SCIENCE

Structuring Competencies in a Definitive Budget of Work

Grade	**NINE**
Science Discipline/Component	**MATTER**
Grade Level Standard	At the end of Grade 9, learners have gained a a deeper understanding of the digestive, respiratory, and circulatory systems to promote overall health. They have become familiar with some technologies that introduce desired traits in economically important plants and animals. Learners can explain how new materials are formed when atoms are rearranged. They recognize that a wide variety of useful compounds may arise from such rearrangements. Learners can identify volcanoes and distinguish between active and inactive ones. They can explain how energy from volcanoes may be tapped for human use. They are familiar with climatic phenomena that occur on a global scale. They can explain why certain constellations can be seen only at certain times of the year. Learners can predict the outcomes of interactions among objects in real life applying the laws of conservation of energy and momentum.

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Domain	**PROPERTIES AND STRUCTURE OF MATTER.** Using their understanding of atomic structure learned in Grade 8, learners describe how atoms can form units called molecules. They also learn about ions. Further, they explain how atoms form bonds (ionic and covalent) with other atoms by the transfer or sharing of electrons. They also learn that the forces holding metals together are caused by the attraction between flowing electrons and the positively charged metal ions. Learners explain how covalent bonding in carbon forms a wide variety of carbon compounds. Recognizing that matter consists of an extremely large number of very small particles, counting these particles is not practical. So, learners are introduced to the unit—mole. **CHANGES THAT MATTER UNDERGO.** Learners explain how new compounds are formed in terms of the rearrangement of particles. They also recognize that a wide variety of useful compounds may arise from such rearrangements.
Performance Standard	The learners shall be able to: analyze the percentage composition of different brands of two food products and decide on the products' appropriate percentage composition
Content Standard	The learners demonstrate an understanding of… 1. the development of atomic models that led to the description of the behavior of electrons within atoms 2. how atoms combine with other atoms by transferring or by sharing electrons 3. forces that hold metals together

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CONTENT	LEARNING COMPETENCIES	CODE	NO. OF DAY/S TAUGHT	REMARKS
1. Electronic Structure of Matter	**1. Describe how the Bohr model of the atom improved Rutherford's atomic model**	**S9MT-IIa-21**		
	1.1 Create a historical development of the atom in different forms: song, poem, illustration, rap, skit/drama, etc.	S9MT-IIa-21.1.1	2	
	1.2 Compare and contrast the model of the atom of Bohr and Rutherford	S9MT-IIa-21.1.2	1	
	2. Explain how the Quantum Mechanical of the atom describes the energies and positions of the electrons	**S9MT-IIa-22**	1	
	2.1 Trace the scientific breakthroughs leading to the development of the quantum mechanical model of the atom	S9MT-IIa-22.2.1	1	
	2.2 Predict the probable location of electron/s in an atom (electron cloud, Heisenberg's Uncertainty Principle)	S9MT-IIa-22.2.2	1	
	2.3 Perform "Flame Test" to show excitation of electrons and describe electron configuration and write the correct electron configuration of given elements	S9MT-IIa-22.2.3	1	

	2.4 Describe the set of quantium numbers and complete the given set of quantum numbers for each given elements	S9MT-IIa-22.2.4	1	
	2.5 Supply the following data from the electron configuration such as: period number, group number, number of paired and unpaired electron/s, number of valence electron/s, and number of core electrons	S9MT-IIa-22.2.5	1	
	SUMMATIVE TEST		1	
1. Chemical Bonding	**1. Explain the formation of ionic and covalent bonds**	**S9MT-IIa-13**	1	
1.1 Ionic and Covalent Bonding	1.1 Differentiate metallic from nonmetallic elements and explain electronegativity, electron affinity, and ionization energy of elements in the periodic table	S9MT-IIa-13.1.1	1	
1.2 Metallic Bonding	1.2 Relate group number of the elements with Lewis Electron Dot Symbol (LEDS)	S9MT-IIa-13.1.2	1	
	1.3 Infer the characteristic of electrons (metal and nonmetal) by using the LEDS, its electronegativity and ionization energy values	S9MT-IIa-13.1.3	1	

