

**CERTIFICATE**

*Of*

**RECOGNITION**

**Grosse Pointe High School**

is thanked for its phenomenal participation in the American Chemical Society

**THE CHEMICAL HISTORY OF FOOD ESSAY CONTEST**



PRESENTED BY:

*Mary Virginia Orna, Councilor, ACS*

ON THIS DAY:

*19 March 2018*

Jordan Craighead, Michal Ruprecht, and Steven Kosmas

Grosse Pointe North High School Chemistry Club

[gpnchemclub.weebly.com](http://gpnchemclub.weebly.com)

707 Vernier Road, Grosse Pointe Woods, MI 48236

The Chemical History of Food: A Cheesy Situation

28 February 2018

### **The Chemical History of Food: A Cheesy Situation**

There's more to the stringy, yellow wonder that we all know as cheese than the average person might think. Cheese is a complicated product that is synthesised from a variety of ions and molecules. The making of cheese dates back more than 4,000 years, according to Kindstedt (2013). Cheese was first made in the Roman Empire when it was at its height. This led to cheesemaking in England, which made it a popular snack during the Middle Ages. Until its discovery in America, it was improved by monks and monasteries in Europe. In fact, one type of cheese, Gorgonzola, was created in the Po Valley in Italy in 879 A.D. This helped make Italy the cheesemaking center of Europe during the 10th Century. Some cheeses were also mentioned in ancient records of monasteries in France as early as 1070.

There is also a large amount of chemistry involved in cheese. According to Ritter (2000), cheese is made from fats, proteins and water, which give it its rich taste. The fats in cheese are made from fatty acids attached to a glycerol. The fats contribute to the taste, consistency and composition of cheese. Proteins are made from amino acids, which are known as monomer units, that are combined to form long protein chains. "Milk Facts" reported that milk actually contains

all the amino acids that are essential, or that are unable to be made by the human body by itself. According to "What Is the Competition of Water?", the water in cheese is somewhat like other types of water, in that it is made from hydrogen and oxygen. The hydrogen atoms have a positive one charge and the oxygen has a negative one charge, meaning that the hydrogen atoms need to lose one valence electron to make a full outer valence shell. The oxygen needs to gain two electrons in order to fill its outer valence shell. Water has the positive hydrogen ions linked to a hydroxyl ions. Water is very part of cheese, for example, when pizza is reheated, some of the moisture from water is lost, and that's why the pizza doesn't taste the same.

Another reason pizza cheese doesn't taste the same being reheated, is because of protein rearrangement, "Pizza Cheese" (2018) reported. When pizza is heated, some of the water and fat evaporates off. This, along with heat, causes the cheese proteins to rearrange, making cheese tougher.

Humans have come a long way in discovering the chemistry of cheese. Companies continue to innovate different ways to create cheeses not only via milk, but in ways for all people to enjoy, including people who may be vegan or lactose intolerant. Although at the surface cheese may seem simple, it has connected cultures and has influenced history along with chemistry in many ways.

## Works Cited

"Milk Facts." *Milk Composition*. N.p., n.d. Web.

"Pizza Cheese." *Science NetLinks*. N.p., 2018. Web. 28 Feb. 2018.

"What Is the Competition of Water?" *Water's the Matter*. N.p., n.d. Web.

Kindstedt, Paul. *Cheese and Culture: a History of Cheese and Its Place in Western Civilization*.

Chelsea Green, 2013.

Ritter, Steve. "What's That Stuff?" *C&EN*, vol. 78, no. 6, 7 Feb. 2000.