

Milk & Cheese

TRANSFORMATION STATION

Did you know that milk is used to make many different products?

Milk can be transformed into other products because of its complex properties. A few of these products are evaporated milk, sweetened condensed milk, and dry milk.

Lactose is the carbohydrate (sugar) in milk. Lactose is made of the two sugar molecules, glucose, and galactose. Lactose is a disaccharide. Once lactose is broken down into these single sugar molecules (monosaccharides); it cannot be broken down further in the body. **Lactase** is an enzyme produced in the small intestine, which is used to breakdown lactose.

Enzymes are substances that help chemical digestion occur in our digestive system. Without lactase, lactose is broken down by microorganisms (bacteria) in the small intestine producing gas, cramping, and diarrhea. Lactose intolerant individuals do not produce enough lactase to digest lactose causing these problems to occur. You will



learn more about the carbohydrate lactose in *Food Lab Explorations Lab 1* of this chapter. See below for a list of the disaccharides, their monosaccharide components, the enzymes that help break them down during digestion, and their common food sources. You can find disaccharides in different types of milk. For example, lactose can be found in mammal's milk. This type of milk is produced by the mammary glands of mammals like cows and goats. Rice and soy milk, however, are produced from plant products. They are actually a beverage and not milk. They are considered milk because they have a similar macronutrient (carbohydrate, protein, fat) composition.

Carbohydrate	Single Sugar Molecules	Digestive Enzyme	Common Food Source
Lactose	Glucose + Galactose	Lactase	Milk, Dairy
Maltose	Glucose + Glucose	Maltase	Malt
Sucrose	Glucose + Fructose	Sucrase	Table Sugar



Consuming products like yogurt that have active cultures help maintain and/or restore normal intestinal function.

Using bacteria, milk can also be transformed into other foods. Products formed through this process are called fermented milks. **Fermentation** is the breakdown of carbohydrates (sugars), like lactose. When milk is fermented with bacteria, it will make certain dairy products, like yogurt. It can be initiated with the addition of bacteria,

yeast or mold. Yogurt is made by mixing two types of bacteria with milk. Once bacteria is added to milk, the mixture is warmed to promote fermentation. This will help develop the desired consistency, flavor, and acidity. Once the desired consistency has been reached, the fermentation process is stopped. The yogurt can then be chilled or heated. Chilling allows the bacterial culture or **active culture** to stay alive. If the yogurt is heated, the cultures are destroyed. Consuming these products with active cultures will help maintain and/or restore normal intestinal bacteria. You will learn more about the role of bacteria in yogurt production in *Food Lab Explorations Part II* of this chapter.

Milk, no matter its origin, is a staple drink in the United States that is used for a variety of purposes. Its versatility allows us to consume necessary nutrients from our favorite products. Let's explore some of the different methods used to transform milk!

Think About It

Food Explorations Lab I

1. The name of the sugar in cow's milk is _____.
2. The enzyme needed to digest that sugar is _____.
3. Give an example of a disaccharide and the monosacharides that make it up.

Food Explorations Lab II

1. Fermentation requires sugar to take place. What else is needed?

2. What does fermentation do to sugar? _____
3. A _____ (cold/warm) environment is best for fermentation.