COURSE OUTLINE: NSC INTEGRATED SCIENCE

Assessment Weighting:

Classwork: **25%**

Tests: **15%**

Exam: **45%**

Attendance: **5% (absent for 50% of classes = 0%)**

Punctuality: **5% (late for more than 50% of classes = 0%)**

Participation: **5% (participate in less than 50% of classes = 0%)**

Unit topic: More about Matter

Unit Description:

In this unit students will use the periodic table as a means of classifying elements into metals and nonmetals. Students will apply the kinetic theory of matter to explain the movement of particles. In addition student will perform experiments to account for the observations of the kinetic theory of matter. Students will learn additional information about atoms are the building blocks of elements. They are introduced to the terms subatomic particles protons electrons neutrons and also the location mass and charge of each subatomic particles.

General Objectives:

On completion of this Section, students should:

1. Understand that all matter is made up of small particles known as atoms.
2. Understand that atoms interact each other to make up matter.

Content:

At the end of this unit students will have knowledge of the following:

- The atom is the smallest particle of matter that can exist on its own.
- Evidence that matter is made up of tiny moving particles can be proven by using diffusion and osmosis experiment.
- During diffusion particles move from an area of high molecular concentration to an area of low molecular concentration.
- Elements are made up of only one kind of atom.
- The atom consists of protons and neutrons located in the nucleus and electrons that orbit the nucleus on electron shells.
- Protons, neutrons and electrons in terms of relative charge and mass. Atomic number refers to the number of protons in an atom.
- The elements in the periodic table are arranged in order of increasing atomic number.
- All known elements (solid liquid or gas) can be found in the periodic table. They are usually represented by symbols.
- Alkali metals, alkaline earth metals, halogens and noble gases are special groups of elements found in the periodic table.
- The arrangement of elements in the periodic table was based on the works of scientists such as John Newlands and Dmitri Mendeleev.

Learning Outcomes:

Upon completion of this section students should be able to:

1. Know that symbols are used to represent elements in the periodic table.
2. Recognize some familiar Elements by their symbols.
3. Classify elements as metals and nonmetals. Formulate a definition for diffusion.
4. Describe experiments which proved evidence of the kinetic theory of matter.
5. Describe the subatomic particles in terms of charge mass and location.
6. Place elements in the periodic table according to periods and groups based on atomic number.
7. Apply the concept of atomic structure to identify special groups on the periodic table.
8. Create and format word processing and spreadsheet documents and tables.
9. Collaborate and communicate information using discussion forum and social network.

Course Details

Date	Topics	Specific Objectives	1. Assignments	Resources
Week 1-3 October	More about matter	1. Cite evidence for the kinetic theory of matter. 2. Use appropriate scientific language.	• Make a short video presentation on the difference between diffusion and osmosis. Presentation must	

		3. Describe briefly the development of the periodic table. 4. Show that the periodic table is a collection of elements. 5. Collect and display common everyday elements on the periodic table. 6. Match elements to their respective symbols. 7. Classify elements as metals or nonmetals. 8. Distinguish between some selected properties of metals and nonmetals. 9. Summarize uses of selected metals and nonmetals. 10. Categorize the groups and periods in the periodic table. 11. Investigate the building blocks of elements or matter. 12. Differentiate between the subatomic particles in terms of their position in the atom and relative mass and charge. 13. Create models to represent different atoms. 14. Did use the basis for the arrangement of the table the elements of the periodic table. 15. Construct a board game using the first 20 elements of the periodic table based on their symbols and atomic number. 16. Identify by name some special groups in the periodic table.	include examples of diffusion and osmosis taking place. ● Collect labels of items in the home and identify the elements present in each of these items. Presentation will be done on padlet. ● Prepare a short presentation on the uses of metals and nonmetals in and around the home. Students will be at liberty to choose their method of presentation. ● Draw a diagram representing the structures of the first 20 elements and write the electronic configuration of each. ● Place unknown elements in the periodic table based on their electronic configuration.	

Unit topic: Chemical bonding, formulae and equations

Unit Description:

In this unit students will explore the electronic configuration of the first 20 elements and use the need for stability to demonstrate the formation of ionic, covalent and metallic bonds. They will participate in various activities aimed at helping them to understand how chemical formulae are written. Students would also learn how to write chemical equations through the use of innovative activities and laboratory investigations.

General Objectives:

On completion of this Section, students should:

1. Understand chemical reactions change one material into another and results in the formation of new substances.

Content:

At the end of this unit students will have knowledge of the following:

- In an atom the mass number is it some of the protons and neutrons for the atomic number is the number of protons.
- The electronic configuration describes the arrangement of electrons in energy levels or shells.
- There are a maximum of electrons that each energy level can hold. Atoms bond in order to achieve stability.
- In ionic bonding atoms transfer electrons where one atom loses and the other gains the electrons that were lost.

- The number of protons and electrons are equal in a neutral atom. Ions are formed when an atom loses or gains electrons.
- Ionic compounds are soluble in water conduct electricity and have high melting points.
- In covalent bonding atoms share electrons.
- There is no overall charge when atoms share electrons they shared electrons belong to each atom equally.
- Covalent compounds are insoluble in water they do not conduct electricity and they have low melting points.
- Metallic bonding is the bonding between metal ion and its delocalized electrons.
- This allows metals to conduct electricity by we of mobile electrons.
- A chemical formula shows the composition of atoms or elements in a substance.
- By using the charge of ions the chemical formula of ionic compounds can be determined.
- A chemical equation shows the reactants and products in a chemical reaction.
- When an equation is balanced equal numbers of each atom appear on both sides of the equation along with the respective state symbols.
- The main types of chemical reactions are oxidation, combustion, synthesis, decomposition and single displacement.
- In exothermic reactions heat is given off and heat is absorbed from the surroundings in endothermic reactions.

