Meden School Curriculum Planning							
Subject	Chemistry	**Year Group**	12	**Sequence No.**		**Topic**	3.1.1 Atomic Structure

Retrieval	Core Knowledge	Student Thinking
What do teachers need to **retrieve** from students before they start teaching **new content**?	What **specific ambitious knowledge** do teachers need to teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to **development of our students thinking, encouraging them to see the inequalities around them** and 'do something about them!'
C1 Atomic Structure. History of the atom including the contributions of Dalton, Thomson, Rutherford, Bohr and Chadwick. Subatomic particles and configuration. C3 Atomic and molecular mass calculations. Isotope calculations.	**3.1.1.1 Fundamental Particles** An atom consists of proton, neutrons and electrons. Protons have a relative charge of +1 and a relative mass of 1, neutrons have no charge and a relative mass of 1, electrons have a relative charge of -1 and a relative mass of 1/2000. An atom consists of a nucleus containing protons and neutrons surrounded by electrons. Ions are charged particles caused when atoms loose or gain of electrons 19th Century, Dalton described all atoms as solid spheres, with each atom having a different type of sphere, 1897 JJ Thomson concluded that atoms were a sphere of positive charge with negatively charge particles embedded called electrons. The electrons cancelled out the positive charge, this is the plum pudding model. 1909 Rutherford, Geiger and Marsden carried out the the alpha scattering experiment this identified the positive nucleus with electrons orbiting, with the atom being mostly empty space with the mass and positive charge concentrated in the centre, this was the nuclear model and identified the presence of protons. Niels Bohr added to this model but stating that electrons existed in discrete energy levels	Western world focuses on the discoveries made by our scientists, we need to acknowledge scientists from all cultures Eg Japanese scientists behind the discovery of element 113, the first atomic element found in Asia – indeed, the first found outside Europe or the United States – have dubbed it "nihonium" after the Japanese-language name for their country.

	called shells, Chadwick identified the presence of neutrons when the mass of nuclei did not match up with the mass of protons. **3.1.1.2 Mass Number and Isotopes** The mass number (A) is the sum of protons and neutrons, atomic number (Z) is the number of protons which is also the number of electrons because atoms are neutral. Isotopes are atoms of the same element with different numbers of neutrons. Relative atomic mass and relative molecular mass in terms of ^{12}C. The relative atomic mass, A_r is the average mass of an atom of an element on a scale that uses the mass of carbon-12 as being exactly 12. Relative atomic mass is calculated using the percentage abundance of all known isotopes. Relative molecular mass Mr, is the average mass of a molecule compared to carbon-12, it is calculated by adding together all of the relative atomic masses of the atoms in the molecule. The term relative formula mass will be used for ionic compounds, it is calculated based on the lowest whole number ratio of elements in the compound. The principles of a simple time of flight (TOF) mass, spectrometer, limited to ionisation, acceleration to give all ions constant kinetic energy, ion drift, ion detection, data analysis. The mass spectrometer gives accurate information about relative isotopic mass and also about the relative abundance of isotopes. Mass spectrometry can be used to identify elements. Mass spectrometry can be used to determine relative molecular mass. **3.1.1.3 Electron Configuration** Electron configurations of atoms and ions up to Z = 36 in terms of shells and sub-shells (orbitals) s, p and d. S subshells hold 2, electrons, p subshells hold 6 electrons and d subshells hold 10 electrons. Orbitals hold 2 electrons which are spin-paired. Filling of d-subshell is different as the following	

	s-shell has a lower energy value and so gets filled first, special focus on chromium and copper with the oddity of 4s1. Knowledge of the electronic configuration of the first row of the d-block is required. Formation of ions of the d-block needs to highlight the importance of electrons leaving the outer s-subshell before the d-subshells. Ionisation energies. Students should be able to: • define first ionisation energy • write equations for first and successive ionisation energies • explain how first and successive ionisation energies in Period 3 (Na–Ar) and in Group 2 (Be–Ba) give evidence for electron configuration in sub-shells and in shells.	