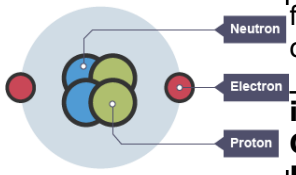
Chemistry 1: Atomic Structure and the Periodic Table

Section 1: Key Terms

	The **smallest part of an element** that can exist. All substances are made of atoms. **No** overall **electrical charge**. **Very small**, radius of 0.1nm.
	An element **contains only one type of atom**. Found on the Periodic Table. There are about 100 elements.
	Two or more elements chemically bonded with each other. Can only be separated into the elements through chemical reactions.
	Contains two or more elements or compounds not chemically bonded. Can be separated using physical methods e.g. by filtration, crystallisation, distillation and chromatography.
	A process that **separates** mixtures of **insoluble solids and liquids**.
	A process that **separates dissolved solids from liquids** by **evaporating** the liquid to leave crystals.
	A process that **separates a mixture of liquids** based on their **boiling points**.
	A process that **separates mixtures** by **how quickly they move through a stationary phase** (e.g. paper)
	An atom of the **same element** with **different numbers of neutrons**.
	An **average value of mass** that takes account of the **abundance of the isotopes** of the element.

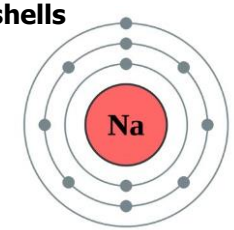
Section 2: Development of Atomic Model

	The _____ _____ model shows that the atom is a **ball of positive charge** with **negative electrons embedded** in it. Was **incorrect**.
12 Nuclear Model 	**Rutherford's** scattering experiment found a central area of positive charge. The nuclear model has a _____ **nucleus** and **electrons in shells**. **Chadwick** later discovered **neutrons**. **Bohr** discovered the arrangement of _____ **in shells**.

16 **Mass number** – the total number of **protons** and **neutrons**

17 **Atomic number** – the **number of protons** (the number of electrons is the same in an atom)

18 **Electron configuration**– Electrons fill the first energy level (shell) first.
Maximum electrons:
2 in first shell
8 electrons in other shells



Section 3: Properties of Sub-Atomic Particles

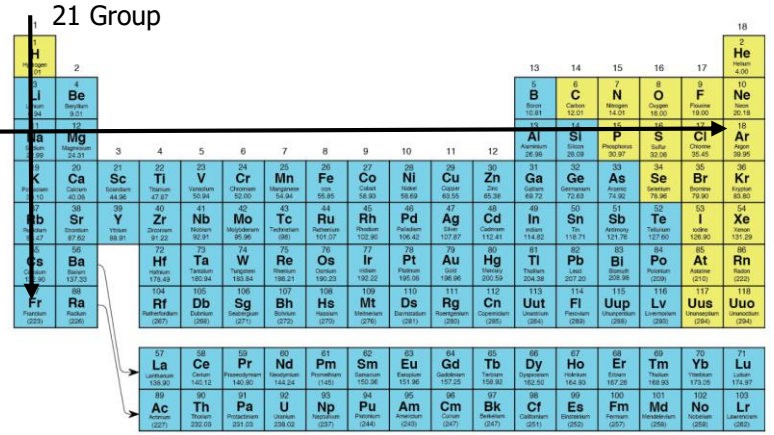
Sub-atomic particle	Mass	Charge	Position in Atom
13 Proton			
14 Neutron			
15 Electron	Very small		Orbiting in shells

Section 4: Periodic Table

	Elements in the **same vertical column** are in the same group. Elements in the same group have the **same number of electrons in their outer shell**, and therefore **similar properties**.
	Elements in the **same horizontal row**. The atomic number increases by one moving across the period.
	Elements that react to form positive ions (except Hydrogen). Left and centre of periodic table
	Elements that react to form negative ions. Right of periodic table.
	Was able to make a relatively accurate periodic table by **leaving gaps for undiscovered elements** and **re-arranging some elements** (Mendeleev could only measure relative atomic mass, not atomic number).

21 Group

22 Period



23 Elements in the modern periodic table are **arranged by atomic (proton) number**.

Section 3: Groups of the Periodic Table

Sub-atomic particle	Properties	Trends	Reactions
24 Group 0 (Noble Gases)	**Unreactive** and **do not form molecules**.	**Boiling point** _____ going **down the group**.	Very unreactive as they **have full outer shells**.
25 Group 1 (Alkali Metals)	**Reactive** because they can easily lose one electron.	**Reactivity** _____ going **down the group**.	With water: Metal + water → Metal hydroxide and hydrogen With oxygen: Metal + oxygen → Metal oxide With chlorine: Metal + chlorine → Metal chloride
26 Group 7 (Halogens)	Non-metals **Form molecules**	**Reactivity** _____ going **down the group**. **Boiling point** and **melting point** _____ going **down the group.**	A **more reactive halogen** can **displace** a **less reactive halogen** from a solution of its salt.