



High School Science Virtual Learning

Forensic Science

Industrial Microbiology

May 12, 2020



High School Forensic Science Lesson: May 12, 2020

Objective/Learning Target:

Students will be able to describe several areas of industry where microorganisms are used to help produce goods.

1. What chemicals or types of molecules do microorganisms produce throughout their normal life cycle?
2. What kinds of products can you think of that are made using microorganisms?

1. Products of cellular respiration (Carbon dioxide, alcohols, vitamins, fats, proteins), antibiotics for self-protection.
2. Anything fermented, dairy products like cheese and yogurt, alcohols. Some medicines and antibiotics.



Lesson Activity:

Directions: Follow the link for each section. Each reading will teach you about a particular area or product made in industrial microbiology. For each section, answer the comprehension and review questions.



Practice 1: Antibiotics

You will use the information from [the article linked here](#) to answer the questions on the following page.



Practice 1 Questions

1. Which microorganism is responsible for making the antibiotic penicillin?
2. What fuel source does the fungus need to make the antibiotic?
3. What has to be done after the fungus makes the penicillin?



Practice Questions 1 ANSWER KEY

1. Which microorganism is responsible for making the antibiotic penicillin?
Penicillium mold
2. What fuel source does the fungus need to make the antibiotic? **Scientists add sugar to fuel the penicillin making process.**
3. What has to be done after the fungus makes the penicillin? **Once the antibiotic has been created by the mold, scientists have to separate the penicillin from the mold. Then the penicillin is purified to meet standards so it can be used for medicinal purposes.**



Practice 2: Fermentation

You will use the information from [the article linked here](#) to answer the questions on the following page.



Practice 2 Questions

1. What do all fermented foods contain?
2. What are some health benefits of eating fermented foods?
3. What was thought to be the first example of humans fermenting foods?
4. What is the difference between prebiotics and probiotics?
5. Give an example of one food and one drink that is made using fermentation. Also include what types of microorganisms are present in that item.



Practice 2 Questions **Answer Key**

1. What do all fermented foods contain? **Microorganisms such as bacteria and yeast**
2. What are some health benefits of eating fermented foods? **Improved gastrointestinal health: better gut bacteria, lessened symptoms of constipation or diarrhea, improved function of the digestive system**
3. What was thought to be the first example of humans fermenting foods? **The Fertile Crescent region of the middle east around 6000 BC.**
4. What is the difference between prebiotics and probiotics? **Prebiotics are foods that do not contain microorganisms, but are beneficial to the microorganisms in the digestive system. Probiotics are foods that contain microorganisms that directly aid in digestion and improve gut health.**
5. Give an example of one food and one drink that is made using fermentation. Also include what types of microorganisms are present in that item. **Kombucha is a fermented tea drink made from SCOBY (Symbiotic Culture of Bacteria and Yeast). Kimchi is a Korean cabbage dish made from lactobacillus bacteria.**



Practice 3: Biopesticides

You will use the information from [the article linked here](#) to answer the questions on the following page.



Practice Questions

1. Where do biopesticides come from?
2. How many registered biopesticides are there?
3. Write a summary sentence about each class of biopesticide.
4. What are the advantages of biopesticides?
5. What is the EPA's stance on biopesticides?



Practice Questions

1. Where do biopesticides come from? **Natural materials such as plants, animals, and bacteria.**
2. How many registered biopesticides are there? **299**
3. Write a summary sentence about each class of biopesticide.
 - a. **Biochemical: naturally occurring substances that control pests by non-toxic mechanisms**
 - b. **Microbial: The microorganism is the active ingredient. For example, a bacteria can interrupt the larval life cycle of some pest insects.**
 - c. **Plant-Incorporated-Protectant: the genes from microorganisms are inserted into the plant's genome.**
4. What are the advantages of biopesticides? **Biopesticides are usually more specific to the pest they are attempting to eliminate. They are usually less toxic and decompose quickly, eliminating many environmental concerns.**
5. What is the EPA's stance on biopesticides? **They encourage their development and actively approve applications for more of them.**