

LESSON PLAN TEMPLATE

Lesson Title	Energy Exchange: Exploring Exothermic and Endothermic Reactions
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: - Identify that chemical reactions may be exothermic or endothermic. 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
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	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:	- Define exothermic and endothermic reactions in the context of energy transfer. - Identify signs of energy change in chemical reactions based on temperature observations.	- Distinguish between exothermic and endothermic reactions through real-world Philippine examples. - Explain the practical applications of energy-changing reactions in daily life.	- Conduct a controlled investigation to measure temperature changes in common chemical reactions. - Analyze data to classify reactions as exothermic or endothermic.	- Interpret energy profile diagrams for exothermic and endothermic reactions. - Summarize the importance of energy changes in biological and environmental processes.
Learner Context:	Learners demonstrate high engagement when presented with visual demonstrations but often confuse the direction of heat flow (system vs. surroundings). While they have a strong grasp of basic chemical changes from previous weeks, several students struggle with abstract scientific terminology. A significant portion of the class prefers tactile learning experiences but may find it difficult to articulate their	Students show a strong interest in how science applies to their community, such as in local cooking methods or traditional medicine (e.g., warm poultices). However, a barrier exists for some students who lack consistent access to digital resources at home, making classroom-based visual aids and printed materials crucial. Many learners excel in group discussions when allowed to use familiar local contexts.	The class is highly motivated by hands-on laboratory work but shows varied proficiency in using measuring instruments like thermometers. Some learners exhibit 'science anxiety' when handling chemicals, requiring clear safety protocols and step-by-step guidance. Their strength lies in collaborative problem-solving during experimental procedures.	As the week concludes, learners have mastered the 'feel' of the reactions but struggle to translate this into graphical representations (energy diagrams). They are increasingly curious about global issues like the 'Greenhouse Effect,' which provides a window for environmental integration. Visual learners will benefit from color-coded graphs.

	observations in written form without guided prompts.			
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:	● Quick Recall: A 3-minute 'Think-Pair-Share' where students list three chemical changes they observed at home this morning (e.g., frying an egg, lighting a stove). ● Prediction Activity: Students touch a small pouch of laundry detergent in their palm, then add a drop of water, predicting if it will feel 'hot' or 'cold'.	● Visual Stimulus: Display a picture of a 'Banaue Rice Terraces' sunrise and a 'Mount Mayon' eruption, asking which event involves more visible energy release. ● Anticipation Guide: A checklist of 'True or False' statements about heat and chemistry to be revisited at the end of the session.	● Safety Drill: A 5-minute review of laboratory safety rules and proper thermometer handling. ● Hypothesis Setting: Students write down their predicted temperature change for mixing vinegar and baking soda.	● Memory Game: A quick matching game on the board where students pair 'Exothermic' with 'Releases Heat' and 'Graph A' with 'Graph B'. ● Mental Warm-up: 'Imagine you are a molecule. Do you need a push (energy) to get over the hill?'
Flow:	● Introduction: Define 'System' and	● Modeling: The teacher demonstrates the	● Guided Investigation: Students work in pairs	● Direct Instruction: Use the 'Energy Hill'

