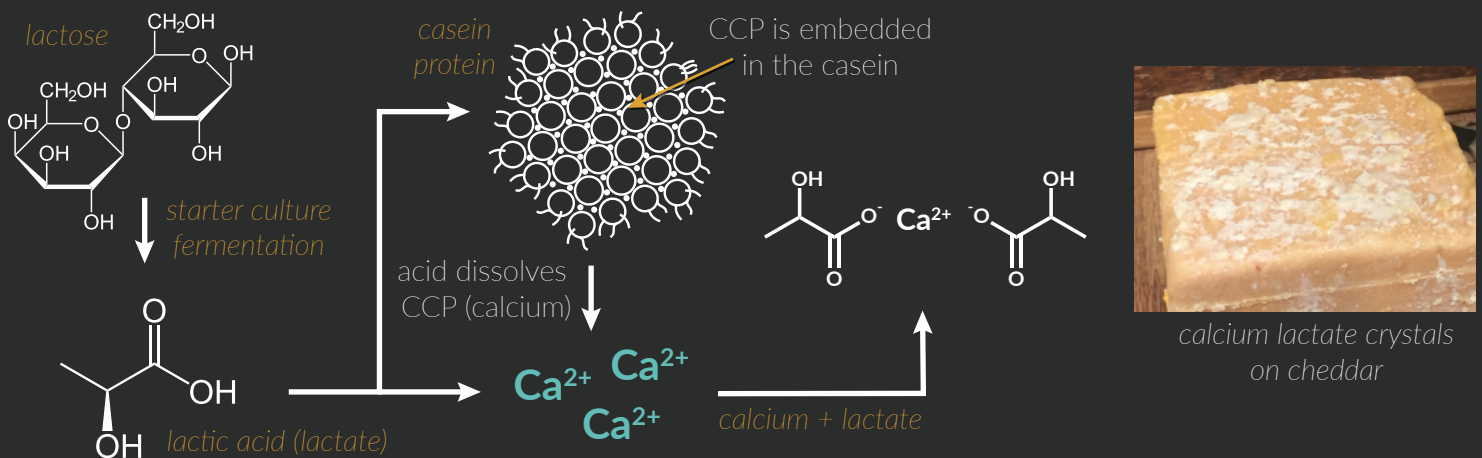


# Learn Cheese Chemistry via Cheese Crystals

The **chemistry of cheese** is complex. Of the main components of cheese, protein and minerals are what make up its structure. Knowing this, it's no surprise that the most prevalent types of cheese crystals come about from **minerals** (like calcium) and **protein breakdown** (amino acids)

## MINERALS IN CHEESE

Minerals exist in **soluble** and **insoluble** forms in milk and cheese. Calcium and phosphate, the main minerals in cheese, are partitioned between insoluble **colloidal calcium phosphate (CCP)** and a soluble aqueous phase. CCP is the mineral "glue" that holds cheese structure together; it crosslinks casein protein. When **lactic acid is produced** (from starter culture), it **solubilizes** these minerals into the water phase of the cheese. In other words, as cheese ripens acid is produced and calcium is dissolved out of the cheese structure. When these two components reach high enough concentrations, they can form **calcium lactate** crystals.



## PROTEIN BREAKDOWN IN CHEESE

As mentioned above, the body and structure of cheese is protein. The building blocks of proteins are **amino acids**. When protein is broken down free amino acids can be liberated. Examples of free amino acids include **tyrosine** and **leucine**, which can crystallize when they reach high enough concentrations. Protein breakdown not only can create crystals but is also a crucial part of **flavor development** in cheese. Therefore, while these amino acid crystals don't have much of their own flavor, they can **signify** a well-aged cheese that should have **rich, complex flavors**. Think of them as markers of potential cheese flavor.

