Milk curdling essay

We’ve all seen it, lumpy milk poured from an outdated jug or lemon juice added to warm milk. What was once smooth, creamy milk becomes chunky, lumpy, and completely unappetizing. But curdled milk isn’t always a bad thing. Although it sometimes signifies spoilage, it can also be a method of producing more delicious food, like cheese. Milk curdles because of a simple chemical reaction that can be set into place for a variety of reasons. Let’s take a closer look at some of those reasons. What is Curdled Milk?

Milk is comprised of several compounds, primarily fat, protein, and sugar. The protein in milk is normally suspended in a colloidal solution, which means that the small protein molecules float around freely and independently. These floating protein molecules refract light and give milk its white appearance. Normally these protein molecules repel each other, allowing them to float about without clumping, but when the pH of their solution changes, they can suddenly attract one another and form clumps. This is exactly what happens when milk curdles.

As the pH drops and becomes more acidic, the protein (casein) molecules attract one another and become “ curdles” floating in a solution of translucent whey. This clumping reaction happens more swiftly at warmer temperatures than it does at cold temperatures. Spoiled Milk All milk, even pasteurized milk, contains bacteria. As bacteria go about happily with their lives, they eat the natural sugars in milk, called lactose. As they digest lactose, a number of byproducts are created, including lactic acid.

When the amount of lactic acid in the milk begins to increase, the pH drops and the casein molecules begin to clump. The high levels of lactic acid are

also what give spoiled milk its characteristically sour smell. Milk and Lemon Juice or Vinegar It’s not uncommon for recipes to call for lemon juice or vinegar to be added to milk. In fact, lemon juice and vinegar can be added to milk as a substitute for buttermilk in many recipes. So why does this not cause the milk to curdle? As with many chemical reactions, temperature controls the rate at which the reaction occurs.

When adding lemon juice or vinegar to hot milk, it will curdle almost immediately, but adding it to cold milk will not produce a reaction for quite some time. This is the very same reaction used to create fresh cheeses like ricotta or paneer. Milk is heated to a designated temperature and then an acid (lemon juice or vinegar) is added. Once the milk curdles, the solid proteins are then strained from the liquid whey and shaped into a round of cheese. In this scenario, curdling has nothing to do with spoilage and is, in fact, very useful.

Milk and Coffee or Tea On occasion, cold milk added to coffee or tea will curdle. This can be alarming as curdled milk is often seen as the same as spoiled milk. In this case, it can be half true. Coffee and tea are both slightly acidic, although usually not enough to curdle fresh milk. When milk is just on the brink of spoilage and bacteria have produced some, but not enough acid to curdle the cold milk, a little bit of extra acid from the coffee or tea, along with their heat can tip the scale and cause the milk to curdle.

The milk may not be spoiled enough to cause an off odor or flavor, but just enough acid and heat in addition to its own can cause curdling. 1. Milk curdles when it goes bad due to the fact is is a colloid. Colloids are

substances that do not separate easily, so they clump together when they start to turn. 2. curdling of milk occurs in different ways with the help of chemistry let’s try to understand.

The methods of curdling: It may occur thanks to milk ferments that transform lactose in to milk acid, taking the milk to 4. pH, or for the addition of acid substances; it is, generally, the sweet curdling that occurs thanks to enzymes. The substance that in the milk gets the transformation is casein, a fundamental protein that in the milk is found in a colloidal solution. The casein is a conjugate protein formed (by beside C, H, O, N, S) also phosphorus (P) in the form of ester phosphoric acid of which a part is found inside every unit of a, b, k- “ salificato” casein with calcium and magnesium ions, a part is in the form of tricalcium phospote (apatite) that joins together the units of a, b, k- casein as in the picture.

The whole casein “ micella” is called “ phospho-caseinatum of calcium”. The quantity of calcium ions regulates the aggregation’s state of “ micelle” and the sped of their flocculation: without calcium casein can’t coagulate. In normal conditions milk has a pH of about 6. 5-6. 7 and at this pH value the casein is without protons, it has a negative charge and therefore the casein micelles are relatively soluble, because they repel each others.

In an acid ambient milk coagulates, because casein has its isoelectric point at 4. 6 pH, that is at this pH value it has a quantity of positive charges equal to the quantity of negative charges and the positive part of each “ micelle” is attracted by the negative part of the others, causing the formation of ionic bonds among the “ micelle” working against the dipole-dipole bonds with

water, so that the protein precipitates in the form of demineralized casein and in the solution remain soluble calcium salts.