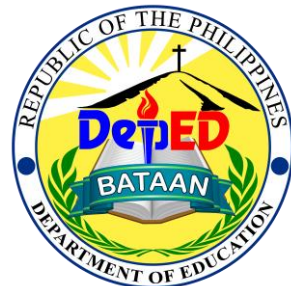


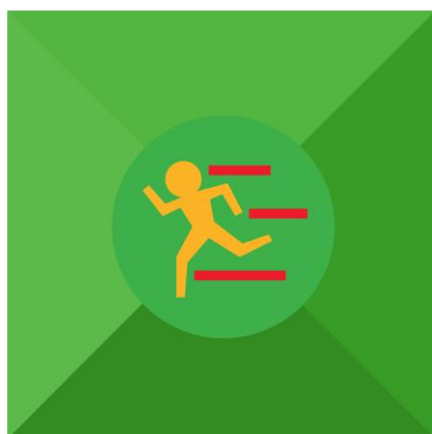
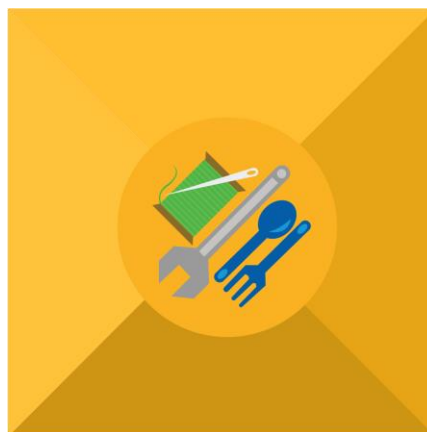
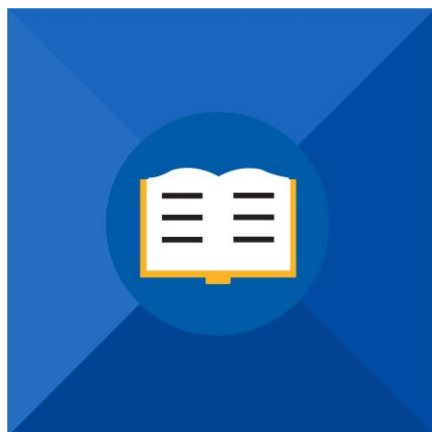
Senior High School



# Physical Science

## Quarter 3 – Module 8:

### Active Ingredients in Product Labels



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**Physical Science – Grade 11**  
**Alternative Delivery Mode**  
**Quarter 3 – Module 8: Active Ingredients in Product Labels**  
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Senior High School

**Physical Science**  
**Quarter 3 – Module 8:**  
**Active Ingredients in Product**  
**Labels**

## **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 you're 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.

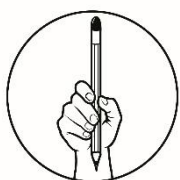


## ***What I Need to Know***

This module was designed for you to identify the active ingredient found in product labels of common household products used for cleaning.

Specifically, you are expected to:

1. Define active ingredients. (S11/12PS-IIIi-j-31)
2. Give examples of household cleaning products and explain the need to use them. (S11/12PS-IIIi-j-31)
3. Determine the importance of knowing the active ingredient in certain products. (S11/12PS-IIIi-j-31)



## ***What I Know***

Direction: Read the following questions carefully. Write only the letter of the correct answer on your answer sheet.

1. What do you call the substances that are not directly used in achieving the performance of a product?
  - a. Active Ingredients
  - b. Inactive Ingredients
  - c. Secret Ingredients
  - d. Enhancing Ingredients
2. It is a substance that directly helps in achieving the performance objective of a certain product
  - a. Active Ingredients
  - b. Inactive Ingredients
  - c. Secret Ingredients
  - d. Enhancing Ingredients
3. Which of the following is an active ingredient found in product labels of bleach?
  - a. lye
  - b. sulfuric acid
  - c. carboxylates
  - d. sodium hypochlorite
4. Which can be found in the product labels of drain cleaners?
  - a. sodium hydroxide
  - b. sodium hypochlorite
  - c. sulfonates
  - d. alcohols
5. Which of the following is always true about active ingredients?
  - a. They are the cause of the health risks of products.
  - b. They constitute a large percentage of the product.
  - c. They are more hazardous than inactive ingredients.
  - d. They dictate the efficacy of the product for its intended purpose.

