Lesson Plan

Student Teacher	Linda Bouguila		Cooperating Teacher Supervisor		
Date		Start/End Time	8:05 – 8:55	Room	

Title of lesson	Chapter 4: Changes in Matter	Grade level	Grade 10
Subject	*Science of the Environment (SE)*	Topic	*Endothermic and Exothermic Reactions*
Relevance	*Students have learned about chemical reactions and how different molecules react to produce products. Reactions happen daily in our environment; some reactions absorb energy from our environment while others liberate energy.*		
Materials/Resources Required	*Computer for reading assistance,* *Pencil/pen* *Paper (provided)*		
QEP Subject Area Competencies	• *Makes the most of his/her knowledge of science and technology: students are given situations that encourage them to form their opinion.* • *Communicates in the languages used in science and technology: students are given scientific vocabulary and are instructed to use it. Students also make connections between concepts.*		
Learning Objectives	• *Students can distinguish between endothermic and exothermic reactions based on perceptible signs (e.g. temperature variations).* • *Students can distinguish between endothermic and exothermic reactions based on energetic calculations (bond energies).*		
Essential Question(s)	*How do reactions contribute to heat changes within our environment?*		

Lesson Timing	Introduction (hook):	Students will know:
2 min *8 min*	*Intro: what do we remember from last class? Anything special to share? Science facts?* *At the beginning of this chapter, we addressed the concept of matter and its conservation, as established by Antoine de Lavoisier.* *What is matter? What does conservation of matter mean?* *As mentioned by Lavoisier, matter is transformed. What are the different transformations possible?* *What are some examples of chemical changes/reactions?* *Showing them a picture of a cake baking: what is happening in this photo? What type of change is this? How do you know?*	*Students will know:* • *that matter is what forms all of our environment, everything is made of matter;* • *that matter within the system that is our universe is never created nor destroyed, it is only transformed;* • *that transformation of matter can occur through chemical, physical, or nuclear changes;* • *some examples of chemical changes/reactions.*

	Does heat play a role in this reaction? What role is it?	
10 min 20 min	Development (Learning activities – step by step sequential procedure): *Chemical reactions can be classified into two types depending on whether they absorb or release energy.* • *An endothermic reaction is a chemical change that absorbs energy.* • *An exothermic reaction is a chemical change that releases energy.* *The energy transfer occurs between the system of the reaction and the environment.* *Chemically speaking, what makes a reaction release or absorb energy? It is the composition of the molecule and the change it needs to undergo as part of the reaction.* • *Students will be introduced to bond energy.* • *Breaking a bond requires energy, forming one releases energy. The energy difference is what determines whether a reaction overall will release or absorb energy.* • *Students will be shown tables of bond energies, and will be shown how to calculate the bond energy for one molecule. They will then be asked to calculate the bond energy for all molecules of a reaction, in pairs or individually.* *We will then share as a class to compare, and we will calculate the energy of products – energy of the reactants.*	Students will understand: *Students should be able to:* • *List the different types of changes that can occur to matter (chemical, physical, and nuclear);* • *Explain what a chemical change means and give an example;* • *Define an exothermic reaction in terms of energy release;* • *Define an endothermic reaction in terms of energy absorption;* • *explain what bond energy represents;* *Students should also be able to connect the concept of bond energies to balancing equations. The coefficients that are in balanced equations are used to calculate the number of molecules involved in a reaction and play a critical role in the multiplication of bond energies.*
		Students will do: *Students will be able to apply the calculations of bond energies to deduce the nature of a reaction as endo or exothermic.* Cross Curricular Competencies: • *Solves problems:*

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<td rowspan="6">10 min</td>
<td rowspan="2"></td>
<td>students will develop their problem-solving skills. Problem-solving is not a linear process.
• Cooperates with others:
through group work, students will develop cooperation skills. Solely working together does not mean cooperation, but contributing to team effort, participating actively, and exchanging points of views are aspects that develop cooperation skills.</td>
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<td>Broad Areas of Learning:
Environmental Awareness:
Students will be encouraged to develop an active relationship with their environment while maintaining a critical attitude towards the exploitation of the environment. By being introduced to the heat exchange between systems and the environment, students will have a greater sense of the relationship between human beings and the world.
Universal Design for Learning / Differentiation
Information and content will be digital and in hard copy to accommodate different needs. Students will be given oral and written opportunities to express their concerns, as well as their learning progress.</td>
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<td>Closure (transition):

As a closing activity, I will give 2 different reactions to students in the class (so that students sitting next to one another are working on a different reaction to be done individually) and they will need to:
1. Calculate the bond energy of each reactant and product,
2. Give the overall energy of the reaction,
3. Deduce if it is endo or exothermic.

I will allow students to complete it prior to next class if they need more time, but I will pick it up prior to next class in order to get an idea of how much understanding they have.

<u>Extension / Hard scaffolding:</u></td>
<td>FORMATIVE - Assessment FOR learning:
Oral assessment at the beginning of class in the form of a class discussion, sharing of ideas.
FORMATIVE - Assessment AS learning:
The students calculating the bond energies and sharing while learning will give them (and myself) a sense of their understanding.
"Exit ticket" given at the end of class.
SUMMATIVE - Assessment OF learning:
N/A</td>
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	If students are done before time, a worksheet will be ready as an assessment of learning for students to exhibit their learning. Furthermore, this can help students develop group skills as they are allowed to work in groups of maximum 3.	

Equity, Diversity & Inclusion (EDI) Considerations:

Mentioning Antoine de Lavoisier and his wife Marie-Anne Lavoisier, who also greatly contributed to scientific advancements despite her husband's name being mentioned. She translated many scientific publications into French and published his memoirs after he passed.

Further Considerations:

Group work is optional but available for some parts of the lesson,
The computer is allowed for individuals who require technological assistance.