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DEPARTMENT OF EDUCATION

Lesson Exemplar for Science

Quarter 1
Lesson
2

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Lesson Exemplar for Science 7
Quarter 1: Lesson 2 (Week 2)
S.Y. 2024-2025

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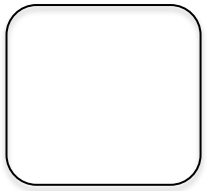
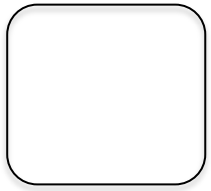
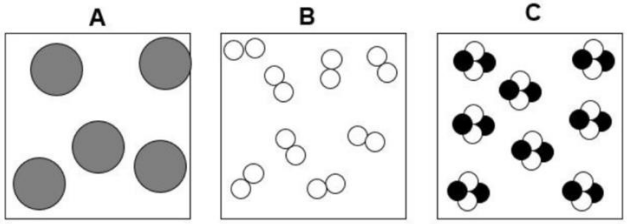
SCIENCE (CHEMISTRY) / QUARTER 1 / GRADE 7

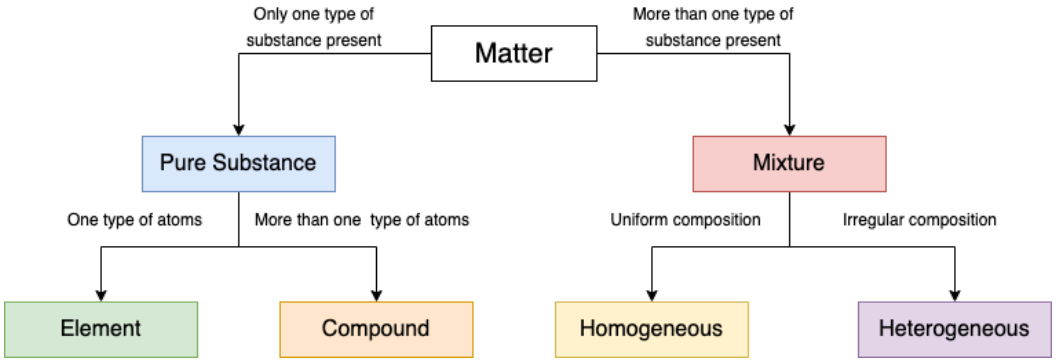
I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners shall learn that there are specific processes for planning, conducting, and recording scientific investigations
B. Performance Standards	By the end of the quarter, the learners shall recognize that scientists use models to describe the particle model of matter. They use diagrams and illustrations to explain the motion and arrangement of particles during changes of state. They demonstrate an understanding of the role of solute and solvent in solutions and the factors that affect solubility. They demonstrate skills to plan and conduct a scientific investigation making accurate measurements and using standard units.
C. Learning Competencies and Objectives	***Learning Competency*** The learners shall be able to: 1. describe the Particle Model of Matter as "All matter is made up of tiny particles with each pure substance having its own kind of particles."; and 2. describe that particles are constantly in motion, have spaces between them, attract each other, and move faster as the temperature increases (or with the addition of heat). ***Lesson Objectives:*** The learners shall be able to: 1. differentiate elements and compounds based on particle composition; and 2. explain how the Kinetic Molecular Theory describes the behavior of particles in terms of constant motion, spacing between particles, and the relationship between temperature and particle speed.
C. Content	• Pure Substances • Kinetic Molecular Theory of Matter
D. Integration	▪ Exploring the nature of matter fosters a sense of **curiosity** about the world around us. ▪ A basic understanding of KMT contributes to **scientific literacy**, allowing individuals to make informed decisions about their environment, and the products they use. ▪ **The critical thinking and problem-solving** skills developed in these lessons are valuable for various aspects of life beyond science

II. LEARNING RESOURCES
• Worksheet for Science 7 Quarter 1 – Week 2

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
1. Activating Prior Knowledge	**WEEK 2 -Day 1** **1. Short Review - Particle Party!** This activity bridges the gap between atomic models and Kinetic Molecular Theory (KMT). **Materials:** • Index cards (enough for each student) • Markers **Essential Questions for Review:** 1. What are atoms made of? (protons, neutrons, and electrons) 2. What does the particle model tell us about matter? (made of tiny particles) **Activity for Students:** 1. Imagine tiny particles representing atoms or molecules. On your index cards, draw these "partying particles." 2. Use arrows on your cards to show the movement of the particles. Represent "cold" particles with slow, short arrows on one side of the card while "hot" particles with fast, long arrows.	Distribute index cards and markers or make this their assignment before the end of Week 1. Briefly remind students about the atomic model learned in the previous lesson. Briefly discuss the drawings. Ask students to explain how their drawings relate to the particle model and the concept of temperature.

