Meadowbrook High School

Grade 9 Chemistry Syllabus

2019 - 2020

Topics an General Objectives	**Specific Objectives**	**Contents/Explanatory notes to be included**	**Activities and Practical to be Done.**
<u>Explanation of the arrangement of elements in the periodic table.</u>	Explanation of groups, periods, valency. Identify and list the properties of metal and non-metal	At the end, students should be able to identify elements from the periodic table based on the group or period to which they belong, whether they are metals or non-metals.. Explain the connection between the electronic configuration and the periodic table.	Use periodic table to show how to identify groups and periods.
	i) define, identify the sub-atomic particles and their properties a. Proton b. Neutron and c. Electron Atomic number	The holistic definition must include all of the following properties: relative mass, relative charge and the location of the sub-atomic particles in an atom - It should be pointed out that atomic number and protons are not the same, but rather the number of protons is the same as the atomic number	
		(ii) Draw diagrams to show the arrangement of the sub-atomic particles in the first twenty atoms	Draw the first twenty elements Have students recite the first twenty elements and do oral quiz to ensure students know the elements
	) Interpret and understand data for atoms represented in the form	a- Atomic mass b- Atomic number c- Charge/oxidation number d- Number of atoms	

	$^{a}_{b}X^{c}_{d}$	x- symbol of element They should be able to use the information given in relation to the aim of the other objectives in atomic structure and bonding	
	define electronic configuration and write the electronic configuration for the first twenty elements (viii) use electronic configuration to determine the a. Group b. Period c. Valency d. Whether element is a metal or non-metal	-Valency should be defined - Metals should be identified as elements in groups I to III (exception being Boron and Hydrogen) - Non-metals being groups IV- VIII	
	ix) Define a. Isotopes b. Radioactivity Radioactive isotopes	Teacher should explain to students with the aid of diagrams or models the isotopes of carbon, chlorine, and hydrogen	**Students MUST be given a project on the following:** -Define radioactive isotopes List two isotopes used in each of the following field and give their importance to society >medicine ->Industries >Agriculture
Structure and Bonding in ionic compounds	(i) Define Ionic bonding (ii) Draw dot and cross diagrams to represent ionic bonding	When describing ionic bonding students should be encourage to identify which element is the metal and which is non-metal -When drawing structures, ensure	

	(iii) List the properties of Ionic compounds	that the metals are placed first. Students should be encouraged to draw the entire atom and not only the valence shell for this type of bonding.	
	(i) Define covalent bonding (ii) Draw dot and cross diagrams to represent Covalent bonding (iii) List the properties of Covalent compounds	-Student may draw these structures with the valence shell only but encourage them to draw them using the entire structure of the atom. -Explanation of the type of bonding in diatomic elements such as Cl_2 , O_2 etc are required. Make sure to point out that even though these consist of covalent bonding they are elements and not compounds.	
	(i) Define metallic bonding (ii) Draw simple diagram to represent metallic bonding (iii) Link the structure of metals and their forces of attraction to their properties	Included properties such as shiny (lustrous), hard malleable, ductile, conduct electricity, high melting and boiling point. **These must be explained in terms of their structure and should not be listed.**	
Formulae Writing and Balancing Equations	(i) Be able to write formulae for ionic and covalent compounds using their valency (ii) Relate the dot and	Students should be encouraged to use the valency to write formulae for compounds. The use of unknown elements should be emphasized. Students should be encourage to use the symbol given and do not identify unknown elements. Eg if X is given as the symbol for element then X should	In groups, select from a set of flash cards with the names of simple ionic compounds sodium chloride, calcium fluoride and magnesium oxide. Determine the ions (with charges) present in the compounds. Formulate the chemical formulae of these compounds by adding the integers (charges) to get zero, forming a neutral compound. Share their

