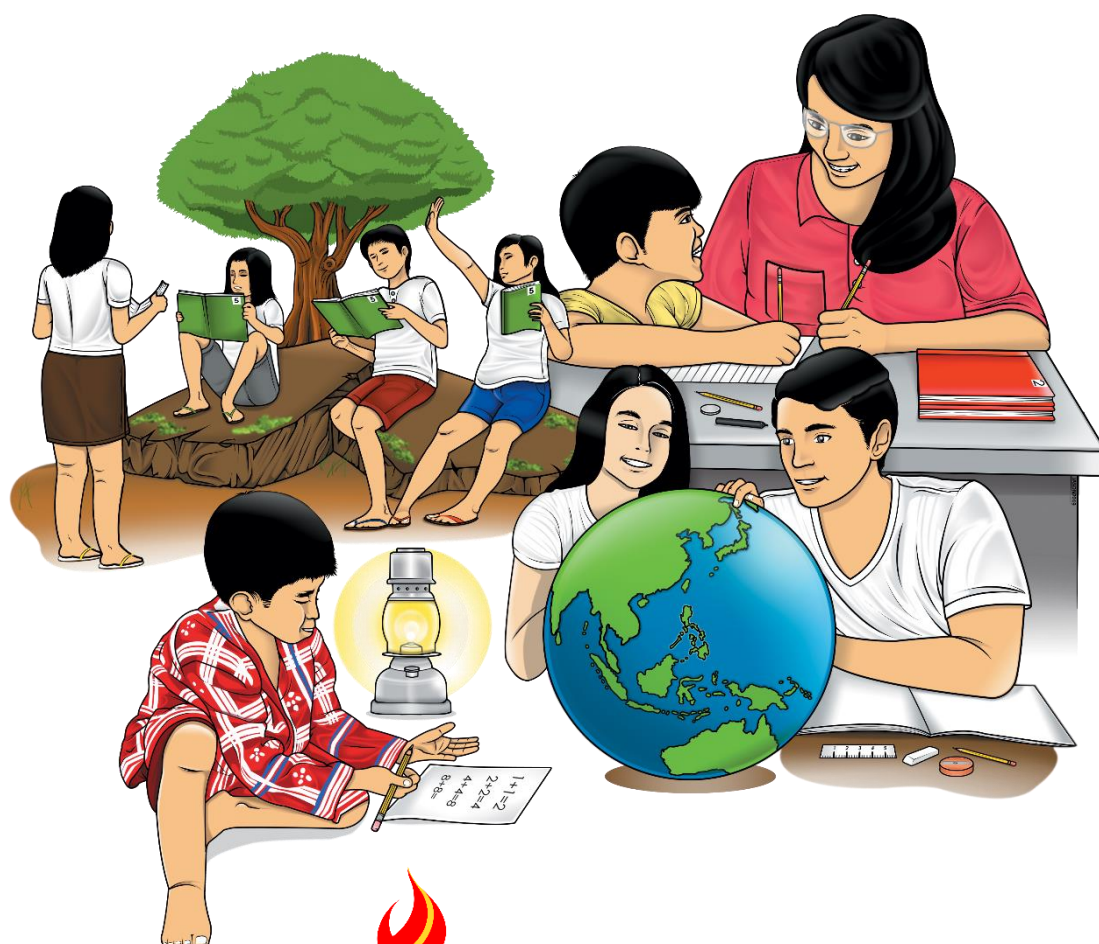


Earth Science for Stem

Quarter 1 – Module 7: Formation of Fossil Fuels



Earth Science for STEM
Alternative Delivery Mode
Quarter 1 – Module 7: Formation of Fossil Fuels
First Edition, 2021

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Earth Science for STEM

Quarter 3 – Module 7:

Formation of Fossil Fuels

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

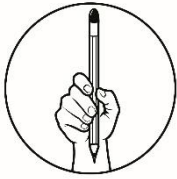


What I Need to Know

This module was designed and written with you in mind. It is here to help you master the nature of Biology. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

After going through this module, you are expected to:

1. identify the components of a fossil fuel;
2. discuss how fossil fuels are formed; and
3. differentiate the three major types of fossil fuels formation



What I Know

Read and analyze the following questions. Choose the letter of the best answer. Write your answer on a separate sheet of paper.