	  *"cold" particles* *"hot" particles* **Key Points for Review:** Particles are constantly moving (even in solids!), there are spaces between particles, and the speed of particle motion increases with temperature.	Reiterate this important concept as a springboard to the lessons for Week 2.
2. Establishing Lesson Purpose	**1. Lesson Purpose** • Introduce Pure substances – elements and compounds in our daily life • Connect scientific models with particles of pure substances  • Compare the models of elements, diatomic molecules and compounds based on what is seen in the conceptual model. • Build the bridge from particles of pure substances in relation to the concept of Kinetic Molecular Theory (KMT). • Explain the core principles of KMT: This includes understanding the constant motion of particles, the presence of spaces between them, and the relationship between temperature and particle speed. • Connect Thermal Energy and Particle Behavior: Students will establish the link between thermal energy and temperature. They will then explore how adding heat increases the kinetic energy and speed of particles within a substance, ultimately leading to changes in state or phase.	Introduce the Pure substances – elements and compounds. Teased the learners with some important elements and compounds they encounter in their daily lives. Tell them that the particles of these pure substances can be illustrated using a conceptual model. Then relate the model to the concept of Kinetic Molecular Theory (KMT) to explain the behavior of these "partying particles". Emphasize that this lesson aims to equip them with a foundational understanding of the Kinetic Molecular Theory (KMT) and its applications to particles of materials.

	2. Unlocking Content Vocabulary: Vocabulary Scramble! *Materials:* • Whiteboard or projector • Markers or pens (if using whiteboard) • List of KMT vocabulary words scrambled (e.g., TICELPAR, ONITMO, PERATREMTEU) • Optional: Stickers or small prizes for the winning team (increases engagement) *General Instructions for students:* 1. You will be divided into groups of 4 or 5. Think of a team name. 2. On the board, you will see the list of vocabulary words related to KMT, but the letters are scrambled. 3. Unscramble the words within a time limit given by your teacher. **Point for Discussion:** 1. How does particle motion relate to temperature? 2. Why are spaces between particles important?	You divide the class into teams of 4 or 5. Project or write on the board a list of vocabulary words related to KMT, but with the letters scrambled. Instruct teams to unscramble the words within a time limit of 3-5 minutes (depending on difficulty). Award points to the team who unscrambles the most words correctly within the time limit. After the time is up, reveal the unscrambled words and their definitions, can be in a slide deck or using written visuals. Discuss the meaning of each vocabulary word in the context of KMT by asking these questions. *Examples of Scrambled KMT Vocabulary Words:* • TICELPAR (Particle) • ONITMO (Motion) • SUFNOIDIF (Diffusion) • PERATREMTEU (Temperature) • CANEPS (Space) • EOIYVLCT (Velocity) • TRACATITRON (Attraction) • SEHPA (Phase) • NEREGY (Energy) • ILUQID (Liquid) • DLIOS (Solid)

		• OELEUCLM (Molecule) • ORCESF (Forces) • NIBOILG (Boiling Point) • SOILUBITLY (Solubility)
3. Developing and Deepening Understanding	**Week 2 - Day 2** **Lesson 1: Elements and Compounds** **1. Explicitation:** *Quick Questions:* • What are the basic units that make up all matter according to the particle model? (Particles) • How does the movement and arrangement of these particles affect the state of matter (solid, liquid, gas)? (Students should recall that movement and spacing influence the state.) **2. Lesson Activity: Think-Pair-Share** *Processing Questions:* Can you think of any examples of different types of matter? Do you think these materials are made up of the same tiny particles? Why or why not?  ***Source:*** https://chem.libretexts.org/@api/deki/files/294894/Classification_of_Matter_(1).png?revision=1	Begin with a quick review of the previous lesson on the particle model of matter. Ask students the quick questions. Allow brainstorming for various materials like water, sugar, iron, etc. After Processing the answers, show the figure to the class. Focus on the pure substances only. You can pre-empt Mixtures, but this will be tackled in detail in the succeeding weeks. After discussing properties and characteristics, even samples, of pure substances, ask the learners to evaluate the situations.

Pairwork: Which shows an element/compound?

Situation A: Consider tearing a piece of tissue paper. Tissue paper is made from smaller building blocks like cellulose fibers. These fibers are themselves made of carbon, hydrogen, and oxygen atoms linked together in a specific way. Ripping the tissue separates these complex fibers, not individual atoms.

Situation B: Imagine tearing a sheet of aluminum foil. Aluminum foil is mostly made up of a single element called aluminum (Al). When you rip it, you're separating tiny pieces of aluminum, each still being aluminum.

