Components of milk

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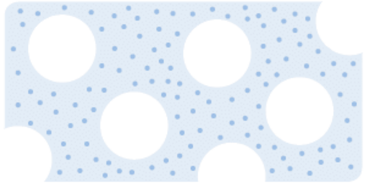
THE CHEMISTRY OF COW'S MILK

MILK'S COMPOSITION

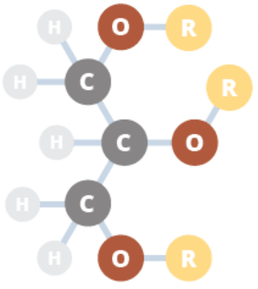
Milk is an emulsion of fat in water. It is also a colloidal suspension of proteins. Other compounds, including lactose and minerals, are fully dissolved in the solution.



WATER	87.5%
FAT	3.9%
PROTEINS	3.4%
LACTOSE & MINERALS	5.2%

FATS IN MILK

Droplets of fat in milk have an average size of 3–4 micrometres. They consist mainly of triglycerides, and also contain fat-soluble vitamins.



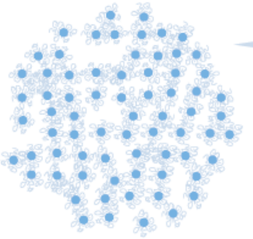
TRIGLYCERIDE

R = FATTY ACID MOLECULES

PALMITIC ACID	23.6–31.4%
OLEIC ACID	14.9–22.0%
STEARIC ACID	10.4–14.6%
MYRISTIC ACID	9.1–11.9%

WHY IS MILK WHITE?

Milk contains hundreds of types of protein, of which casein is the main type. The milk proteins form micelles. These micelles scatter light, causing milk to appear white.



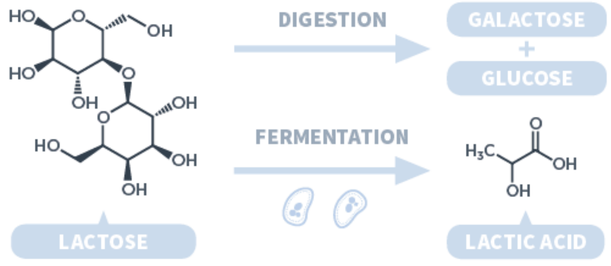
CASEIN MICELLES

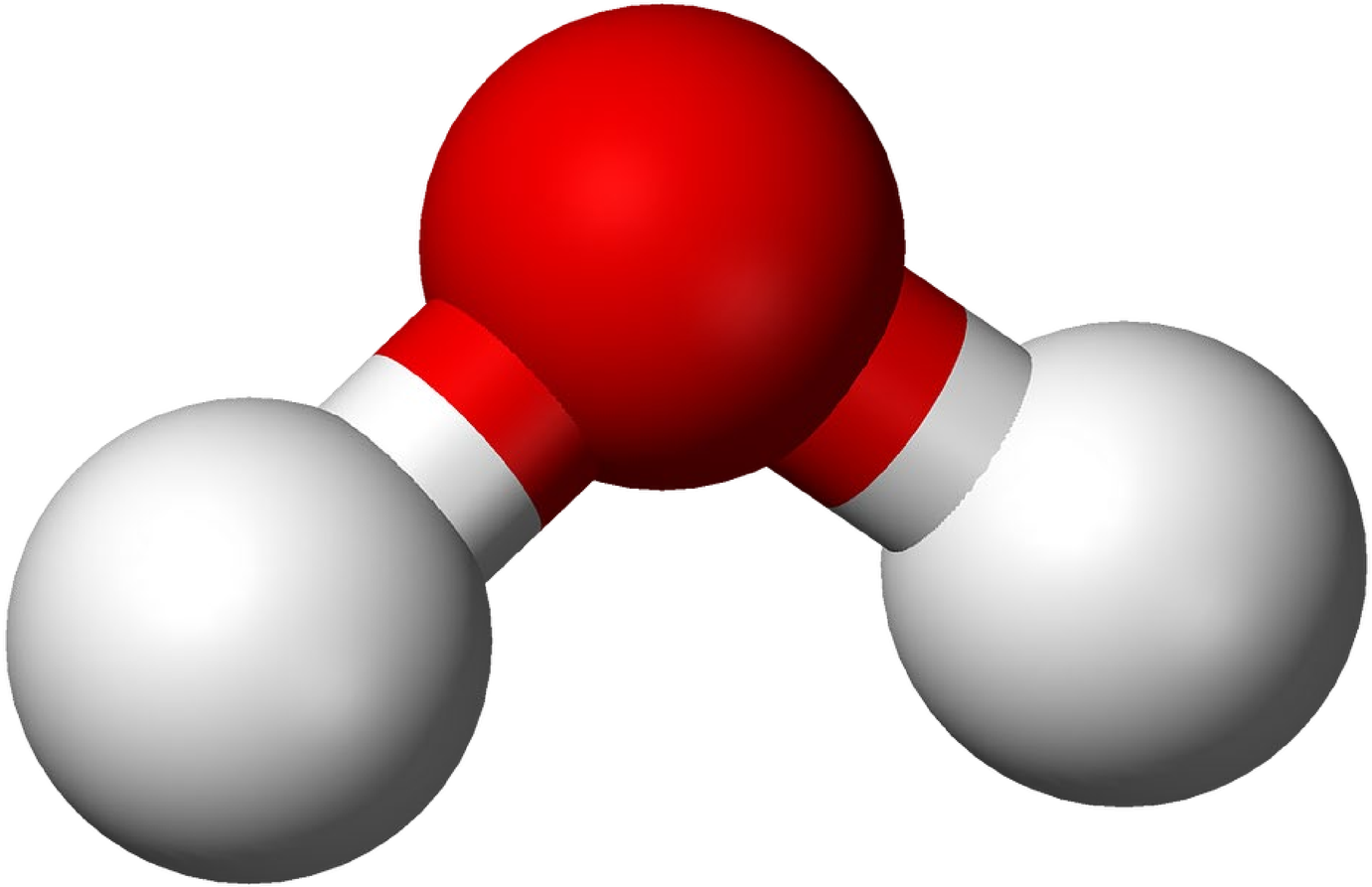
There are several models of casein micelle structure. This diagram shows the supramolecular structure.

