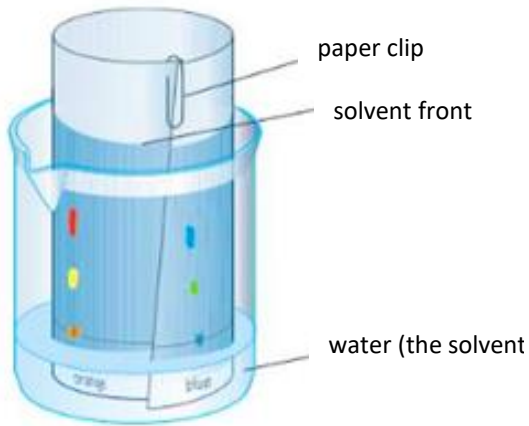


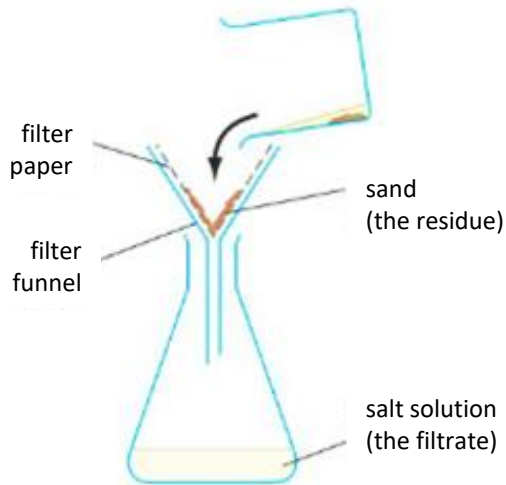
NAME	CHARGE	MASS
Proton	+1	1
Neutron	0	1
Electron	-1	1/1840

YEAR	HISTORY OF THE ATOM
1800s	John Dalton came up with the idea of the atom – tiny, hard spheres
1800s	JJ Thompson discovered the electron and theorised the Plum Pudding model
1900s	Geiger and Marsden completed the gold-foil experiment and discovered the nucleus
1914	Niels Bohr came up with the idea of energy levels
1932	James Chadwick discovered the neutron

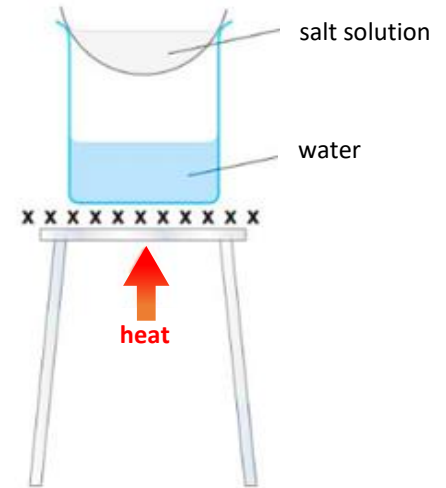
KEYWORD	DEFINITION	KEYWORD	DEFINITION
1. Atoms	The smallest part of an element that can still be recognised as that element	13. Reactant	The substances you start a reaction with
2. Element	A substance made up from only one type of atom. An element cannot be broken down chemically into any simpler substance	14. Product	The substances made from the reaction
3. Compound	A substance made when two or more elements are chemically bonded together	15. Symbol Equation	An equation that uses the symbols for elements from in the periodic table
4. Mixture	When some elements or compounds are mixed together and intermingle but do react together (i.e. no new substance is made)	16. Word Equation	An equation that uses words to name the substances found in the reaction
5. Periodic Table	An arrangement of elements in the order of their atomic numbers, forming groups and periods	17. Law of the conversation of mass	The total mass of the products formed in the reaction is equal to the total mass of the reactants
6. Group	A column of the periodic table	18. State symbol	Added to a reactant or product to tell you whether or not a substance is solid (s), liquid (l), gas (g) or aqueous (aq)
7. Period	A row of the periodic table	19. Atomic Number	The amount of protons found in the nucleus for that particular element
8. Nucleus	The very small and dense central part of an atom that contains protons and neutrons	20. Ion	When an electron is either gained or lost from an atom
9. Electron	A tiny particle with a negative charge. Electrons orbit the nucleus of atoms or ions in shells. It has a mass of one.	22. Shell	Electrons are arranged around the nucleus, going up in energy per shell
11. Neutron	A dense particle found in the nucleus of an atom. It is electrically neutral, carrying no charge	23. Electronic Structure	The arrangement of electrons around a nucleus. There are 2 electrons in the first shell, and 8 in every shell after that
12. Molecule	A grouping of two or more atoms bonded together	24. Noble Gas	Gases that always have a full outer shell of electrons