After the activity, summarize the discussion by asking the essential question.

Essential Question:
What generalization can you make for elements and compounds? How can you easily distinguish them?

3. Worked Example: Substance List

Students should be able to group them into elements and compounds. Instruct them to rewrite the substance' name in the box for elements and compounds.

The following is a list of substances. Group them into elements and compounds.

Baking Soda	Vinegar	Sugar	Shiny Coin	Graphite (Pencil Lead)
Aluminum Foil	Diamond	Stainless Steel	Sulfur Powder	Table Salt

Elements	Compounds

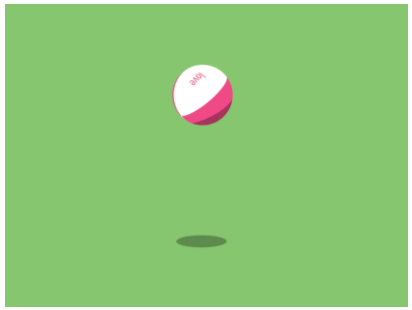
Learning Activity

- For the activity worksheet, refer to LAS 1 in the Worksheet for Science 7 Quarter 1 – Week 2

Week 2 - Day 3

Lesson 2: The Kinetic Molecular Theory (KMT) of Matter

1. Explicitation



Briefly show a video clip of a bouncing ball or a pot of boiling water. Ask the students: "What do you think is happening at the tiny particle level in these objects?" (focus on the movement of the particles)

2. Lesson Activity: Atomic Activities

Mini-activity 1: The Shivering Statue

Instructions: Ask students to stand perfectly still, like a statue. After a few seconds, ask them to silently shiver in place without moving their feet.

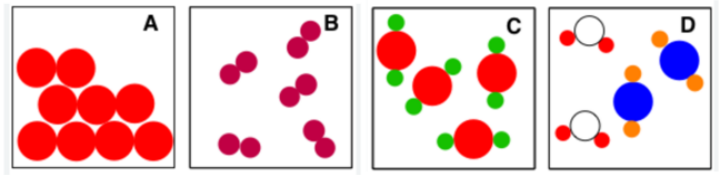
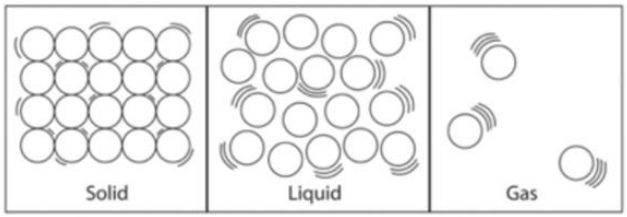
Process Question: Even though you looked like a statue, what was happening to the tiny particles in your body (atoms and molecules)? (They were still moving, but with less movement compared to shivering)

Explanation: Explain the concept of constant motion in KMT. Particles are always moving, even in solids where things seem still. The shivering activity demonstrated a small increase in particle movement.

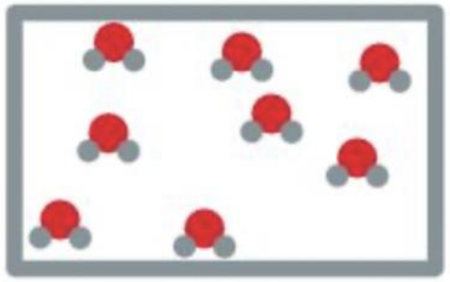
Present in class the "Atomic" (Mini) activities that they will do. You select student/s that will do the activity in front and then proceed to ask the guide questions. Make sure to properly explain the important concepts per activity.

	Mini-activity 2: Personal Space Instructions: Ask students to stand shoulder-to-shoulder, representing tightly packed particles in a solid. Then, ask them to take a comfortable step back, representing the spaces between particles in a liquid. Finally, ask them to spread out even further, representing the spaces between particles in a gas. Process Question: How did the space between you change throughout the activity? (The space increased as we went from solid to liquid to gas) Explanation: Explain that particles are not glued together. There are spaces between them, although these spaces may be very small, especially in solids **Mini-Activity 3: Particle Dance Party!** Instructions: Play some upbeat music and ask students to pretend they are tiny particles. Instruct them to move slowly at first, representing particles in a cold substance. As the music gets faster, instruct them to move more vigorously, representing particles in a hot substance. Process Question: How did the speed of your movement change with the music? (The movement became faster as the music got faster) Explanation: Explain the relationship between temperature and particle motion according to KMT. Higher temperatures correspond to faster-moving particles. The music simulated adding thermal energy, which increased the speed of the "particle dance party." **3. Worked Example: The Fizzy Fun of Diffusion** Investigate how different factors can influence the rate of diffusion with special focus on the effect of temperature on the movement of gas particles from an effervescent tablet. Refer to LAS 2 in the Worksheet for Science 7 Quarter 1 – Week 2 **Week 2 – Day 4**	After all the mini-activities, briefly summarize the key points of KMT: constant motion, spaces between particles, and the influence of temperature on motion. Mention that the upcoming activities (The Fizzy Fun of Diffusion) will allow them to further explore these concepts through hands-on experiences. Briefly introduce the concept of diffusion – the movement of particles from an area of high concentration to an area of low concentration. Explain that this phenomenon occurs in liquids. After doing LAS 2, discussion follows the next day, Day 4. Focus on the questions in the worksheet and clear misconceptions.

