The Periodic Table

- Elements in the periodic table are arranged in order of their proton number
- Vertical columns are called groups
- Horizontal rows are called periods
- Elements in the same group have similar chemical properties, this is because they have the same number of valence electrons
- Metallic character decreases across a period but increases down a group
- Basic oxides are on the left hand side of the periodic table, acidic oxides are on the right hand side
- Most metal oxides are basic oxides and most non-metal oxides are acidic oxides
- The valency of an element is the number of electrons its atoms gain, lose or share when they form a compound.

Group	I	II	III	IV	V	VI	VII	0
Valency	1	2	3	4	3	2	1	0

Group I Metals

- Group I metals are called the alkali metals
- They are very reactive because they only have to give away 1 electron
- They are stored in paraffin or oil because they are so reactive
- The melting points and boiling points decrease down the group
- The metals get softer down the group
- There is a general increase in density down the group with the exception of sodium
- The reaction of the alkali metals with water:

Lithium	Fizzes slowly, few bubbles	Disappears slowly	Moves slowly on the surface	Remains solid, no flames
Sodium	Fizzes quickly, many bubbles	Disappears quickly	Moves quickly on the surface	Melts into a liquid ball, no flames
Potassium	Fizzes violently, even more bubbles	Disappears very quickly	Moves very quickly on the surface	Melts into a liquid ball, violet flame

- They react with water to form a metal hydroxide and hydrogen gas
- Group I elements all react with water to produce hydrogen and a solution or the alkali metal hydroxide

- The chemical reactivity of the alkali metals increases down the group because the atoms get larger down the group so the electrostatic force between the electron and the positive nucleus decreases

Group VII elements

- Group VII elements are called halogens
- They are poisonous non-metals that have low melting and boiling points
- They all exist as diatomic molecules
- The melting points and boiling points of the halogens increase down the group. This is the opposite to Group I metals
- The state of the halogens at room temperature changes from gas to liquid to solid down the group
- The color gets darker down the group
- Salts when metals react with halogens are called halide
- Reactivity decreases down the group because as the atoms get larger the electrostatic force between the outer shell and the nucleus decreases
- Chlorine is a green, bromine is an orange-brown liquid and iodine is a grey solid
- When metals react with halogens, halides salts are formed
- Displacement reactions occur when more reactive halogens compete to form compounds

Noble gases

- Noble gases are found in Group 0
- They have a full outer shell of electrons
- They are unreactive or inert
- They are monatomic
- They are colorless gases
- Helium and neon are lighter than air
- Argon, krypton, xenon and radon are heavier than air
- The density of the noble gases increases down the group
- The boiling points of the noble gases increase down the group
- Helium is used in weather balloons and airships because it is less dense than air
- Neon is used in advertising signs because it glows red when a high voltage is passed through it
- Argon is used in lightbulbs because it is inert
- Krypton is used in lasers for eye surgery and in bulbs for car headlamps
- Xenon is used where very bright light is required, they are also used in lasers

Transition Elements

- They are all metals
- They all conduct heat and electricity
- They are malleable and ductile
- They are shiny and sonorous
- They have very high melting and boiling points
- They have very high densities
- They are stronger and harder than Group I metals
- They have more than one oxidation state- they have variable valency
- They form colored compounds
- They form complex ions
- Many transition elements and oxides are good catalysts
- They are less reactive than metals from other groups. They do not react with cold water, although some react with steam