

MILKY MAGIC

Cool Casein Facts

The plastic substance you made is called Casein (from latin “caesus” for ‘cheese’). It is the main protein found in milk, which you might have seen before as curds in sour milk. Using formaldehyde (a preservative), chemists in the 30s & 40s made a simple and cheap synthetic plastic called Galalith.

Galalith was commonly used for buttons, combs, buckles and even chess sets.



Casein-based glues were also common woodworking, aeronautical manufacturing and electrical transformers.

Wooden aircraft and old plains like the 1938 ‘de Havilland Albatross’ used casein glue all the time!

Casein is used today for specialist jewellery and protein shakes.

Can you think of any modern uses for casein?



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Chemical conundrums

Casein is a plastic, and is very similar to other plastics you might encounter at home.

‘Plastic’ is another name for *polymers*, which in chemistry are any substance made of repeating bits.

Proteins are *organic polymers* (hair, DNA, spider silk), whereas household plastics such as your water bottle, laptop, phone case or food containers are all examples of *synthetic polymers*.



How do we get plastic from milk anyway?

Vinegar is actually a weak acid, which lowers pH in the milk when you add it. Heat makes the chemical reaction go faster (since molecules are whizzing about more and thus more likely to hit each other).

Casein is a long protein chain in milk, so lowering the pH causes it to unfurl (like untangling headphones), in a process called *denaturation*. This creates a long polymer chain.

Polymer Basics:

psic.ws/macrog/kidsmac/wiap.htm

Why don't we use more organic plastics?

edx.org/course/industrial-biotechnology-delftx-ib01x

Natural vs Synthetic Polymers

cmu.edu/gelfand/k12-teachers/polymers/natural-synthetic-polymers/

**FURTHER
READING**