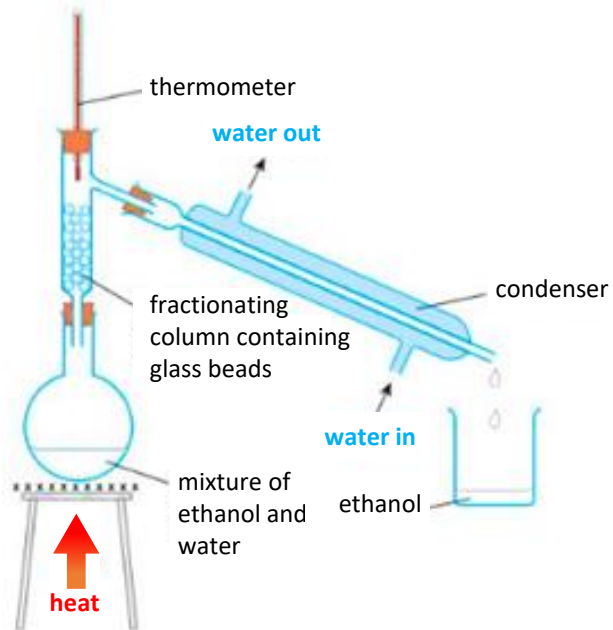
Chromatography



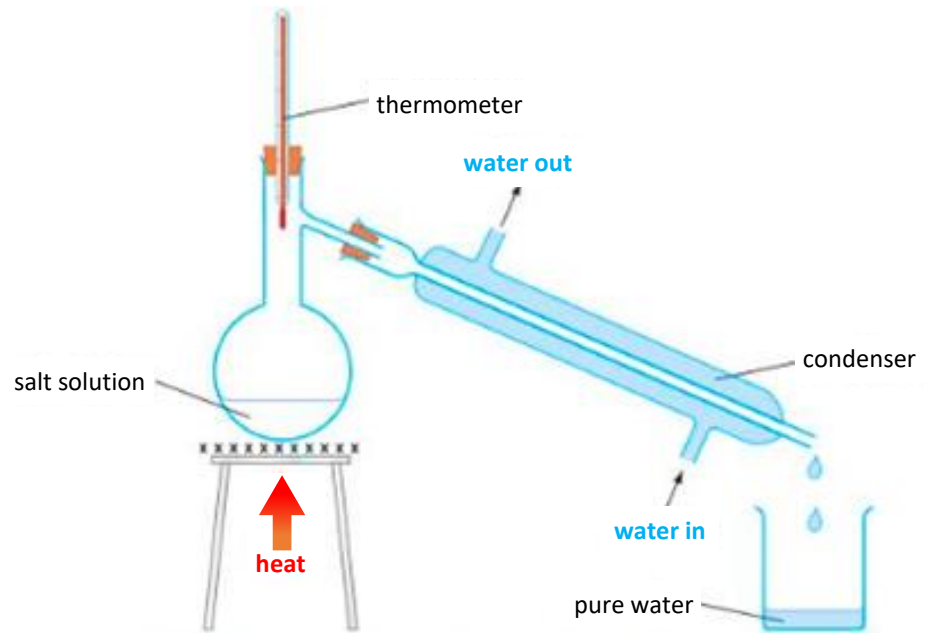
Filtration



Crystallisation



Fractional Distillation



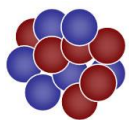
Distillation

The History of the Periodic Table

- Throughout history scientists have tried to classify substances and many scientists attempted to construct a Periodic Table.
- Before the knowledge of proton, neutrons and electrons, scientists arranged the Periodic Table by **atomic weight**. This meant the groups were not always correct.
- In 1869 Dimitri **Mendeleev**, a Russian scientist, published his Periodic Table. It was slightly different from those that had been before. He still arranged elements by atomic weight but he also left gaps for where he predicted elements would be.
- He very accurately predicted the properties of elements that were not discovered until many years later; for example Gallium.
- Mendeleev's Periodic Table is still different from the modern one as some of these masses were wrong due to the existence of **isotopes**
- Isotopes are elements with the same number of protons and electrons but a different number of neutrons and therefore different atomic weight.

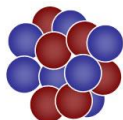
KEY TERMS	DEFINITIONS
Dimitri Mendeleev	A Russian chemist, who in 1869 published a Periodic Table containing groups
Periodic Table	The Table which organises the 118 elements based on atomic structure (number of protons)
Isotope	Two atoms with the same number of protons and electrons but with a different number of neutrons
Metal	An element which loses electrons to form a positive charge
Non Metal	An element which gains electrons to form a negative charge
Ion	An element with a positive or negative charge

Isotopes of Carbon



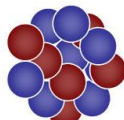
$^{12}_6\text{C}$

Carbon-12
6 protons
6 neutrons



$^{13}_6\text{C}$

Carbon-13
6 protons
7 neutrons