Learning Outcomes:

Upon completion of this section students should be able to:

1. Construct electron shell diagrams for the first 20 elements.
2. Show how ions are formed from loss or gain of electrons.
3. Use diagrams to represent I haven't Monday.
4. Use diagrams to represent covalent bonding.
5. Use diagrams to represent metallic bonding.
6. Write the chemical formula binary compounds using valances.
7. Right word and chemical equations for simple reactions.
8. State the law of conservation of mass.
9. Balance chemical equations.
10. Work cooperatively in groups.

Course Details

Date	Topics	Specific Objectives	1. Assignments	Resources
Week 4-8 Oct-Nov (20×40 mins)	Chemical bonding, formulae, and equations	1. Recall the symbols of the first 20 elements. 2. Calculate the number of each subatomic particle present in an atom or ion. 3. Deduce the pattern for determining electronic configuration of the first 20 elements. 4. Use the octet rule to explain why atoms bond.	● Draw dot and cross diagrams to represent ionic bonding. ● Draw diagrams to represent covalent bonding. ● Draw diagrams to represent metallic bonding.	

		5. Draw dot and cross diagrams to represent ionic bonding. 6. Draw diagrams to represent covalent bonding. 7. Draw diagrams to represent metallic bonding. 8. Formulate working definitions for ions, cation, anion, ionic bonding, covalent bonding and metallic bonding. 9. Investigate physical properties of ionic compounds. 10. Investigate physical properties of covalent compounds. 11. Write the formula of simple binary compounds using symbols and valances. 12. Translate word equations for simple chemical reactions into simple equations. 13. Investigate main types of reactions. 14. Cite examples of exothermic and endothermic reactions. 15. State and apply the law of mass conservation to write in balanced equation. 16. Investigate the law of conservation of mass using precipitation reactions. 17. Construct balance symbol and ionic equations for given information. 18. Use appropriate scientific language. 19. Make sure they are working safely	● Conduct experiment to investigate the physical properties of ionic and covalent compounds summarize findings in a suitable table. ● Correctly deduce and write the formulae of ionic and covalent compounds. ● Conduct experiments demonstrating the main types of reactions. ● Using examples differentiate between exothermic and endothermic reactions. ● Conduct experiments demonstrating the law of conservation of mass. Explained findings.	

Unit topic: Acids and Alkalis

Unit Description:

In this unit students with engage in activities to classify substances in their environment as alkalized and acids using different indicators on the pH scale. They will investigate reactions of acids and alkalis and represent these in balanced equations. Students will also investigate salts, their classification and preparation and note examples of neutralization reactions in daily life.

General Objectives:

On completion of this Section, students should:

1. Understand the importance of chemical reactions.

Content:

At the end of this unit students will have knowledge of the following:

- Acids have a sour taste and turn blue litmus red.
- Alkalis are soluble bases, have a soapy feel and turn red litmus blue.
- During neutralization reactions acids and bases completely react to form neutral solutions.
- Indicators are substances which change color in acids and alkalis.
- The pH scale measures the acidity and alkalinity of a substance. It runs from 0 to 14, with acids less than 7, alkaline is greater than 7 and a neutral Solutions at 7.
- Acids react with bases metals and carbonate to produce salts.
- Bases react with ammonium salts to produce ammonia and alkaline gas.

- Gases produced during acid reactions include hydrogen and carbon dioxide.
- Salts can be classified as soluble or insoluble. Insoluble salts can be prepared by precipitation mixing two soluble salts.
- Neutralization reactions in daily life include using bicarbonate of soda toothpaste, antacid and baking powder in cake making.

Learning Outcomes:

Upon completion of this section students should be able to:

1. Classify substances as acids and alkalis
2. Cite evidence to determine acidity or alkalinity of a substance
3. Research for specific pieces of information.
4. Create homemade acid base indicators.
5. Conduct investigations on acids and alkalis.
6. Work cooperatively in groups.
7. Navigate and manipulate digital content on website and storage devices.
8. Use word processing and presentation software to collaborate and communicate information.
9. Collaborate and communicate by posing ideas comments to and responding two Piers posts on the class wall.

Course Details

Date	Topics	Specific Objectives	1. Assignments	Resources
Week 9-13 Dec-Jan (20×40 mins)	Acids and Alkalis	1. State that Compounds can be classified as acids and alkalis. 2. Identify common acids alkalis and salts. 3. Interpret the pH scale. 4. Use pH paper and Universal indicator solutions to determine the pH of different substances. 5. Show that acid base indicators change color in acids and alkalis. 6. LIST THE NAMES OF NATURALLY OCCURING ACIDS AND ALKALIS. 7. Analyze and synthesize information from multiple sources. 8. Synthesize homemade indicators using materials found in the kitchen and garden. 9. Investigate household chemicals using acid base indicators. 10. Create individual pH scale from household substances. Investigate selected reactions of acids and alkalis. 11. Create a safety booklet dealing with handling of acids and Alkali. 12. Distinguish between soluble and insoluble salts. 13. Prepare an insoluble salt. 14. Cite practical examples of neutralization in daily life.	● Classify substances as acids or alkaline based on results of an indicator test. ● Create a video showing the process of preparing on homemade indicator. ● Creates pH scale a household chemicals. ● Create safety booklet. ● Prepare a sample of insoluble salt. ● Using everyday examples explain the process of neutralization. ● MYTH BUSTER - IDENTIFY MYTHS INVOLVING AND EXPLAIN THE 'MYSTERY' SCIENTIFICALLY.	

		15. Base conclusions and suggestions on evidence. 16. Show interest in the outcomes of experiments and investigations.		