## Lesson

# 1

# Active Ingredients in Product Labels

Do you help in doing household chores? I bet it is a “Yes”. While helping in doing some tasks that require cleaning, what products do you use at home? Have you tried using products like detergents, bleach, or disinfectant? Do you have time reading the labels before applying these?

In this module, you will observe the chemistry of household cleaning products. You will know how these products that you may have used can guarantee cleanliness in your home.



## What's In

Direction: Choose the household cleaning products that best describes the picture shown below. Write the letter of the correct answer on your answer sheet.

1.



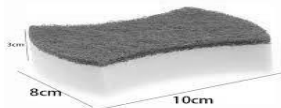
3.



5.



2.



4.



A. Scouring cleaner  
B. Stain remover

C. Bathroom cleaner  
D. Surface cleaner

E. Disinfectant



## ***What's New***

Your mother is busy working on different household chores. She asks you to help her in cleaning the following spaces in your home.

- Bathroom tiles
- Kitchen sink
- Carpet in the living room

What cleaning products will you use? Why? Can you explain the chemistry behind those commercial cleaning products you will be using?



## ***What Is it?***

Cleaning products contain substances that remove dirt, stain, and bad smell. There are a number of cleaning products, and some of them are used to clean surfaces such as bathroom tiles, floors, sinks, and drains. Others are used to clean clothing, blankets, and curtains.

Moreover, they contain substances that are classified either as active or inactive ingredients. Active ingredients are substances that directly help in achieving the performance objective of a certain product while inactive ingredients include fragrance and solvents.

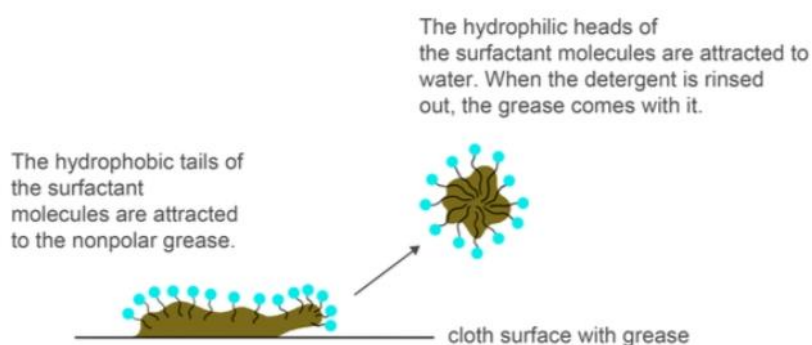
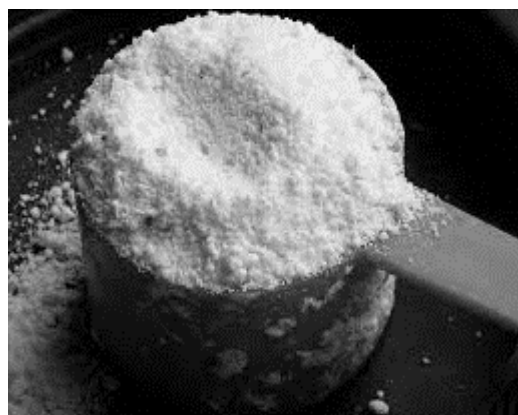
Below are examples of cleaning products and their respective active ingredients. Continue reading!

### **1. Detergent**

Detergent contains **surfactant**, which are substances with cleaning properties. The most common surfactants are **sodium alkyl, benzyl sulfonates**, and **carboxylates**. These specific active ingredients have long water-insoluble hydrocarbon tail and water-soluble polar heads. When a group of surfactant molecules is placed in water, the form **micelles**. They orient themselves with the hydrocarbon tails, sticking to one another while the polar heads are pointing outwards and into the water.



