# Ethanol Production Process Unit 2 Lesson 3

**Matching:**

Corn

Cellulose

Fermentation

Starch

Acid hydrolysis

Enzymatic hydrolysis

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the break-down of complex carbohydrates to simple sugars.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a complex carbohydrate.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ***ethanol*** that is exactly the same as grain-based ***ethanol***, but it is made from agricultural residues.
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ utilizes pre-treatment process to reduce the size of the material to make it accessible for hydrolysis. Enzymes then are added back in to break corn material for ***fermentation***.
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ results in ***ethanol*** and carbon dioxide.
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is typically used to make ethanol in the Midwest because of its low cost and high starch content.

**Sequence:**

1. Indicate the major steps used in a dry milling process by placing a number in the blank provided to indicate the proper steps in order.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Liquefaction
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fermentation
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Milling
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dehydration
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Saccharification
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Distillation
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Denaturing

**Short Answer:**

1. Write out the ***fermentation*** equation with the by-products in the correct chemical formula.
2. Explain the difference in the ***starch*** process and ***cellulosic*** process of ***fermentation***?
3. Explain the major difference in the dry and wet-milling process?
4. Identify three byproducts of ethanol production?