1. Coal is considered as a non-renewable energy source because _____.
A. it is sustainable
B. it is expensive to mine
C. it takes millions of years to form
D. it can be regenerated or replaced

2. Fossil fuels formed million years ago from different materials. Which of the following are its components?
1. remains of bacteria 3. remains of all vegetation
2. remains of animals 4. remains of volcanic ashes

A. 1, 2 and 3 B. 1, 2 and 4 C. 1, 3 and 4 D. 2, 3 and 4

3. Which of the following contribute to the formation of fossil fuels?
A. water and air C. carbon and oxygen
B. heat and pressure D. oxygen and carbon dioxide

4. Coal is one of the major types of fossil fuels. In which types of organic matter does coal come from?
A. mostly algae C. dissolve minerals from rocks
B. marine organisms D. forest trees, plants and marshes

5. Which of the following statement is correct?
A. Natural gas is not a fossil fuel.
B. Coal, natural gas, and oil are fossil fuels.
C. Fossil fuels are man-made energy source.
D. Coal is the most expensive energy source in the world.

6. Which of the following is an example of non-renewable energy?
A. coal B. solar C. water D. wind

7. Which energy resource is derived from natural organic materials?
A. fossil fuels B. geothermal C. solar D. water

8. Which of the following statements is/are correct?
I. Philippines has the largest coal production in the world.
II. Oil, coal, and natural gas are examples of renewable energy.
III. Non-renewable energy is finite; they can't be used for a second time.

A. I only B. II only C. III only D. I and II

9. Malampaya is one of the fossil fuel reservoirs of the Philippines situated at the island of Palawan. What type of fossil fuel is harnessed in it?
A. coal B. coal and oil C. natural gas D. oil
10. Based on the Department of Energy 2017 power statistics, coal is the main source of energy in the Philippines. What do you think might happen if coal reserves run out?
A. It will result to decreasing number of air pollutants.
B. It will decrease the energy resources present in the Philippines.
C. It will not affect the Philippine economy because it is an infinite resource.
D. Both A & B
11. Which among the following fossil fuels is the cleanest, odorless and colorless?
A. coal B. coal and oil C. natural gas D. oil
12. Which of the following is the correct increasing order of the types of coal based on the quality?
A. anthracite, bituminous, subbituminous and lignite
B. anthracite, lignite, bituminous and subbituminous
C. lignite, anthracite, subbituminous and bituminous
D. lignite, subbituminous, bituminous and anthracite
13. Which of the following is the chronological order of fossil fuel formation?
I. They are then able to turn it into products we can use, such as petrol and diesel.
II. Millions of years ago the remains of prehistoric plants and animals are buried at the bottom of the Earth.
III. The plant and animal remain were altered chemically by this process, and slowly changed into crude oil and natural gas.
IV. The mud sediment was buried by more sediments, and it started to change into rock as the temperature and pressure increase.

A. I, II, III, IV B. I, III, II, IV C. II, IV, III, I D. II, III, IV, I
14. What are the essential factors involved in the formation of fossil fuel?
A. Pressure and temperature
B. Pressure and low oxygen environment
C. Pressure, temperature and low oxygen environment
D. Pressure, temperature and high oxygen environment
15. Which of the following fossil fuel is formed from organic materials which are mostly algae?
A. carbon B. natural gas C. oil D. oil and coal

Lesson**7**

How fossil fuels are formed?

Fossil fuels provide almost 90% of the world's energy supply. Coal, oil, and natural gas are types of fossil fuels formed from the remains of dead plants and animals. They are classified as non-renewable resources, meaning there is a finite source and a possible run-out of supply might happen if we do not consume them wisely.



What's In

Memory Work Review

There are five important terms below associated with the previous lesson. Choose the correct letter which best describes the word.

