

SCIENCE

Structuring Competencies in a Definitive Budget of Work

Grade	TEN
Science Discipline/Component	MATTER
Grade Level Standard	<p>At the end of Grade 10, learners realize that volcanoes and earthquakes occur in the same places in the world and that these are related to plate boundaries. They can demonstrate ways to ensure safety and reduce damage during earthquakes, tsunamis, and volcanic eruptions. Learners can explain the factors affecting the balance and stability of an object to help them practice appropriate positions and movements to achieve efficiency and safety such as in sports and dancing. They can analyze situations in which energy is harnessed for human use whereby heat is released, affecting the physical and biological components of the environment. Learners will have completed the study of the entire organism with their deeper study of the excretory and reproductive systems. They can explain in greater detail how genetic information is passed from parents to offspring, and how diversity of species increases the probability of adaptation and survival in changing environments. Learners can explain the importance of controlling the conditions under which a chemical reaction occurs. They recognize that cells and tissues of the human body are made up of water, a few kinds of ions, and biomolecules. These biomolecules may also be found in the food they eat.</p>
Domain	<p>PROPERTIES AND STRUCTURE OF MATTER. Learners investigate how gases behave in different conditions based on their knowledge of the motion of and distances between gas particles. Learners then confirm whether their explanations are consistent with the Kinetic Molecular Theory. They also learn the relationships between volume, temperature, and pressure using established gas laws.</p> <p>In Grade 9, learners learned that the bonding characteristics of carbon result in the formation of large variety of compounds. In Grade 10, they learn more about these compounds that include biomolecules such as carbohydrates, lipids, proteins, and nucleic acids. Further, they will recognize that the structure of these compounds comprises repeating units that are made up of a limited number of elements such as carbon, hydrogen, oxygen, and nitrogen.</p>

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	CHANGES THAT MATTER UNDERGO. Learners described how particles rearrange to form new substances. In Grade 10, they learn that the rearrangement of particles happen when substances undergo chemical reaction. They further explain that when this rearrangement happens, the total number of atoms and total mass of newly formed substances remain the same. This is the Law of Conservation of Mass. Applying this law, learners learn to balance chemical equations and solve simple mole-mole, mole-mass, and mass-mass problems.			
Performance Standard	The learners shall be able to: using any form of media, present chemical reactions involved in biological and industrial processes affecting life and the environment			
Content Standard	The learners demonstrate understanding of... 1. how gases behave based on the motion and relative distances between gas particles 2. the structure of biomolecules, which are made up mostly of a limited number of elements, such as carbon, hydrogen, oxygen, and nitrogen 3. the chemical reactions associated with biological and industrial processes affecting life and the environment			
Performance Task	The learners shall be able to: 1. Investigate the relationship between pressure and volume at constant temperature of a gas; 2. plot given values of volume against pressure at constant temperature of a gas; 3. Create a poem, song, poster, slogan, rap song, or the like in showing the importance of biomolecules to humans 4. Prepare product/s or material/s which involve chemical in a controlled set - up			
CONTENT	LEARNING COMPETENCIES	CODE	NO. OF DAY/S TAUGHT	REMARKS
1. Gas Laws	1. Investigate the relationship between:	S10MT-IVa-b-21		
1.1 Kinetic Molecular Theory	1.1 volume and pressure at constant temperature of a gas;			

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1.2 Volume, pressure, and temperature relationship 1.3 Ideal gas	1.1.a. Investigate the relationship between volume and pressure at constant temperature of a gas through an experiment (Ex. Marshmallow in a Syringe, Scuba Diver's Activity, Cartesian Diver Experiment, etc.)	S10MT-IVa-b-21.1.1.a	1	
	1.1.b. Plot given values of volume against pressure at constant temperature of a gas	S10MT-IVa-b-21.1.1.b	1	
	1.1.c Solve problems on volume and pressure relationship at constant temperature of a gas	S10MT-IVa-b-21.1.1.c	1	
	1.2 Volume and temperature at constant pressure of a gas;			
	1.2.a Determine the relationship of volume and temperature at constant pressure of a gas through experiment/observation/video clip/etc.	S10MT-IVa-b-21.1.2.a	1	
	1.2.b Describe the relationship between volume and temperature at constant pressure from a given data/ graph/simulation / video clips/etc.,	S10MT-IVa-b-21.1.2.b	1	
	1.2.c Calculate for each unknown on volume and temperature relationship at constant pressure of a gas	S10MT-IVa-b-21.1.2.b	2	
	1.3 Explains these relationships using the kinetic molecular theory	S10MT-IVa-b-21.1.3		
	1.3.a Cite and describe each Kinetic Molecular Theory assumptions	S10MT-IVa-b-21.1.3.a	1	

