases, Boiling points increase going down the group

Models of the Atom



Discovery of electrons led to the _____ _____ model.

Rutherford fired _____ _____ at thin gold and some deflected or bounced back.



The new evidence changed the model to the _____ model.

In the new model the _____ is concentrated in the nucleus and the nucleus is _____.

James Chadwick later showed the nucleus contained _____.

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Relative Atomic Mass

Why is the relative atomic mass of copper 63.5 and not a whole number? It is the average mass of the different isotopes making up the copper

What is the relative atomic mass of copper when 25% of the atoms are an isotope with mass number 37 and 75% of the atoms are an isotope with mass number 35? 35.5

Atoms Elements and Compounds

Fill in the name or the symbol of the first 20 elements

H Hydrogen	He Helium	Li Lithium	Be Beryllium
B Boron	C Carbon	N Nitrogen	O Oxygen
F Fluorine	Ne Neon	Na Sodium	Mg Magnesium
Al Aluminium	Si Silicon	P Phosphorous	S Sulfur
Cl Chlorine	Ar Argon	K Potassium	Ca Calcium

New substances can be formed by chemical reactions

Two or more elements chemically combined for a compound

What is the difference between Co and CO? Element Cobalt and Compound Carbon Monoxide

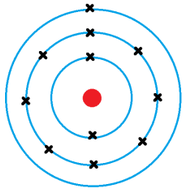
Periodic Table Development and the Modern Periodic Table

- Early scientists organised elements by their atomic weights.
- Mendeleev designed the first modern periodic table.
- His table left gaps for elements that he (correctly) thought would be discovered.
- He put elements with similar properties in the same column of his table.
- Knowledge of isotopes explains why atomic weights can cause errors in the order.
- Now scientists organise elements by their atomic number.
- Elements with similar properties are in columns, known as groups.
- Elements in the same group in the periodic table have the same number of electrons in their outer shell.

Electronic Structure

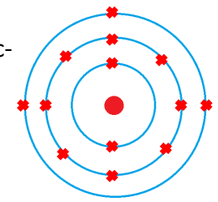
Electrons in an atom occupy the lowest available energy levels.

What is the electronic structure on the Sodium Atom? 2,8,1



Draw the electron structure for Aluminium (13 electrons)

2,8,3



Subatomic Particles

$^{23}_{11}Na$

How many protons? 11

How many neutrons? 12

What is the mass number? 23

What is the atomic number? 11

How many electrons if it is an atom? 11

Name	Relative	Relative
Proton	1	+1
Neutron	1	0
Electron	0	-1

Metals and Non-Metals

Add the word metal or non-metal to each

- Elements that form positive ions. Metals
- Elements that do not form positive ions. Non-metals
- Most of the elements. Metals
- Found in left and bottom sections of periodic table. Metals
- Found in top right section of periodic table. Non-metals
- Poor conductors of heat and electricity. Non-metals

Mixtures colour the sets (red set done)

Filtration	Separate solid form liquid	Use a column to condense vapours at different temperatures
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Fractional Distillation	Separate solvent from solution	Solvent evaporated and then condensed
Chromatography	Separate different liquids from a mixture	Solvent evaporates, crystals remain

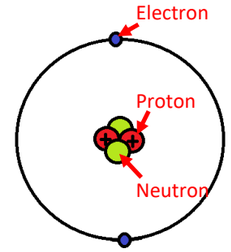
How do the chemical properties change when the mixtures are separated? The don't as no reactions happen and nothing new is made

Size and Mass of Atoms

Atoms have a radius of about 1×10^{-10} m

The radius of a nucleus is about 10,000 times smaller than the atom.

Label the diagram



What is the…

Mass number 4

Atomic Number 2

Neutron Number 2

Charge 0

Is it an atom or an ion? How can you tell? Atom, No overall charge

1 extra neutron would make a different… isotope

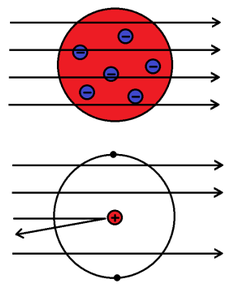
1 extra electron would make… a negative ion

Group 0, Group 1, Group 7 Add the information to the correct column

Group 0	Group 1	Group 7
Noble Gases	Alkali Metals	Halogens
Unreactive	1 electron in outer shell	7 electrons in outer shell
Full outer shell	Reactivity increases going down the group	Found as 2 atom molecules
Boiling points increase going down the group	Form positive ions	Reactivity decreases going down the group
Found as single atoms	React with non-metals to form salts	Form negative ions
		React with metals to form salts

React with metals to form salts, Alkali Metals, 7 electrons in outer shell, Halogens, Unreactive, 1 electron in outer shell, Form negative ions, Reactivity increases going down the group, Found as single atoms, Reactivity decreases going down the group, Form positive ions, Full outer shell, React with non-metals to form salts, Found as 2 atom molecules, Noble Gases, Boiling points increase going down the group

Models of the Atom



Discovery of electrons led to the plum pudding model.

Rutherford fired alpha particles at thin gold and some deflected or bounced back.

The new evidence changed the model to the Nuclear model.

In the new model the mass is concentrated in the nucleus and the nucleus is charged.

James Chadwick later showed the nucleus contained neutrons.