1. Ore	A. It is naturally occurring solid matter that has a metal inside it. B. It is a man-made material that contains valuable minerals.
2. Mining	A. It is a process by which oil industries use to produce cheaper fuel. B. It is a process of extracting valuable materials such as gold.
3. Minerals	A. It is solid and have crystal structure. It is naturally occurring material. B. It is a consolidate aggregate of rocks.
4. Open-pit Mining	A. It is the most common type of mining that involves making a big hole (or pit) in the ground. B. It involves the removal of a thin strip of overburden (earth or soil) above a desired deposit.
5. Underground Mining	A. It is used to extract the rocks, minerals and other precious stories that can be found beneath the earth's surface. B. It is used to extract ore minerals near the surface of the earth.



Notes to the Teacher

As a facilitator always instructed your learners to carefully read and analyze the content and activities written in the module. Asks them about knowledge they obtained and achieved as they go through the module.



What's New

It's all About Transportation!

How do students like you normally go to school? Do you ride on a motorcycle? Buses? Or *taxi*? There are different modes of transportation in the Philippines that make our life more convenient and easier, the most common and traditional are *Jeepneys*. Air transportation like aircrafts, water transportation like ferries, and automobile industry like grab and motor-taxi are some of the major ways and transportations that really help in transporting goods and services and play a major role in the economy.

List down five major modes of transportation in the Philippines and their energy sources.

Mode of Transportation	Source of Energy
1.	
2.	
3.	
4.	
5.	

Guide Questions:

1. Among the five modes of transportation, which is the most common?
2. What is the common source of energy of the different modes of transportation?
3. What do you think is the effect on the mode of transportation if the source of energy is not available?
4. What do you think will be its impact on our economy?



What is It

Fossil Fuels Formation

What are fossil fuels?

Fossil fuels are basically remains of plants and animals that died millions of years ago. They are the world's primary energy source that provide most of the energy support in transportation, electricity, and industries. They are natural and finite resources that are very abundant and has a cheaper cost production compared to other resources present on Earth. They are considered as non-renewable energy source as they take millions of years to form.

What are the major types of fossil fuels and where are they usually found?

There are three types of fossil fuels formation: coal, oil, and natural gas

1. **Coal** - is an important and primary fossil fuel present on Earth. Coal resources are found predominantly where forest trees, plants and marshes existed before being buried and compressed millions of years ago. Philippines uses approximately 50% coal resource to produce energy and electricity. There are four major ranks of coal. First is **anthracite**, which is the highest rank of coal. It is a hard, brittle, and black lustrous coal, often referred to as hard coal, containing a high percentage of fixed carbon and a low percentage of volatile matter. Second is the **bituminous coal**. It usually has a high heating value and is the most common type of coal used in electricity generation. It appears shiny and smooth at first glance, but when you look closely, you will see that it has layers. The third one is **subbituminous coal**, which is black in color and dull, and has a higher heating value than lignite. The last in rank is **lignite**, which is also known as brown coal. It is the lowest grade coal with the least concentration of carbon.

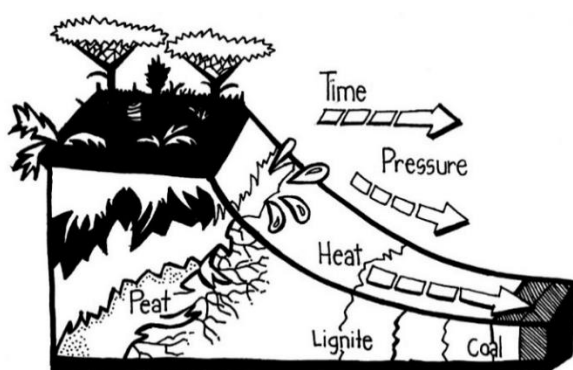


2. **Oil** - Most of the oil that we are using today started forming millions of years ago. Oil is an organic material, mostly algae, which was buried in mud at the bottom of the sea and lakes. It is used mainly to produce transportation fuels and petroleum-based products. Philippines imports crude oil and petroleum from Saudi Arabia and Russia. The majority of the market are Petron Corporation, Pilipinas Shell, and Chevron Philippines.

3. **Natural gas** - is a naturally occurring hydrocarbon gas with the mixture of methane. It is the Earth's cleanest fossil fuel and is odorless and colorless in its natural state. Natural gas is produced from sedimentary rock formation by forcing chemicals, water, and sand down a well under high pressure. The Philippines' main domestic source of energy is the Malampaya natural gas field which is located at Palawan Island.



