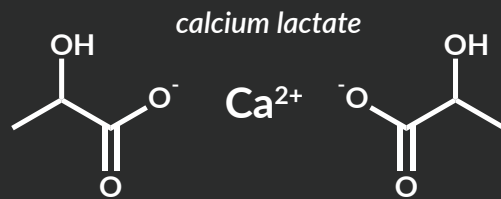


The Wonderful World of Cheese Crystals

A variety of crystal types exist across the wide spectrum of cheeses in the marketplace. The most prevalent crystals can come about from **minerals** such as **calcium** and **magnesium**, and **amino acids** such as **tyrosine** and **leucine**.

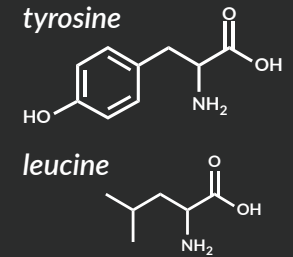
CALCIUM LACTATE

The **white powdery** smear found on many **aged cheddars** are crystals of the compound calcium lactate. Calcium lactate is formed as the cheese ages when **lactic acid** reacts with **calcium** in the cheese. They don't have any flavor themselves, but usually signify a piece of well-aged cheese that will be flavorful.



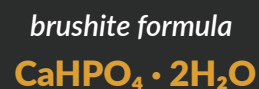
TYROSINE & LEUCINE

The crystals found in **aged Italian, Dutch, and Swiss cheese** varieties are usually the **amino acids** tyrosine (distinct specks) and/or leucine (powdery smear, diffuse spots). These are formed as the cheese ages when the **protein breaks down** into its constituent amino acids. They can build up to high concentrations and crystallize out.



CALCIUM PHOSPHATE

Calcium and **phosphorus** are ubiquitous minerals in milk and cheese. Under the correct acidity conditions, these minerals can crystallize. **Brushite**, a form of calcium phosphate, has been observed in **bloomy rind** cheeses such as brie and camembert, **washed rind** cheeses, and **blue cheeses** to name a few.



IKAITE & STRUVITE

The **gritty mouthfeel** associated with washed rind cheese is caused by crystals. Ikaite is a **calcium carbonate** crystal, and struvite is a **magnesium ammonium phosphate** crystal. The mineral components are omnipresent in milk/cheese, the carbonate and ammonium is derived from the **gases** created by the surface microbes.

