

Milk is a suspension of lipids and proteins. At the pH of milk (about 6.4) these proteins are soluble because they have either a ~~net positive or~~ net negative charge. The charge keeps the proteins from interacting with each other **by repelling each other yet** ~~and~~ allows for sufficient solvation. **The proteins do not get close enough for short range interactions like van der Waals forces to take effect.** Bacteria produce acidic byproducts that decrease the pH as does the addition of vinegar. Several of the major proteins in milk must have isoelectric points in the acidic range. At their isoelectric points the proteins have no net charge. While the proteins have no net charge, their surfaces still carry multiple positive and negative regions. The proteins begin to interact through this network of positive and negative charges. Other interactions, such as van der Waals forces and the hydrophobic effect increase the total attractive force. The proteins thus begin to aggregate and eventually the particles grow large enough that they precipitate leading to the appearance of coagulation.