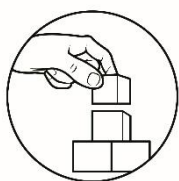
How are fossil fuels formed?



Millions of years ago the remains of prehistoric plants and animals are buried beneath the Earth's surface. These remains were covered by mud. The mud sediment was buried by more sediments, and it started to change into rock as the temperature and pressure increase. In that case fossil fuels are formed in a low oxygen environment. The plant and animal remains were altered chemically by

this process, and slowly changed into crude oil and natural gas.

Through the spaces of permeable rock, the oils move upwards and will be trapped if it reached impermeable rock. Oil companies can drill down through the impermeable rocks to get it out. They are then able to turn it into products we can use, such as petrol and diesel. On the other hand, coal can be extracted from the Earth through underground mining. Once it has been extracted, it can be used to fuel power plants for electricity.



What's More

Fill it in!

Fill in the table below of the corresponding characteristics, uses and sources of each type of fossil fuel.

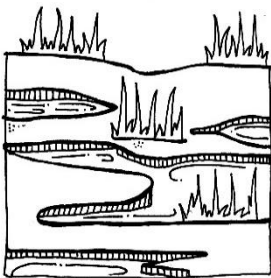
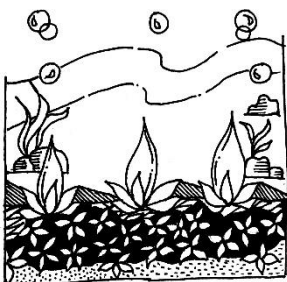
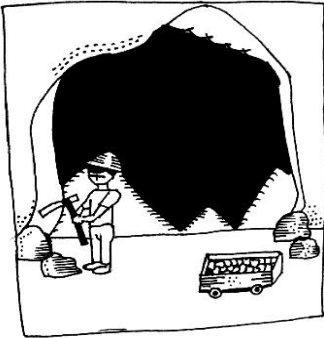
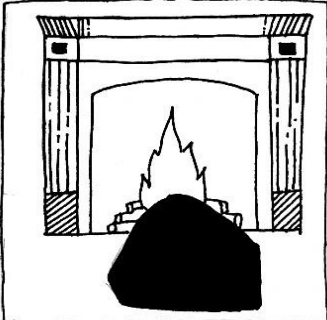
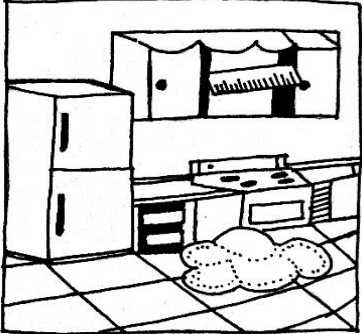
Types of Fossil Fuel	Characteristics	Uses	Sources
Coal			
Oil			
Natural Gas			

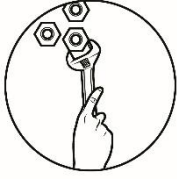


What I Have Learned

Fossil Fuels Storyboard

A storyboard is a graphic organizer to visually present information and explain process. It is a set of sequential drawings to tell a story. It is time for you to make your own. Complete the storyboard showing how fossil fuels are formed. If the picture is given, write a short description about the process shown. If the description is given, draw or illustrate the stated process.

Scene 1	Scene 2	Scene 3
		
Millions of years ago, dead plants and animals fall into seas and swamps.		The plant and animal remains eventually form coal far underground.
Scene 4	Scene 5	Scene 6
		
		Natural gas and crude oil formed in the same way, and they are used for heating, cooking, and electricity generation.



What I Can Do

Let's Save Energy!

Philippines depends primarily on fossil fuel as a main source of energy. Coal is one of the major sources of electricity in Luzon, Visayas, and Mindanao. Since this source is nonrenewable, it means there will be a time that it will perish. By showing your support in the preservation of electricity in our country, make your own infographics that highlight and explain different ways to help reduce energy consumption.



Assessment

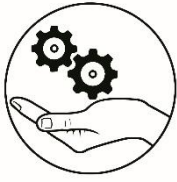
Multiple Choice. Read and analyze the following questions. Choose the letter of the best answer. Write your answer on your separate sheet of paper.