- CASEIN PROTEINS
- CALCIUM PHOSPHATE CLUSTER

LACTOSE & MILK

Lactose is a sugar found in milk. People who are lactose intolerant are unable to digest it. Lactose can be fermented by microorganisms to form lactic acid, causing the milk to sour.

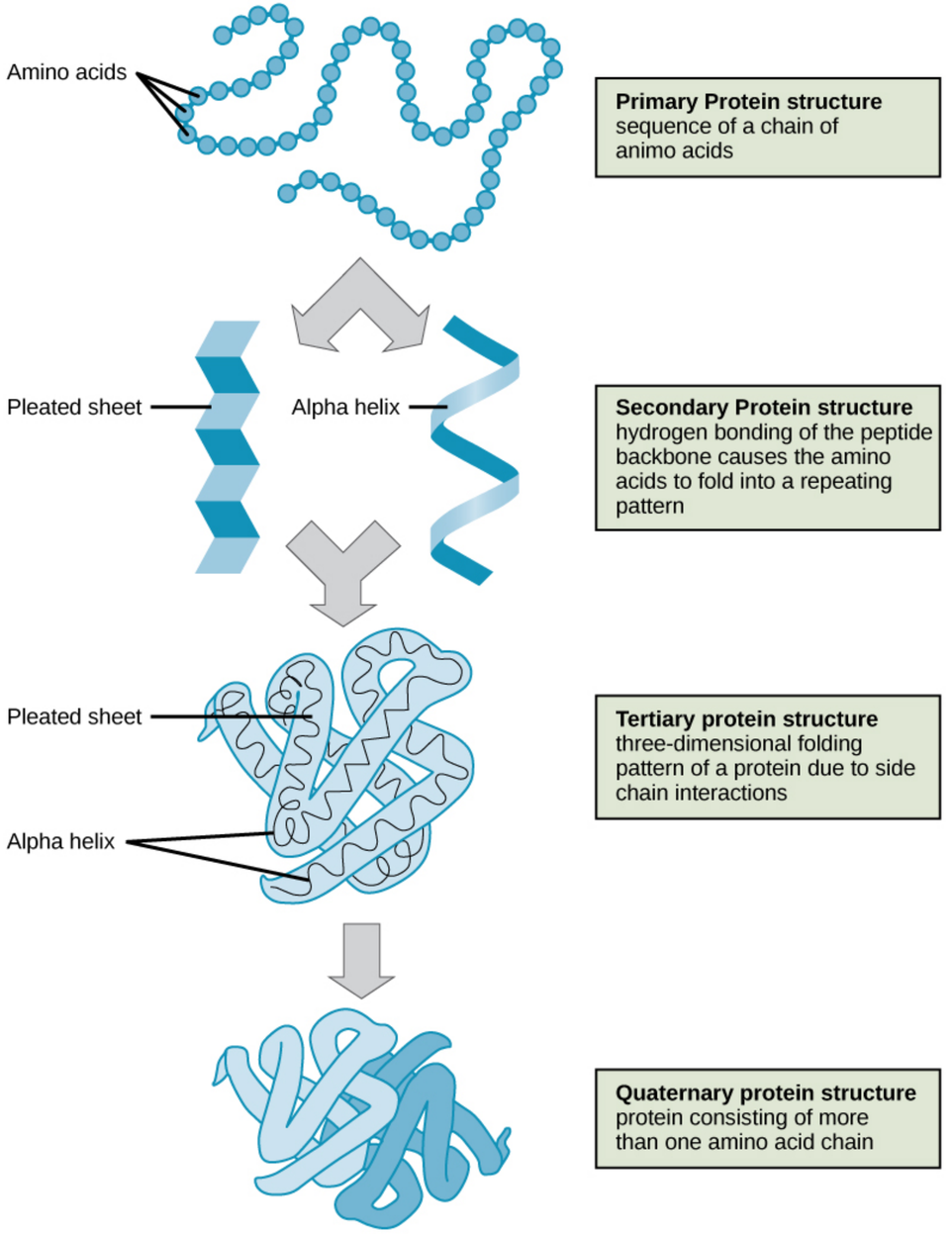




Water

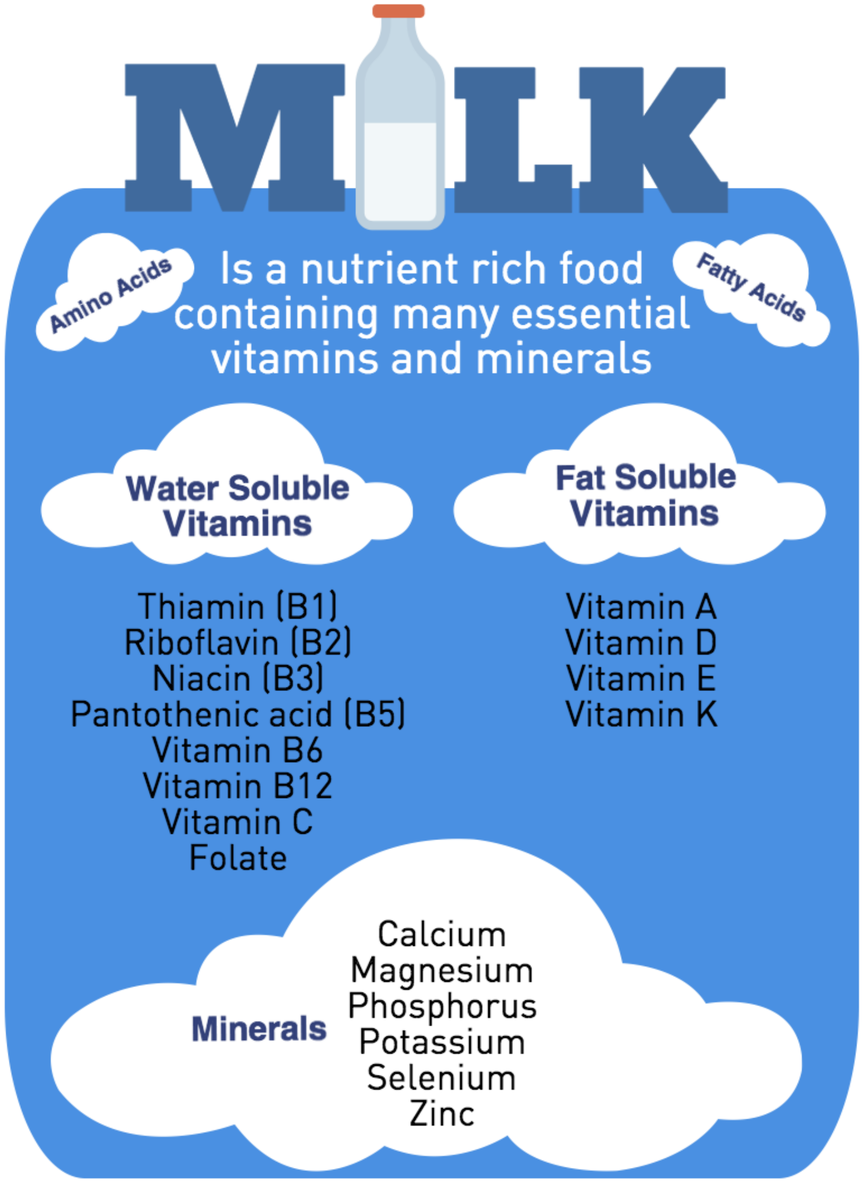
Casein

- A complete protein containing 18 of 20 amino acids
