(Science Kingfishers) - (Paper 3 Entry Level Science)

Key Stage/Year	KS4 - Year 10
Approximate Number of Lessons and Term	8 lessons teaching plus two lessons for revision and 1 lesson for the assessment and 1 lesson for feedback. All lessons are on Google Classroom.
Qualification/Exam (if applicable)	Paper 3 Entry Level Certificate

Consideration of prior learning	KS3 model of an atom, different types of bonds and properties of the periodic table including how to find the atomic number and the atomic mass.
How will learners' knowledge, skills and understanding be checked at the start of the unit?	Progress check assessment used as a baseline to assess memory recall of KS3 work or use of online BBC quiz on BBC Bitesize if students do not feel confident.

How will learners' knowledge, skills and understanding be checked at the end of the unit?	Two options. Students will take the end of topic assessment to assess their understanding and to help with their revision. Students will then sit the assessment for the entry level certificate.

Learning Outcome	Potential Activities	Behaviour/Safety/Personal Development/SMSC Opportunities
1A.1 Describe the structure of an atom as: a a nucleus containing protons and neutrons b a nucleus surrounded by electrons arranged in shells (of the first 20 elements of the periodic table)	Use atomic structure models so that students can build models of an atom - challenge - build atoms with different electron configurations. Photos can be taken and stuck into folders or a worksheet can be used from the course to assess learning.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.2 Describe the nucleus of an atom as very small compared to the overall size of the atom	https://www.youtube.com/watch?v=KgSGIbV0kZo Students will draw and label a diagram.	
1A.3 Recall the relative charge and relative mass of: a a proton b a neutron c an electron	Draw a table to show mass and charge of a neutron, proton and an electron - challenge - work out the number neutrons, protons and electrons in an atom using the atomic mass and the atomic number.	
1A.4 Recall that most of the mass of an atom is concentrated in the nucleus	See video from 1A.2 - challenge - look at plum pudding model versus nuclear model of an atom and the alpha particle scattering experiment. Can use PheT simulations.	
1A.5 Describe atoms of a given element as having the same number of protons in the nucleus and that this number is unique to that element and known as the atomic number	Look at the atomic number on the periodic table - students can colour in their own periodic table at this stage to show metals and nonmetals. Challenge - look at differences between an atom and an ion.	

1A.6 Recall the meaning of the term mass number of an atom	See 1A.5	
1A.7 Recall that atoms of the same element with different numbers of neutrons are called isotopes	Use atomic structure model kits and encourage students to create their own atoms and isotopes - photos could be taken and out into books.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.8 Describe how Mendeleev arranged the elements, known at that time, in a periodic table by using properties of these elements and their compounds	https://www.youtube.com/watch?v=fPnwBITSmgU	
1A.9 Describe how Mendeleev used his table to predict the existence and properties of some elements not then discovered	See 1A.8 - students can be given a copy of the periodic table and begin to colour it in if not already done so.	
1A.10 Describe that in the periodic table elements: a are arranged in order of increasing atomic number, in rows called periods b with similar properties are placed in the same vertical columns called groups	See 1A.9 this will involve colouring in periodic table according to properties of metals and non metals.	
1A.11 Identify elements as metals or non-metals according to their position in	See above.	

the periodic table		
1A.12 Describe most metals as shiny solids that have high melting points, high density and are good conductors of electricity, whereas most non-metals have low boiling points and are poor conductors	Experiments with snap circuit using metals and non metals in the circuit - challenge - look at free electron theory to explain why some metals are better conductors than other conductors.	Danger of electric shock and from using sharp or weighted metals.
1A.13 Explain how the arrangement of electrons in an element is related to its position in the periodic table	Use the atomic structure kits to build atoms.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.14 Recall that when elements react, their atoms join with other atoms to form compounds	Revision of key stage three work on bonds - challenge - introduce dot and cross diagrams using atomic structure kids.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.15 Describe how ionic bonds are formed: a between a metal atom and a non-metal atom b by the transfer of electrons to produce positive and negative ions, including the use of dot-and-cross diagrams	See above.	
1A.16 Describe the formation of ions in ionic compounds from their atoms, limited to	Use the atomic structure model kits and the dot and cross kits to show transfer of electrons and show the difference between an ion and an atom.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous

compounds of elements in groups 1 and 7		if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.17 Describe the structure of an ionic compound as a giant structure of positive and negative ions	Marshmallows and pasta to build structures.	Check for allergies to students. Pasta can have sharp ends and so risk to eyes if handled incorrectly.
1A.18 Describe the properties of ionic compounds limited to: a high melting points and boiling points, because energy is needed to overcome the strong forces between the ions b solubility in water c whether or not they conduct electricity as solids, when molten and in aqueous solution	Challenge - look at graphs and identify melting and boiling points of a substance. Challenge - investigate temperature change on the graph.	
1A.19 Describe how a covalent bond is formed when a pair of electrons is shared between two non-metal atoms	Use atomic structure kits to show sharing of electrons between two atoms.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.20 Recall that covalent bonding usually results in the formation of simple molecules	Challenge - develop word equations into balanced equations using symbols.	
1A.21 Describe the formation of simple molecular, covalent substances using dot-and-cross diagrams, including: a hydrogen b hydrogen chloride c water	Use atomic structure kits and build the dot and cross diagrams.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.

(double bonds are not required)		
1A.22 Describe the properties of typical covalent, simple molecular compounds limited to: a low melting points and boiling points, because of weak forces between molecules (intermolecular forces) b poor conduction of electricity	Use PhET simulations to model covalent bonds.	
1A.23 Recall that covalent bonding sometimes results in the formation of giant molecules	Use of marshmallows and pasta if not already used.	
1A.24 Describe the properties of giant covalent compounds, limited to: a high melting and boiling point b poor conduction of electricity (except graphite) c insoluble in water	Use the chromebooks to create a document collaboratively to illustrate the properties.	
1A.25 Recall that graphite and diamond are different forms of carbon and that they are examples of giant covalent substances	Look at examples of graphite and diamond and build the structures using the model kits.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.26 Describe the uses of graphite in electrodes or as a lubricant, and diamond in cutting tools, and relate them	Use the chromebooks to create a document collaboratively to show the differences between graphite and diamond. Challenge - investigate the Mohs Scale.	

to their properties		
1A.27 Describe, using poly(ethene) as the example, that simple polymers consist of large molecules containing chains of carbon atoms	Use kits to build polymer chains.	Hazards include swallowing of molecules and throwing molecules at the eyes of students. Kit is weighted and so dangerous if thrown. Kit is also magnetic and so cannot be near electronic equipment.
1A.28 Describe the properties of metals, including: a the ability to conduct electricity, because of free moving electrons b malleability, because layers of metal atoms can slide over each other	Free electron theory can be introduced here if not already done so. Use PHet simulation to show electrons in a connected circuit and a non-connected circuit.	
1A.29 Describe the arrangement and movement of particles in each of the three states of matter: solid, liquid and gas	Demo of sublimation such as carbon dioxide if it can be obtained. If food grade liquid nitrogen make ‘space’ food.	Risks to students with asthma and also risk of burning from liquid nitrogen if not handled properly.
1A.30 Recall the names used for the interconversions between the three states of matter	Challenge - introduce key words such as internal energy, potential energy, kinetic energy.	
1A.31 Describe the changes in arrangement and movement of particles during these interconversions	Challenge - cooling curve experiment and draw graph and label/identify changes in temperature, melting point et cetera.	Use of bunsen burners and so danger with gas and burns from hot wax. Also thermometers may break. Check allergies of students also.
1A.32 Recognise that these interconversions are physical changes, unlike chemical	Cook popcorn and melt ice to show difference between physical and chemical changes.	Use of bunsen burners and so danger with gas and burns from hot metals and hot oil. Check allergies of students also.

reactions that result in chemical changes		
0.1 Recall the formulae of elements and simple compounds in this specification	Use of differentiated worksheets from syllabus.	
0.2 Write word equations	Use of differentiated worksheets from syllabus.	
0.3 Describe the use of hazard symbols on containers to: a indicate the dangers associated with the contents b inform people about safe working precautions with these substances in the laboratory	Students will undertake their safety lab test and gain a certificate in using a bunsen burner. Lab rules are in the folder and hazard symbols are studied in Key Stage 3.	COSHH standards are adhered to.
0.4 Recognise the risks in a practical procedure and suggest suitable precautions for a range of practicals, including those mentioned in the specification	Students will undertake their safety lab test and gain a certificate in using a bunsen burner. Lab rules are in the folder and hazard symbols are studied in Key Stage 3.	COSHH standards are adhered to.

Possible Adaptations for Higher and Lower Achievers	See challenge for each objective as this will apply to high achievers. Also work from Foundation GCSE courses can be used. Low achievers can use Entry Level Certificate material as well as revise Key Stage 3 work relevant to the topic.

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