1. Non-renewable energy resources are those that cannot be readily replaced natural substance. Which of the following are examples of renewable energy?
1. coal 2. water 3. wind 4. solar energy

A. 1, 2 and 3 C. 1, 3 and 4
B. 1, 2 and 4 D. 2, 3 and 4
2. Which energy resources is derived from natural organic materials?
A. fossil fuels B. geothermal C. solar D. wind
3. Which of the following statements is/are incorrect?
I. Philippines has the largest coal production in the world.
II. Oil, coal, and natural gas are examples of renewable energy.
III. Non-renewable energy is finite; they can't be used for a second time.

A. I only B. II only C. III only D. I and II
4. Malampaya is one of the fossil fuel reservoirs of the Philippines situated in the island of Palawan. What type of fossil fuel is harnessed in it?
A. coal B. coal and oil C. natural gas D. oil
5. Based on the department of energy 2017 power statistics, coal is the main source of energy in the Philippines. What do you think might happen if coal reserves run out?
A. It will result to decreasing number of air pollutants.
B. It will decrease the energy resources present in the Philippines.
C. It will not affect Philippine economy because it is an infinite resource.
D. both A & B
6. Which among the fossil fuel is the cleanest, odorless, and colorless?
A. coal B. coal and oil C. natural gas D. oil
7. Which of the following is the correct decreasing order of the types of coal based on the quality?
A. anthracite, bituminous, subbituminous and lignite
B. anthracite, lignite, bituminous and subbituminous
C. lignite, anthracite, subbituminous and bituminous
D. lignite, subbituminous, bituminous and anthracite
8. What are the essential factors involved in the formation of fossil fuel?
A. pressure and temperature
B. pressure and low oxygen environment
C. pressure, temperature, and low oxygen environment
D. pressure, temperature, and high oxygen environment

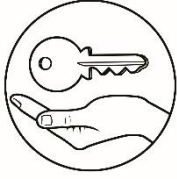
9. Which of the following fossil fuels is formed from organic materials which are mostly algae?
 A. carbon B. natural gas C. oil D. oil and coal
10. Coal is considered as non-renewable energy source because _____.
 A. it is sustainable
 B. it is expensive to mine
 C. it takes millions of years to form
 D. it can be regenerated or replaced
11. Fossil fuels are formed million years ago from different materials. Which of the following is **not** its component?
 A. remains of animals C. remains of all vegetation
 B. remains of bacteria D. remains of volcanic ashes
12. Which of the following factors contribute to the formation of fossil fuels?
 A. water and air C. heat and pressure
 B. carbon and oxygen D. oxygen and carbon dioxide
13. Coal is one of the major types of fossil fuels. In which types of organic matter does coal come from?
 A. mostly algae C. dissolve minerals from rocks
 B. marine organisms D. forest trees, plants and marshes
14. Which of the following statements is **incorrect**?
 I. Natural gas is not a fossil fuel.
 II. Coal, natural gas, and oil are fossil fuels.
 III. Fossil fuels are man-made energy source.
 IV. Coal is the most expensive energy source in the world.
 A. I, II and III B. I, III and IV C. I, II and IV D. II, III and IV
15. Which of the following is the first event in fossil fuel formation?
 A. They are then able to turn it into products we can use, such as petrol and diesel.
 B. Millions of years ago, the remains of prehistoric plants and animals were buried at the bottom of the Earth.
 C. The plants and animals remains were altered chemically by this process and slowly changed into crude oil and natural gas.
 D. The mud sediment was buried by more sediments, and it started to change into rock as the temperature and pressure increased.



Additional Activities

Reflect and Conserve!

Search on fossil fuel deposits that can be found in the Philippines. Determine its location, abundance, and type. Make a short reflection based on your findings.



Answer Key

Assessment 1. D 2. A 3. C 4. C 5. D 6. C 7. A 8. C 9. C 10. C 11. D 12. C 13. D 14. B 15. B	What's In 1. A 2. B 3. A 4. A 5. A	What I Know 1. B 2. A 3. B 4. D 5. B 6. A 7. A 8. C 9. C 10. D 11. C 12. D 13. C 14. C 15. C
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