	'Surroundings' using a Filipino 'palayok' (clay pot) analogy to explain where heat goes. • Direct Instruction (Scaffolding): Present a slideshow showing the molecular view of bond breaking (requires energy) and bond forming (releases energy). • Active Retrieval: 'Concept Check' using flashcards where students raise 'EXO' for heat release and 'ENDO' for heat absorption based on short scenarios. • Social Learning: In small groups, students categorize images of local activities (e.g., 'pagluluto')	'Self-Heating Can' technology (often used in emergency kits) and explains the exothermic reaction inside. • Social Learning (Jigsaw): Groups are assigned specific Filipino contexts: 'Paggawang Asin' (Salt making), 'Pagluluto sa Pugon' (Hearth cooking), and 'Instant Cold Packs' for sports injuries. They identify if these are exo or endothermic. • Scaffolding: Provide a 'Sentence Frame' worksheet to help students explain their reasoning (e.g., 'The reaction is _____ because heat moves from _____ to _____')	to perform two mini-experiments: 1) Vinegar + Baking Soda, and 2) Water + Solid Laundry Bleach or Detergent. • Scaffolding: A pre-formatted data table is provided to ensure students record 'Initial Temperature' and 'Final Temperature' accurately. • Check for Understanding: The teacher circulates, asking pairs: 'Is the thermometer reading going up or down? What does that tell you about the energy?' • Data Analysis: Students calculate the Change in Temperature (ΔT) and determine the reaction type based on their empirical	analogy to explain Activation Energy and Enthalpy. Draw two graphs: one where products are lower than reactants (Exo) and one where they are higher (Endo). • Social Learning: 'Draw-and-Explain' - In groups, students use Manila paper to draw a large energy profile for a specific Philippine process (e.g., Photosynthesis). • Active Retrieval: 'Identify the Error' - The teacher shows a purposely incorrect energy diagram, and students must find and fix the mistake. • Checks for Understanding: Use 'Fist-to-Five'
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	vs. 'pagtunaw ng yelo') into energy-releasing or energy-absorbing categories. ● Check for Understanding: Use a 'Cold Call' technique to ask students to explain why a burning match feels hot using the term 'exothermic'.	____.'). ● Active Retrieval: A 'Gallery Walk' where groups critique each other's categorization of local reactions.	evidence. ● Social Learning: Pairs compare their ΔT values with other groups to discuss consistency and variables.	to gauge student confidence in reading the energy graphs. ● Synthesis: Discussion on how photosynthesis (endothermic) and cellular respiration (exothermic) maintain the balance of life.
Learning Resources:	● PowerPoint presentation on Energy in Chemical Reactions. ● Detergent powder and water samples. ● Visual cards depicting 'System' and 'Surroundings'.	● Printed Activity Sheets with local scenarios. ● Chart paper and markers. ● Video clip of a volcano eruption or forest fire (if technology is available).	● Vinegar, baking soda, detergent powder, plastic cups. ● Thermometers (or digital sensors if available). ● Laboratory Manual/Worksheet.	● Projector for displaying energy graphs. ● Manila paper and color-coded markers (Red for Exo, Blue for Endo). ● Blank graph templates for scaffolding.
Opportunities for integration:	● Physical Education: Discussing how the body releases heat (exothermic) during 'Arnis' practice or exercise.	● Social Studies (AP): Discussing the impact of volcanic eruptions (exothermic events) on Filipino communities and agriculture.	● Mathematics: Calculating the difference in integers (Final Temp - Initial Temp) to determine the value of ΔT.	● Biology/Environmental Science: Linking endothermic reactions to Photosynthesis and exothermic reactions to Global Warming and

				Homeostasis.
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:	Exit Slip: Students must write one sentence explaining the difference between exothermic and endothermic reactions using the 'System/Surroundings' concept.	Categorization Matrix: A worksheet where students classify 5 local scenarios as exothermic or endothermic with a brief justification.	Laboratory Check-point: Successful completion of the data table and the correct classification of the two reactions based on the measured data.	Summative Quizlet/Short Quiz: 10-item assessment focusing on identifying reaction types from descriptions, data, and graphs.
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:	Students are tasked to find one household product that mentions 'flammable' or 'keep cool' and explain the energy implication in their journals.	Interview a family member about how they use 'apoy' (fire) or 'yelo' (ice) for health or work, and identify the reaction type involved.	Students write a 'Lab Reflection' on why it is important to keep variables (like the amount of water) the same in their experiment.	Creative Task: Create a poster or a 'Hugot Line' (witty quote) that uses the concept of exothermic or endothermic reactions to describe a human emotion (e.g., 'Ang

				galit ay exothermic, naglalabas ng init!").
Reflections:	• Which part of the 'system vs. surroundings' analogy did the students find most helpful? • Were the visual aids sufficient for the learners with lower reading proficiency?	• Did the local examples help bridge the gap between abstract theory and reality? • Which groups required the most 'Sentence Frame' support?	• How many students successfully calculated ΔT without assistance? • Were there any misconceptions regarding the 'coldness' of the endothermic reaction (e.g., thinking energy was lost rather than absorbed)?	• Which students still require intervention on graph interpretation? • How effectively did the 'Energy Hill' analogy work for the visual learners?