	cross diagrams to the formulae written (iii) Write formula using radicals Name compounds from their formulae	be used for the symbol to write the formulae. -The structures drawn for bonding, the students should be taken back to those and to match the formulae to the number of atoms used in the structure. -the rules for naming ionic vs. covalent compounds should be explained. Likewise naming of compounds containing radicals. Use the following radicals, OH^- NO_3^- NO_2^-,PO_4^{3-},CO_3^{2-}, SO_3^{2-}, SO_4^{2-} ,HCO_3^- -Special care should be taken where acids are concerned. **Naming of acids should be emphasised.**	answers with the class and participate in discussion. Students will use the charges on the ions to assign the valency of the element. In groups participate in teacher guided instructions on how to write the formula of simple binary compounds including the 'swap' method (which uses the valency or combination power). Swap method should only be used to reinforce and not to teach the concept initially. (Teacher must guide students to the use of subscripts in formulae and that the overall charge on a compound is zero) In groups, view a chart/handout of common ions and engage in an activity to write the formulae of ionic compounds (using one-atom ions). Complete worksheet on formation of binary compounds provided by the teacher. In groups, select two cards one from each colour and complete the following chart for the compound formed between the two ions selected. (Teacher preorganise cards of two different colours, one with positive ions and the other with negative ions). Positive ion # of electrons lost Negative ion # of electrons gained Formula of compound Name of compound Ca2+ 2 F - 1 CaF2 Calcium fluoride In groups, construct models of the substances for which the chemical formulae
Types of equation and Balancing Equations	(i)identify the different types of equations (ii) To balance chemical equations	The following types of equations should be pointed out: Direct Combination, Displacement, decomposition, double displacement,	In groups, given examples of common chemical reactions, students will make observations noting the reactants and products. Students will participate in teacher-

		combustion, oxidation and neutralisation. It is encouraged that while doing the different types of equations the student balance them as you go along. **<u>Neutralisation equations should be looked at when doing acids, bases and salts.</u>**	led discussions to formulate word and symbol equations for the chosen reactions.
			Balance the equation for the reaction with teachers' assistance. In groups, collect a set of index cards with information for a given chemical reaction and complete the following activity. 1. Use the set of index cards to replicate the chemical equation onto work desk. 2. Label the reactant side and the product side. Create an appropriately labelled table and record the following information 3. Identify the elements on the reactant side. 4. Count the number of atoms for each element. 5. Identify the elements on the product side. 6. Count the number of atoms for each element on the product side. 7. Are the 2 sides equal? If not, the equation is not balanced. 8. Insert the whole numbers (coefficients) before given chemical formulae. They can ONLY be placed in front of the elements. You cannot change the subscripts in any of the formulae. 9. Choose an element that is not balanced and add numbers before the formulae until

			the number of atoms of the element are equal on both sides of the equation. 10. Continue until you have worked through all the elements. 11. Once they are balanced, count the final number of Reactants and Products. 12. Write the balanced equation. 13. Can your equation be simplified? 14. Exchange their set of index cards with another group and repeat the activity View video and engage in computer simulation/web quest on writing chemical formulae and balancing equations and complete the activities given.
<u>Acids, Bases and Salts</u>	(i) Define what is an acid and a base (ii) Identify acids and bases (iii) List the properties of Acids and bases (iv) explain how a salt is formed (v) Name the type of reaction taking place when an acid reacts with a base (vi) write equation for the reaction of acids and bases (vii) identify the pH scale and its range (viii) define what is an indicator (ix) Use indicators to	-**When defining an acid as a proton donor, use the structure of hydrogen and its ion to show why an acid is considered a proton donor.** Teachers should use equations to show the formation of salts. Students should be able to write equations from given acids and bases. -	**<u>Students should be given a project to define and identify several types of indicators. They should then be asked to classify several household substances as acids or bases. Let them record their assumptions. Then place the students in groups and have them identify about five(5) of those household chemicals using indicators and compare the results to their assumptions</u>** In groups, conduct research on homemade acid-base indicators. Plan and design a method of preparing an acid-base indicator from materials of their choice. Carry out procedures outlined for the preparation of the indicator. Use it on common household substances to sort them as acids and alkalis based on the colour

	identify acids and bases		changes observed. Use their results to suggest improvements and predictions for setting up further tests. In groups, investigate the properties of acids using simple test tube• reactions of acids and metals (e.g. magnesium), alkalis (e.g. sodium hydroxide), bases (e.g. copper II oxide) and carbonates (e.g. calcium carbonate) and litmus. Test the gases hydrogen and carbon dioxide produced. Use the term neutralization to describe simple acid/base reactions. (Link – show that neutralization reactions are exothermic in nature). Write word and symbol equations for all reactions. In groups, conduct research on the application of neutralization• reactions to everyday life (e.g. indigestion tablets, treatment of bee and wasp stings). Perform laboratory investigations of common neutralization reactions in the home (e.g. reacting baking powder and lemon juice). Report findings (using simple scientific language, drawings, labelled diagrams, bar charts or tables). In groups, investigate the properties of alkalis using test tube reactions• of alkalis with acids, ammonium salts (e.g. ammonium chloride), and litmus. Test the ammonia gas produced with damp red litmus. Students guided to identify ammonia as the only alkaline gas. Write word and