LESSON PLAN TEMPLATE

Lesson Title	Mastering the Balance: The Law of Conservation of Mass in Chemical Equations
Learning Area/s	Science
Name of Teacher/s	DEPED TAMBAYAN PH (Visit www.depedtambayanph.net)
Grade Level and Section	Grade 10
No. of Sessions	4 Sessions
References	None specified
Declaration of AI use	This lesson plan was co-created using Gemini AI to assist with unpacking competencies into a 4-session learning design, structuring activities, and assessment formulation.

Intentions. **Meaningful learning experiences are anchored in how we frame them. Start by deciding what you want learners to master by the end of the lesson – keep it clear and simple.**	
Learning Competency and Curriculum Standards:	**Learning Competency:** • Apply the principles of conservation of mass to balance chemical equations. **Content Standards:** • Several simple observations indicate if a chemical reaction has taken place. • Chemical indicators produce color changes with acids, bases, and salts. • Valid and reliable scientific investigations identify the dependent and independent variables and control other variables. • Many types of chemical reactions are important in our daily lives and in the biotic and abiotic parts of the environment. • Atoms rearrange during chemical reactions but abide by the principle of conservation of mass as illustrated in balanced chemical equations. • Rates of chemical reactions are critical in production and preservation of many useful materials. • Homeostasis is a self - regulating process that allows an organism to maintain stability. • Several theories provide lines of evidence about how organisms evolve. **Performance Standards:** By the end of the term, learners use household products as indicators to identify acids, bases, and salts and describe indicators that a chemical reaction has occurred. They describe important types of chemical reactions, use chemical equations and conservation of mass to represent and balance reactions, and explain impacts on the

	natural and built environments using secondary sources. Also, learners explain factors affecting reaction rates and exothermic and endothermic reactions, demonstrate valid and reliable investigations, describe homeostasis and feedback mechanisms, and explain biotechnology by identifying traditional and modern examples and debating societal, environmental, and ethical implications.			
	Session 1	**Session 2**	**Session 3**	**Session 4**
Learning Objectives:	Explain the Law of Conservation of Mass in the context of chemical reactions. Identify the reactants and products in a given chemical equation representing common Filipino household reactions.	Differentiate between coefficients and subscripts in a chemical equation. Count the number of atoms of each element on both sides of a chemical equation.	Apply the trial-and-error method to balance simple chemical equations. Demonstrate persistence and precision in achieving mass balance.	Balance complex chemical equations related to environmental and biological processes. Relate the importance of balanced equations to real-world Philippine contexts such as fermentation or pollution control.
Learner Context:	Learners demonstrate a strong preference for visual and kinesthetic activities. While they can identify changes in matter (e.g., rusting of iron or cooking), they struggle to articulate that mass is conserved during these transformations. Some learners face barriers with mathematical abstraction, requiring concrete analogies to bridge conceptual gaps. They are generally cooperative during group tasks and show high engagement when	Learners often confuse the function of subscripts and coefficients, leading to errors in atom counting. They perform better when using physical manipulatives. A few learners with numeracy difficulties require additional scaffolding in multiplying coefficients by subscripts. Their interest is piqued by gamified activities and peer-to-peer tutoring.	The class shows a mix of readiness; some grasp the 'balancing act' quickly, while others need repetitive practice. Many learners are motivated by 'puzzle-solving' tasks. Barriers include a tendency to change subscripts instead of coefficients, which requires constant monitoring and correction during the activity.	Learners are now more confident but require reinforcement on multi-element equations. They show significant interest in how chemistry affects their local environment (e.g., air quality in cities). They respond well to task-based learning that has a 'mission' or 'story' attached to it.