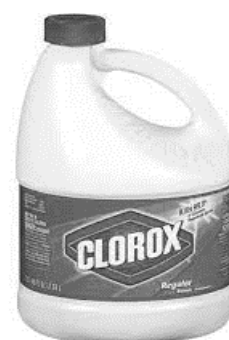
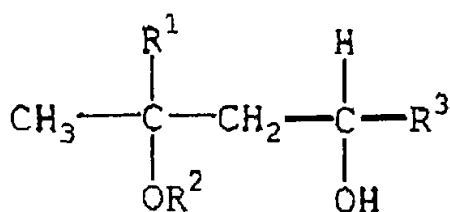
When detergent is mixed with water, the micelles are dispersed throughout the water. In a scenario, when grease is present on a fabric, the micelle disperses and entraps the grease. When detergent is rinsed out, the grease comes with it.



## 2. Bleach

This is a household cleaning product used to remove dyes and whiten clothing. The color that stains white fabrics typically arise from organic dyes and pigments. For example, when ballpen ink spills on your white uniform, the ink pigment binds with the fabric.

White uniform stained with black ink. Then, link the chemical structure below to the stain using a line.



Chlorine-based bleaches, like **sodium hypochlorite** and **calcium hypochlorite**, are used to break the chemical bonds of the pigment. Then, the pigment is changed to a different substance that does not absorb visible light, thereby making the fabric appear white again.

### 3. Drain cleaner

A drain cleaner is a chemical product that unblocks sewer pipes or clogged wastewater drains.

Caustic drain cleaners contain substances such as **lye (sodium hydroxide)** and **caustic potash**. They are bases, so they give electrons to the clogging substance. Meanwhile, the hydroxide ions create the reaction that clears the clog.

On the other hand, acid drain cleaners contain high concentrations of **sulfuric acid** or **hydrochloric acid**. These are substances that increase the number of hydrogen ions in a solution and attract electrons from the clog.



### 4. Disinfectant

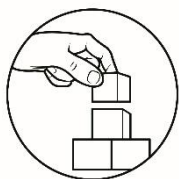
Disinfectant is used to lessen microbes on surfaces but not clean them. It is usually used to disinfect door handles, tables, toilets and bathroom surfaces because it can kill disease-causing microorganisms called pathogens such as salmonella and staphylococci bacteria. Most disinfectants, such as **alcohol** and **chlorine**, work by denaturing proteins of microorganisms. When this happens, the metabolism of microorganisms is disrupted, causing death.



Remember that all products have an active ingredient that enables it to work. Some may even have two or more active ingredients. Here are some important pointers in determining the active ingredient:

1. It can be seen in the labels of consumer products.
2. It can be classified as acidic, basic, or neutral.
3. The determination of its acidity or basicity will dictate how the product will work.

It is very important to know the active ingredient in certain products because it will tell you what function they can serve. In addition, knowing this kind of ingredient can at least make consumers aware and cautious of the toxicity of the product.



## ***What's More***

I believe that you have understood the lesson well. To test how well can you do in the succeeding activities, let do the activities below!

**Activity 1:** Read and analyze the following statements. Write **FACT** if the concept of the statement is true. Otherwise, write **BLUFF**. Do this in your answer sheet.

1. Bleach has specific active ingredients characterized by long water-insoluble hydrocarbon tail and water-soluble polar heads.
2. Disinfectant can kill pathogens, but not clean the area where it is applied.
3. Alcohols which are found as an active ingredient in drain cleaner unblocks sewer pipes or clogged wastewater drains.
4. Active ingredients are substances that help in achieving the performance objective of a certain product.
5. Acidic and basic substances are found in drain cleaners.
6. Detergents contain a surfactant which exhibits cleaning properties.
7. Most disinfectants, such as alcohol and chlorine, work by disrupting the metabolic activities of pathogens.
8. Active ingredients help the consumers to know how a product works.
9. When bleach is mixed with water, the micelles are dispersed throughout the water.
10. All products have an active ingredient that enables it to work.

