

History of the Atom

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Give evidence for the existence of particles.			
Describe what ancient Greeks believed.			
Discuss Dalton's Atomic Theory			
Discuss William Crooke's contribution and experiment			
Discuss J.J. Thompson's contribution and experiment			
Discuss Robert Milikan's contribution and experiment			
Explain the Plum Pudding Model			
Discuss Rutherford's experiment, how this lead to the atomic model of the atom			
Describe the atomic model of the atom			
Account for the discovery of the proton			
Discuss James Chadwick's contribution and experiment			

Arrangement of Electrons in the Atom

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define an energy level			
Distinguish between ground state and excited state.			
Explain Bohr's Model of the Atom			
Explain why Bohr's Model was altered – limitations that led to its change			
Explain the expression $E_2 - E_1 = hf$			
State Heisenburg Uncertainty Principle			
State the Aufbau Principle			
State Hund's Rule			
State Pauli's Exclusion Principle			
Define an atomic orbital			
Draw the shape of s and p orbitals			
Explain why the elements produce different colours during flame test			
State the colours produced by metals in a flame test.			
Distinguish between an energy level and an atomic orbital			
Write electron configurations for elements			

The Periodic Table

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Calculate the number of protons, neutrons, electrons in an ion			
State how any of the 6 (Boyle, Davy, Dobereiner, Newlands, Mendeleev, Moseley) contributed to the Periodic Table.			
Compare the tables/groups created by Dobereiner, Newlands, Mendeleev, and Moseley. Be able to compare any two.			
Define relative atomic mass			
Complete mass spectrometer based calculations.			
Explain emission line spectroscopy			
Explain absorption line spectroscopy			
Define an isotope			
Define the principle of mass spectroscopy			

Trends in the Periodic Table

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define atomic radius			
Describe and explain the trend in atomic radius across the period.			
Describe and explain the trend in atomic radius down the group.			
Define the first ionisation energy.			
Describe and explain the trend in ionisation energy across the period.			
Describe and explain the trend in ionisation energy down the group.			
Given a graph of ionisation energies explain any changes to the pattern/trend for the first 20 elements.			
Given a graph of ionisation energies explain any changes to the pattern/trend for a single element.			
Give evidence for energy levels using the ionisation energies graph.			
Define the second ionisation energy.			
Describe and explain the trend in electronegativity across the period.			
Describe and explain the trend in electronegativity down the group.			
Describe the properties and trends in alkali metals.			
Describe the properties and trends in the halogens.			
Describe why the boiling point of the halogens increases down the group.			

Chemical Bonding

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define a compound			
State the Octet Rule			
Define an ion			
Define an ionic bond			
Show ionic bonding with a dot and cross diagram			
Show covalent bonding with a dot and cross diagram			
Write chemical formulae			
Define a transition metal			
Define a molecule			
Define valence			
Define sigma bonding			
Define pi bonding			
Calculate how many sigma and pi bonds in a molecule			
Define VSEPR			
Determine the shape of a molecule using VSEPR			
Give the bond angle and name of each VSEPR shape			
Define electronegativity			
Define intramolecular forces			
Define intermolecular forces			
Define Van der Waals forces			
Define dipole-dipole forces			
Define hydrogen bonding			
Calculate the type of intramolecular bonding using electronegativity			
Discuss the type of intermolecular bonding for a group of molecules			
Give reasons for the difference between substances melting and boiling points			
Give reasons for the differences between the solubility of substances			

Chemical Equations: Test for Anions

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define the Law of Conservation of Mass			
Define the Law of Conservation of Matter			
Write chemical equations for reactions			
Balance chemical equations			
Describe the test for chloride ions (reagents, observation, inference)			
Describe the test for sulfate ions (reagents, observation, inference)			
Describe the test for sulfite ions (reagents, observation, inference)			
Describe the test for carbonate ions (reagents, observation, inference)			
Describe the test for hydrogencarbonate ions (reagents, observation, inference)			
Describe the test for nitrate ions (reagents, observation, inference)			
Describe the test for phosphate ions (reagents, observation, inference)			