	lessons relate to local experiences like food preparation.			
Learning Experience. **A learning experience is like a thoughtfully designed journey. Each activity and interaction builds towards meaningful understanding and growth. Identify activities and interactions to help learners gain knowledge, skills, or understanding in a purposeful way.**				
Pre-Lesson:	**The Adobo Mystery:** Show a picture of ingredients for Chicken Adobo versus the final dish. Ask: 'If we weigh all ingredients before cooking and the final dish plus the steam/aroma, will the total mass change?'	**The Jeepney Passenger Count:** Use an analogy of a Jeepney. If '2 Jeepneys' (coefficient) each have '10 seats' (subscript), how many total seats are there? Compare this to chemical formulas.	**The Seesaw Challenge:** Display a virtual seesaw that is tilted. Ask: 'What can we add to either side to make it perfectly level without changing what the objects are?'	**Pollution Patrol:** Show a video clip of smog in Metro Manila. Explain that scientists use balanced equations to calculate how much fuel produces how much exhaust.
Flow:	1. **Active Retrieval:** Review physical vs. chemical changes using 'Flash-Cards' (Scaffolding). 2. **Concept Discovery:** Teacher demonstrates a simple reaction (vinegar and baking soda) on a digital scale to show mass remains constant (Check for Understanding). 3. **Social Learning:** In small groups, students map out 'Reactants' and	1. **Visual Modeling:** Use colored bottle caps (tansans) to represent different atoms (e.g., Red for Oxygen, Blue for Hydrogen). 2. **Scaffolding:** Demonstrate the 'Inventory Method'—listing elements and counting atoms for unbalanced equations on a T-chart. 3. **Active Retrieval:** Students practice counting atoms in equations for photosynthesis	1. **Step-by-Step Modeling:** Teacher demonstrates balancing the equation for the formation of table salt (NaCl), emphasizing NEVER changing subscripts (Scaffolding). 2. **Guided Practice:** Students balance equations on mini-whiteboards, starting with 2-element reactions. 3. **Social Learning:** 'Relay Balancing'—groups compete to	1. **Active Retrieval:** Quick-fire round of balancing simple equations as a warm-up. 2. **Contextualized Task:** Groups are assigned 'Environmental Missions'—balancing equations for the fermentation of coconut sap (tubâ) or the neutralization of acid rain on local limestone monuments. 3. **Elaboration:** Discussion on why 'Conservation of Mass' matters in

	'Products' using local examples like the combustion of LPG in their kitchens. 4. **Abstraction:** Define the Law of Conservation of Mass using the 'Nothing is lost, nothing is created, everything is transformed' principle.	(relevant to local rice farming). 4. **Check for Understanding:** 'Peer-Pair-Repair'—students swap their atom inventories to check for counting errors.	balance an equation on the board, with each member performing one step. 4. **Check for Understanding:** Teacher circulates to identify students who are still attempting to change subscripts.	industry (e.g., medicine production in the Philippines). 4. **Summative Check:** Individual assessment featuring a mix of simple and complex equations.
Learning Resources:	● Laptop and Projector ● Digital Weighing Scale ● Baking Soda and Vinegar ● Printed Activity Sheets on Reactants/Products	● Colored Bottle Caps (Tansans) ● Whiteboard Markers ● Smart TV for Interactive Slide Simulation ● Worksheets for Atom Counting	● Mini-whiteboards and markers ● PowerPoint presentation with 'Balance the Scale' animations ● Step-by-step balancing guide handouts	● Case study cards on local environmental issues ● Laptops for research (if available) ● Comprehensive Formative Test Paper
Opportunities for integration:	Integration with TLE (Cookery) regarding ingredient measurements and English (Technical Writing) for labeling scientific components.	Integration with Mathematics (Distributive Property) in multiplying coefficients and subscripts.	Integration with Values Education (Equity and Balance) and Mathematics (Algebraic thinking).	Integration with Araling Panlipunan (Environmental Issues in the Philippines) and Health (Effects of pollutants).
Assessment. **Assessments reveal what learners have gained and what they still need help with. These are helpful in providing you with information to guide your future instruction throughout the entire session.**				
Formative Assessment:	**The Scale Check:** A quick 'Exit Ticket' where students must identify the total mass of	**Atom Inventory Challenge:** A timed worksheet where students must correctly	**The Balancing Board:** Students must balance three equations of increasing	**Mastery Test:** A 10-item assessment where students must balance equations

	products if given the mass of reactants in a sample Filipino charcoal burning scenario.	count atoms for five different chemical equations related to Philippine environmental issues.	difficulty. Success is measured by the correct placement of coefficients and the matching atom counts.	and explain in 1-2 sentences how the Law of Conservation of Mass is shown in their answer.
Ways Forward. **Meaningful learning can also happen beyond the classroom – for both the learners and the teacher. Pause and reflect on what happened today.**				
Extended learning opportunities:	Ask students to observe one chemical change at home (e.g., ripening of a mango) and list what they think are the 'reactants' involved.	Provide a 'Challenge Sheet' with complex formulas (e.g., fertilizers used in local farms) for advanced learners to inventory.	Online simulation (PhET) link provided for those with internet access to practice balancing in a gamified environment.	**Community Scientist:** Research one local industry (e.g., sugar milling, fish sauce making) and find one chemical reaction involved in their process.
Reflections:	Reflect on whether the 'Adobo' analogy effectively bridged the gap between daily life and the Law of Conservation of Mass.	How did the use of bottle caps improve the learners' ability to distinguish between coefficients and subscripts?	Which specific equations caused the most difficulty, and how can the step-by-step model be refined for the next session?	Evaluate the 'Environmental Missions'—did the real-world context increase the accuracy of their balancing compared to abstract practice?