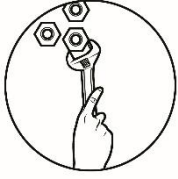


## ***What I Have Learned***

Job well done! This time I want you to work on the table below. Using what you have learned, fill in the table with all the necessary information needed.

Direction: Copy and answer the table in your answer sheet.

Generic Product Name of Cleaning Products	Active Ingredient	Function
1. Drain cleaner		
2. Detergent		
3. Bleach		
4. Disinfectant		



## ***What I Can Do***

Nice work! It appears you have learned a lot in our lesson. This time, you will be needing to roam around your house and search for some items. If necessary, ask for help from your parents or siblings.

Direction: Search for some cleaning items in your house. Fill in the table with the required information

<b>Generic Name of the Product</b>	<b>Brand Name</b>	<b>Active Ingredient</b>	<b>Function</b>
1.			
2.			
3.			
4.			
5.			



## **Assessment**

Direction: Read the following questions carefully. Write only the letter of the correct answer on your answer sheet.

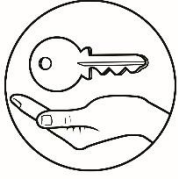
1. It is the functional ingredient of a household product.
  - a. Active Ingredients
  - b. Inactive Ingredients
  - c. Secret Ingredients
  - d. Enhancing Ingredients
  
2. Which of the following form micelles when placed in water?
  - a. bleach
  - b. detergent
  - c. drain cleaner
  - d. disinfectant
  
3. How does disinfectant work?
  - a. It cleans a wide variety of surfaces.
  - b. It kills microorganisms.
  - c. It freshens and purifies the air.
  - d. It gets rid of undesired pigments.
  
4. Why is it necessary to indicate the active ingredient in product labels of cleaning products?
  - a. Because it is a general rule so it must be followed.
  - b. Because it tells consumers how it will work.
  - c. Because it makes the product appear original and effective.
  - d. Because it provides consumers with an estimation of how much it costs.
  
5. Which of the following is always true about active ingredients?
  - a. They are the cause of the health risks of products.
  - b. They constitute a large percentage of the product.
  - c. They are more hazardous than inactive ingredients.
  - d. They dictate the efficacy of the product for its intended purpose.



## ***Additional Activities***

The development of new products is an essential part of the industry. A little knowledge in chemistry can be used in finding alternative products to those which are commercially available. Homemade cleaning materials using similar ingredients can be made from items such as sugar, lemon, calamansi, and baking soda.

Will you explain how baking soda or vinegar can be used as a substitute cleaning product?



## Answer Key

<p>What I Know:</p> <ol style="list-style-type: none"> <li>1. B</li> <li>2. A</li> <li>3. D</li> <li>4. A</li> <li>5. D</li> </ol>	<p>What's In:</p> <ol style="list-style-type: none"> <li>1. B</li> <li>2. A</li> <li>3. E</li> <li>4. C</li> <li>5. D</li> </ol>	<p>What's More:</p> <ol style="list-style-type: none"> <li>1. Bluff</li> <li>2. Fact</li> <li>3. Bluff</li> <li>4. Fact</li> <li>5. Fact</li> <li>6. Fact</li> <li>7. Fact</li> <li>8. Fact</li> <li>9. Bluff</li> <li>10. Fact</li> </ol>
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What I Have Learned

Generic Product Name of Cleaning Products	Active Ingredient	Function
1. Drain cleaner	Lye, sulfuric acid	Digest or remove any material that obscures the pipe
2. Detergent	Sodium alkyl, benzyl sulfonates, carboxylates	Remove stains, kill bacteria
3. Bleach	Hypochlorites	Remove stains
4. Disinfectant	Alcohol and chlorine	Kill pathogens

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