- Gives milk its white color
- **At right:** general protein structure



Fats

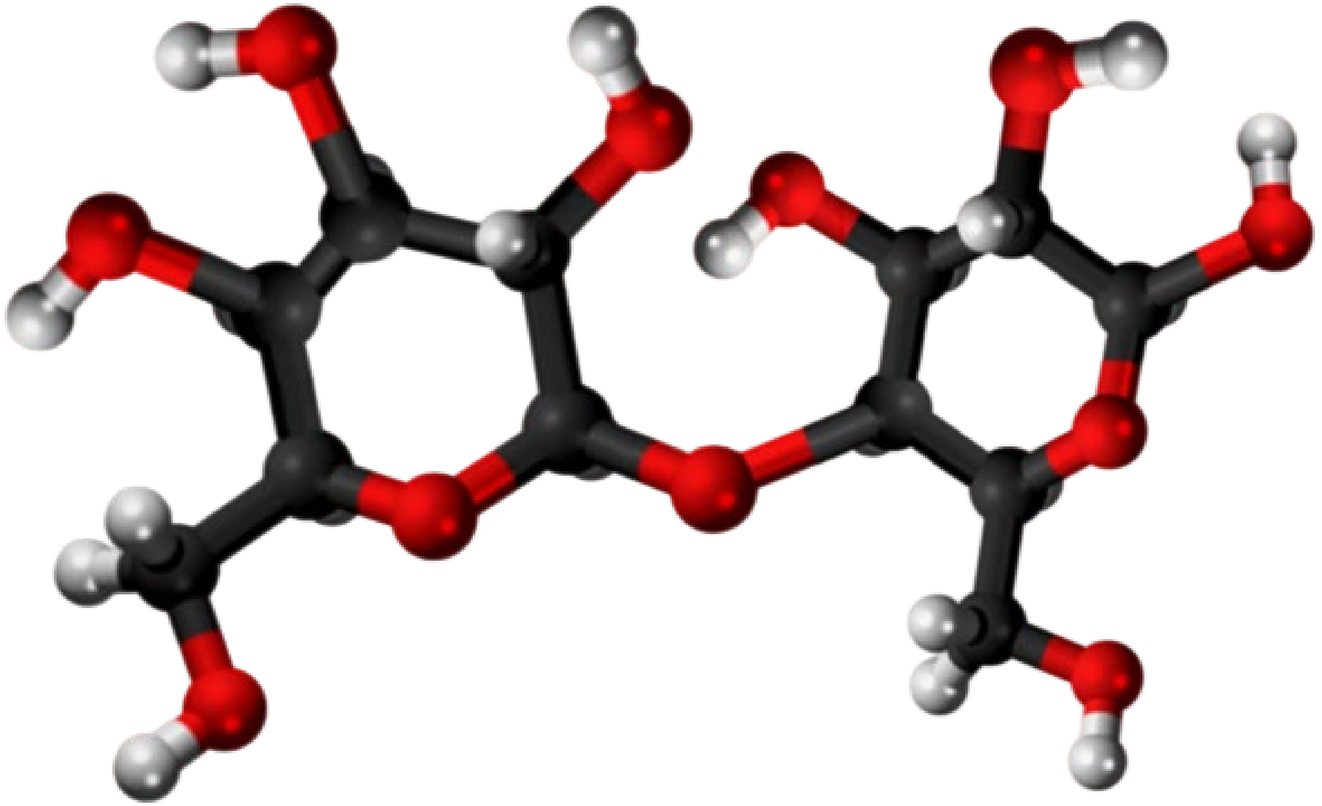
- Commonly, a triglyceride
- Fat-soluble vitamins are dissolved within