Radiation

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define radiation/radioactivity			
Define an alpha/beta/gamma particle			
Describe what an alpha/beta/gamma particle is made of and its charge			
Describe the penetrating power of alpha/beta/gamma radiation			
Describe the path of an alpha/beta/gamma particle in a magnetic field			
Give a use for alpha/beta/gamma radiation			
Write a radiation equation for alpha/beta radiation			
Explain the difference between a chemical reaction and a nuclear reaction			
Define half-life			
Interpret half-life graphs			
Perform half-life calculations			
Define radioisotopes			
Define radiocarbon dating			
Explain radiocarbon dating			

Mole

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
KNOW THE CALCULATIONS FLOW CHART OFF BY HEART!			
Give Avogadro's number			
Define a mole			
Define relative molecular mass			

Properties of Gases

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define a gas			
Convert Celsius to Kelvin			
Convert cm^3 to dm^3 (litres), dm^3 to m^3 , etc.			
Recall s.t.p. values			
State Boyle's Law			
State Charles Law			
Recall the two formulas for pressure, volume and temperature			
Recall the units to be used in each equation			
State Gay-Lussac's Law of Combining Gases			
State Avogadro's Law			
Recall molar volume at s.t.p. and at room temperature.			
Define an ideal gas			
Define a real gas			

Acids and Bases

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
State Arrhenius definition of acid, weak acid, and strong acid.			
Give the general formula for acid dissociation.			
State Arrhenius definition of base, weak base, and strong base.			
State limitations of Arrhenius' theory.			
State Bronsted-Lowry definition of acid, weak acid, and strong acid.			
State Bronsted-Lowry definition of base, weak base, and strong base.			
Define conjugate acid.			
Define conjugate base.			
Define conjugate acid-base pair.			
Identify conjugate acids, conjugate bases, and conjugate pairs from chemical equations.			
Define a salt			
Define neutralisation			
Write first, second, and third dissociation equations for acids.			

Volumetric Analysis: Acid and Bases

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define a solution			
Define concentration			
Define molarity			
Define a one molar solution			
Define a standard solution			
Give properties of primary standards.			
Define primary standard			
Define titration.			
Define standardised solution.			
Perform % w/w, % w/v, % v/v calculations.			
Perform Parts per Million (ppm) calculations.			
Perform moles/litre calculations.			
Convert grams/litre to moles/litre (and vice versa)			
Perform dilution calculations. ($\text{volume}_1 \times \text{molarity}_1 = \text{volume}_2 \times \text{molarity}_2$)			
Describe the procedure for making up a weighed sample in a volumetric flask.			
Describe the procedure for accurately filling a burette.			
Describe the procedure for accurately measuring solutions with a pipette.			
Describe and give reason for all procedures during titration.			
Name the indicator and colour change for all titrations.			
Perform titration calculations, HCl v Na_2CO_3 , Vinegar v NaOH, $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$ v HCl.			

Oxidation and Reduction

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define oxidation			
Define reduction			
Identify oxidation and reduction in chemical reactions			
Define oxidising agent			
Define reducing agent			
Define oxidation number			
Recall and apply rules for assigning oxidation numbers			
Assign oxidation numbers to elements in compound and complex ions			
Describe the effect of oxidation on oxidation number			
Describe the effect of reduction on oxidation number			
Describe experiments to show oxidation and reduction			
Balance redox equations using oxidation numbers			

Volumetric Analysis: Oxidation and Reduction

<i>I am able to:</i>	<i>Green</i>	<i>Amber</i>	<i>Red</i>
Define primary standard, standard solution, and standardised solution			
Describe all lab procedures relating to potassium permanganate (KMnO ₄)			
Explain the reason behind each procedure for KMnO ₄ (see titrations PowerPoint)			
Describe procedure for preparing and filling burette			
Describe procedure for preparing and filling pipette			
Describe procedure for making iron tablets into solution			
Describe procedure for diluting bleach			
Describe how to ensure and accurate end point during titration			
Explain why each procedure above increases the accuracy			
Explain why dilute sulphuric acid when making up iron solutions			
Explain why dilute sulphuric acid is added directly before titration			
Calculate molarity of potassium permanganate			
Calculate mass of iron in an iron tablet			
Calculate concentration of sodium thiosulfate			
Calculate concentration of sodium hypochlorite in bleach			