	1.4 Describe chemical bond and its types: ionic bond and covalent bond in terms of transfer and sharing of electrons (polar and nonpolar) through illustration using LEDS	S9MT-IIa-13.1.4	1	
	1.5 Compute for formal charges for different elements in a given compound and select the best LEDS for compounds with resonance structures	S9MT-IIa-13.1.5	2	
	SUMMATIVE TEST		1	
	2. Recognize different types of compounds (ionic or covalent) based on their properties such as melting point,	**S9MT-IIb-14**		
	2.1 Enumerate and discuss different physical properties of ionic and covalent compounds	S9MT-IIb-14.2.1	1	
	2.2 Distinguish ionic from covalent compounds based on their physical properties	S9MT-IIb-14.2.2	1	
	2.3 Cite natural phenomena that uses different physical properties of ionic and covalent compounds (ex. Snowflakes, voltaic cells)	S9MT-IIb-14.2.3	1	
	3. Explain properties of metals in terms of their structure	S9MT-IIc-d-15		

	3.1 Explain electrical and heat conductivity in terms of the particulate nature of matter and the electronic structure of matter	S9MT-IIc-d-15.1	1	
	3.2 Show a model of the metallic bonding as a sea of electrons flowing within the metal	S9MT-IIc-d-15.2	1	
	4. Explain how ions are formed.	S9MT-IIe-f-16		
	4.1 Differentiate cations from anions based on their tendency to lose or gain electrons	S9MT-IIe-f-16.1	1	
	4.2 Show the formation of ions using the Lewis Electron Dot Symbols (LEDS)	S9MT-IIe-f-16.2	1	
	SUMMATIVE TEST		1	
2. The Variety of Carbon Compounds	**5. Explain how the structure of the carbon atom affects the type of bonds it form**	**S9MT-IIg-17**		
2.1 Carbon Atoms	5.1 Discuss why carbon is a unique atom (valence electron, bond length, strength, multiple bond formation, etc.)	S9MT-IIg-17.1	1	
2.2 Organic Compounds	5.2 Differentiate organic from inorganic componds (from its chemical formula, uses, properties)	S9MT-IIg-17.2	1	

	5.3 Determine the different uses of organic compounds and cite examples of each organic compound	S9MT-IIg-17.3	1	
	5.4 Find the properties of common organic compounds through experimentation (from Grade 9 Module)	S9MT-IIg-17.4	1	
	6. Recognize the general classes and uses of organic compounds	**S9MT-IIh-18**		
	6.1 Differentiate molecular, empirical, and structural (expanded and condensed) formulas	S9MT-IIh-18.1	1	
	6.2 Differentiate alkanes, alkenes and alkynes based on the presence of bonds and their physical properties	S9MT-IIh-18.2	1	
	6.3 Name different structures of hydrocarbons (alkanes, alkenes, alkynes, alcohol, aldehydes, ester, carboxylic acid, ether, amines, amides, etc.)	S9MT-IIh-18.3	2	
	6.4 Identify different functional groups and their uses in organic compounds	S9MT-IIh-18.4	1	
	SUMMATIVE TEST		1	
3. Mole Concept	**7. Use the mole concept to express mass of substances**	**S9MT-IIi-19**		
3.1 Mass	7.1 Differentiate molecular unit from formula unit and compute for the molecular	S9MT-IIi-19.1	1	

3.2 Moles 3.3 Percentage Composition of a Compound	7.2 Define mole and calculate for the number of moles of given compounds 7.3 Convert number of moles, mass, and number of particles from one unknown to **8. Determine the percentage** 8.1 Determine the percentage composition of each element in a given compound 8.2 Differentiate empirical and molecular formula 8.3 Calculate for the empirical and molecular formula of a compound given its	S9MT-IIi-19.2 S9MT-IIi-19.3 **S9MT-IIj-20** S9MT-IIj-20.1 S9MT-IIj-20.2 S9MT-IIj-20.3	1 1 1 1 1	
	SUMMATIVE TEST		1	
		TOTAL NUMBER OF DAYS	43	
		PERIODICAL TEST	2	
		TOTAL NUMBER OF DAYS	45	