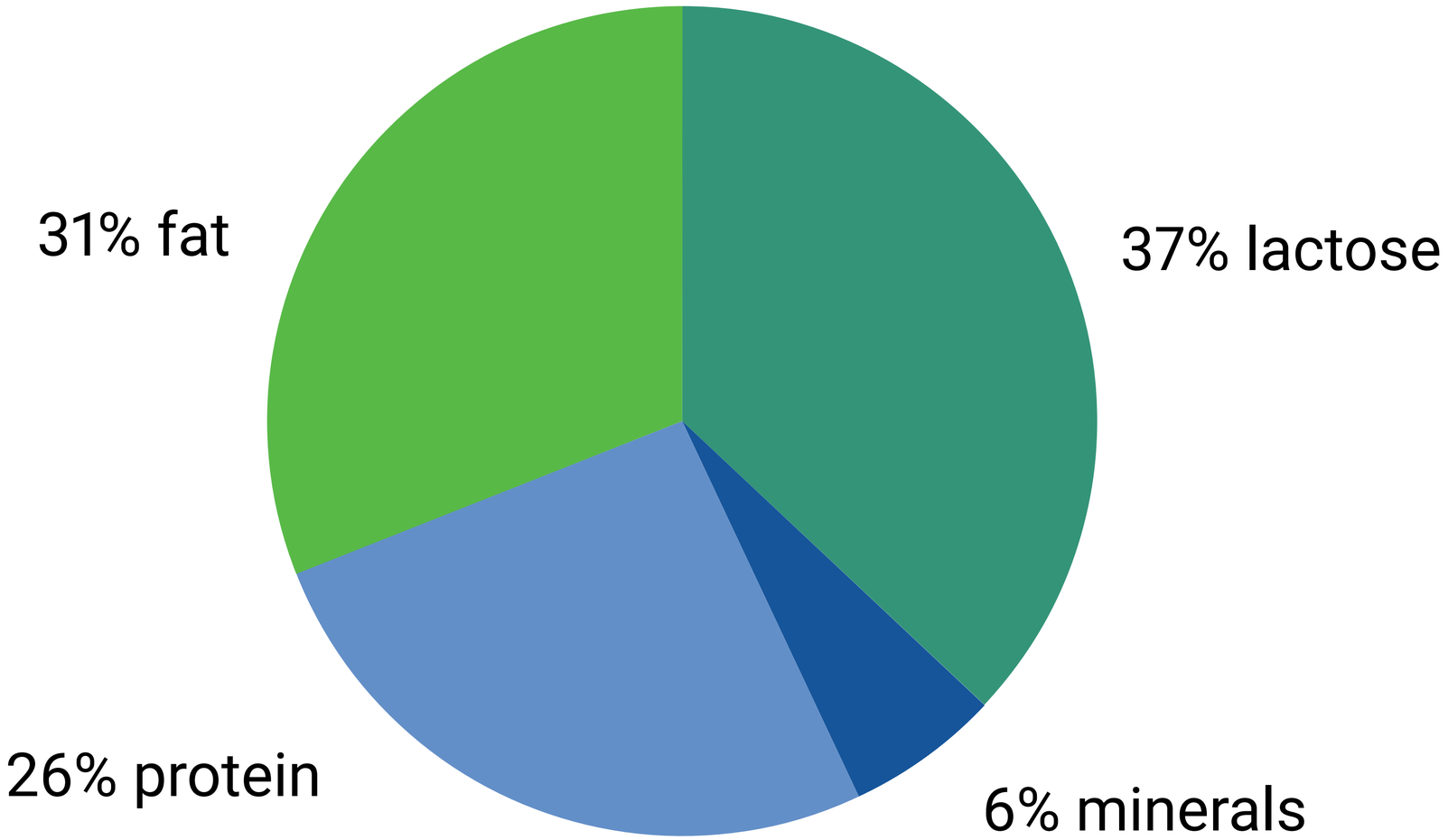
dirt-to-dinner.com/got-milk

Lactose

- Completely dissolved
- $C_{12}H_{22}O_{11}$
- Minerals like calcium are also dissolved



Composition of milk



Microscopic images of milk