	Processing Questions after the activity, LAS 2: 1. How do your observations relate to the concept of temperature and particle movement according to Kinetic Molecular Theory (KMT)? 2. Explain why the bubbles seemed to move faster (or slower) in one container compared to the other. 3. Based on this experiment, what can you predict about the rate of diffusion of food coloring in warm water versus cold water? Why?	
4. Making Generalizations	**1. Learners' Takeaways** • Describe the key difference between an element and a compound in terms of their composition and particles. • How do particles behave in terms of their motion, spacing, and the relationship between temperature and particle speed as described by the KMT? **2. Reflection on Learning** **Ask students the question:** Imagine shrinking yourself down to the size of an atom! Based on what you learned about Kinetic Molecular Theory (KMT), describe what the world around you would look like and how you would interact with it. Consider scenarios like you are a solid, liquid or gas particle.	The questions shall be answered in an interactive discussion. Make sure to get the correct concepts out of the learners by using art of questioning. The teacher can always insert reflection in every lesson or activity if s/he deems necessary not just at the end of the lessons.

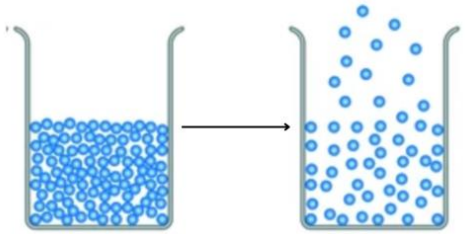
IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	**1. Formative Assessment** 1. An unknown white substance is heated and produced white smoke and black solid. What do you think is this substance? a) a mixture b) an element c) a compound d) a diatomic molecule 2. Water is composed of two atoms of hydrogen and one atom of oxygen. Which of the following can be the particle model for water?  3. What can you say about the movement (speed) of the particles of solid, liquid, and gas based on this model?  a) The speed of the particles is the same in all states of matter. b) Solid particles are the fastest to move compared to liquid and gas. c) Gas particles are the fastest among solids and liquids. d) The speed of the particles is not affected by temperature.	The teachers can employ the assessments and can give additional guide questions if s/he deems necessary. Have learners take this as a quiz. **Answer Key:** 1.C 2.C 3.C 4.A 5.C 6.D 7.C 8.D 9.C 10.A

4. Given this particle model of water, what do you think is the state it is in?



a) Gas
b) Solid
c) Liquid
d) Cannot be determined

5. What do you think is happening in the substance in terms of temperature change?



a) Temperature dropped and solidified the substance.
b) Temperature was increased, and the substance was liquified.
c) The liquid substance was heated and evaporated as gas.
d). The liquid substance was frozen and became solid.

6. How did the Kinetic Molecular Theory describe the particles of a solid?
a) Only vibrating in place.
b) Completely still and packed together.
c) Constantly moving with large spaces between them.
d) Constantly moving with very small spaces between them.

	7. What is the movement of the particles in a gas? a) Not moving at all. b) Moving very slowly and tightly packed together. c) Moving rapidly with large spaces between them. d) Moving very slowly with large spaces between them. 8. Which has a direct relationship with temperature? a) Size of its particles. b) Shape of its particles. c) Type of intermolecular forces present. d) Average kinetic energy (speed) of its particles. 9. In the "Personal Space" mini-activity, how did the space between students change as they went from solid to liquid to gas? a) It decreased slightly. b) It remained the same. c) It increased significantly. d) It completely disappeared. 10. The "Particle Dance Party" mini-activity demonstrated the relationship between temperature and particle motion according to KMT. As the music got faster, the particles (students) moved: a) Faster. b) Slower. c) The same. d) Erratically. **2. Homework (optional)**	The teacher may opt to give homework if s/he thinks the competency is not yet mastered

<table>
<tr><td rowspan="5">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="5"></td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>Others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:

▪ <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

▪ <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

▪ <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td><td></td></tr>
</table>