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	1.3.b Cite instances wherein KMT is observed in life experiences (ex. Discuss the KMT on hot air balloons, etc.)	S10MT-IVa-b-21.1.3.b	1	
	1.3.c. Show the relationship between volume and the number of moles of a gas (Avogadro's Law) by using data/videos/ simulation/ graph/etc.	S10MT-IVa-b-21.1.3.b	1	
	1.3.d Calculate for each unknown on volume and number of moles relationship	S10MT-IVa-b-21.1.3.c	1	
	1.3.e Describe and derive how Ideal Gas Equation was developed	S10MT-IVa-b-21.1.3.d	2	
	1.3.f Calculate for each unknown on the Ideal Gas Equation	S10MT-IVa-b-21.1.3.d	1	
SUMMATIVE TEST			1	
2. Biomolecules	2. Recognize the major categories of biomolecules such as carbohydrates, lipids, proteins, and nucleic acids	S10MT-IVc-d-22		
2.1 Elements present in biomolecules	2.1. Describe biomolecules and identify the different elements present in it (Give list of biomolecules with their respective chemical formula)	S10MT-IVc-d-22.2.1	1	
2.2 Carbohydrates, lipids, proteins, and nucleic acids	2.2.a Describe carbohydrates and its classification (mono - saccharide, disaccharide and polysaccharide)	S10MT-IVc-d-22.2.2.a	1	
2.2.1 Food Labels	2.2.b Describe lipid and differentiate the two classes of lipids (simple and complex)	S10MT-IVc-d-22.2.2.b	1	

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	2.2.c Identify biomolecules based on the result of physical and chemical tests or based on its function	S10MT-IVc-d-22.2.2.c	1	
	2.2.d Discuss the chemical nature of nucleic acid	S10MT-IVc-d-22.2.2.d	1	
	2.2.1.a Identify the different biomolecules present on food labels	S10MT-IVc-d-22.2.2.1.a	1	
	2.2.1.b Discuss the importance and the need in monitoring the amount of biomolecules in the body	S10MT-IVc-d-22.2.2.1.b	1	
	2.2.1.c Compose a song, poem, poster, slogan, rap song, and the like in showing the importance of biomolecules or prepare a dish which contains biomolecules for the following: athletes, construction workers, dancers, etc.	S10MT-IVc-d-22.2.2.1.c	2	
	SUMMATIVE TEST		1	
3. Chemical reactions	3. Apply the principles of conservation of mass to chemical reactions	S10MT-IVe-g-23		
	3.1 State and explain the "Law of Conservation of Mass" by using common chemical reactions around us (ex. Burning of wood/paper, photosynthesis, etc.) and its parts	S10MT-IVe-g-23.3.1	1	
	3.2 Balance given chemical equations	S10MT-IVe-g-23.3.2	1	
	3.3 Cite instances wherein chemical reactions are observed	S10MT-IVe-g-23.3.3	1	

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	3.4 Identify and describe the different types of chemical reactions	S10MT-IVe-g-23.3.4	1	
	3.5 Predict the products/s and balance each given combination reaction	S10MT-IVe-g-23.3.5	1	
	3.6 Predict the product/s and balance given decomposition reaction	S10MT-IVe-g-23.3.6	1	
	3.7 Predict the product/s and balance given single replacement reaction	S10MT-IVe-g-23.3.7	1	
	3.8 Predict the product/s and balance given double replacement reaction	S10MT-IVe-g-23.3.8	1	
	SUMMATIVE TEST		1	
	4. Explain how the factors affecting rates of chemical reactions are applied in food preservation and materials production, control of fire, pollution, and corrosion.	S10MT-IVh-j-24		
	4.1 investigate how temperature affects the rate of chemical reaction	S10MT-IVh-j-24.4.1	1	
	4.2 Describe how the nature of reactants affects the rate of chemical reaction	S10MT-IVh-j-24.4.2	1	
	4.3 Discuss how the physical state and the concentration of reacting materials affects the rate of chemical reaction	S10MT-IVh-j-24.4.3	1	
	4.4 Explain how the presence of catalyst affects the rate of chemical reactions	S10MT-IVh-j-24.4.4	1	
	4.5 Identify and suggest ways to control different chemical reactions in the environment	S10MT-IVh-j-24.4.5	1	

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	4.6 Prepare product/s or material/s which involve chemical in a controlled set - up	S10MT-IVh-j-24.4.6	1	
SUMMATIVE TEST			1	
TOTAL NUMBER OF DAYS			41	
PERIODICAL TEST			2	
OVERALL TOTAL NUMBER OF DAYS			43	