$^{14}_6\text{C}$

Carbon-14
6 protons
8 neutrons

Mendeleev's Periodic Table

I	II	III	IV	V	VI	VII	VIII		
H 1.01	He 4.00								
Li 6.94	Be 9.01	B 10.8	C 12.0	N 14.0	O 16.0	F 19.0			
Na 23.0	Mg 24.3	Al 27.0	Si 28.1	P 31.0	S 32.1	Cl 35.5			
K 39.1	Ca 40.1		Ti 47.9	V 50.9	Cr 52.0	Mn 54.9	Fe 55.9	Co 58.9	Ni 58.7
Cu 63.5	Zn 65.4			As 74.9	Se 79.0	Br 79.9			
Rb 85.5	Sr 87.6	Y 88.9	Zr 91.2	Nb 92.9	Mo 95.9		Ru 101	Rh 103	Pd 106
Ag 108	Cd 112	In 115	Sn 119	Sb 122	Te 128	I 127			
Ce 133	Ba 137	La 139		Ta 181	W 184		Os 194	Ir 192	Pt 195
Au 197	Hg 201	Tl 204	Pb 207	Bi 209					
			Th 232		U 238				

The transition metals, in the central block of the periodic table are:

- Good conductors of heat and electricity
- Can be bent or hammered into shape
- Copper is used in plumbing because it is resistant to corrosion (will not react with the water in the pipes) and electrical wiring because it is a good conductor of heat and electricity

Aluminium and titanium are useful metals because they have a low density and are resistant to corrosion.

	Physical Properties	Chemical Properties	Equation	Trends / Explanation
Group 1 (Alkali Metals)	Soft, low density	React vigorously with water releasing hydrogen	Sodium + water → sodium hydroxide + hydrogen	More reactive as you do down. Outermost electron further from the nucleus so its easy to lose.
Group 7 (Halogens)	Low melting point, exist as a pair (Cl ₂)	React with Group 1 metals to form compounds. Can carry out displacement reactions	Sodium + chlorine → sodium chloride Sodium bromide + chlorine → sodium chloride + bromide	Higher melting point as you go down the group (higher molecular mass). Less reactive as you go down the group
Group 0 (Noble gasses)	Low melting/boiling point. Eight electrons in outer shell (except helium)	Unreactive, as they have a full outer shell	N/A	Higher melting point and boiling point as you go down the group (due to increase in density)