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Quantity of Casein in Different Sample of Milk

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I. MILK

Milk is a nutrient-rich, white liquid food produced by the mammary glands of mammals. It is the primary source of nutrition for infant mammals (including humans who are breastfed) before they are able to digest other types of food. Early-lactation milk contains colostrums, which carries the mother's antibodies to its young and can reduce the risk of many diseases. It contains many other nutrients including protein and lactose. Interspecies consumption of milk is not uncommon, particularly among humans, many of whom consume the milk of other mammals. As an agricultural product, milk, also called dairy milk, is extracted from farm animals during or soon after pregnancy. Dairy farms produced about 730 million tones of milk in 2011, from 260 million dairy cows. India is the world's largest producer of milk, and is the leading exporter of skimmed milk powder, yet it exports few other milk products. The ever increasing rise in domestic demand for dairy products and a large demand-supply gap could lead to India being a net importer of dairy products in the future. The United States, India, China and Brazil are the world's largest exporters of milk and milk products. China and Russia were the world's largest importers of milk and milk products until 2016 when both countries became self-sufficient, contributing to a worldwide glut of milk. Throughout the world, more than six billion people consume milk and milk products. Over 750 million people live in dairy farming households. Milk as a whole contains water, minerals (Ca, K, Na and trace metals), vitamins (A, D, K), carbohydrates, proteins and fats. The proportion of the sevaries from source to source. Average composition of milk from different sources is given ahead.

SOURCE OF MILK	WATER (%)	MINERAL (%)	PROTEIN (%)	FATS (%)	CARBOHYDRATES (%)
COW	87.1	0.7	3.4	3.9	4.9
HUMAN	87.4	0.2	1.4	4.0	4.9
GOAT	87.0	0.7	3.3	4.2	4.8
SHEEP	82.6	0.9	5.5	6.5	4.5

II. CASEIN

Casein (from Latin caseus"cheese") is a family of related phosphor proteins (αS1, αS2, β, κ). These proteins are commonly found in mammalian milk, comprising c. 80% of the proteins in cow's milk and between 20% and 45% of the proteins in human milk. The j Casein has a wide variety of uses, from being a major component of chees , to use as a food additive. The most common form of casein is

Sodium caseinate. As a food source, casein supplies amino acids,carbohydrates, and two essential elements, calcium and phosphorus. Casein contains a high number of proline residues,which do not interact. There are also no disulfide bridges. As a result, it has relatively little tertiary structure. It is relatively hydrophobic, making it poorly soluble in water. It is found in milk as a suspension of particles, called casein micelles, which show only limited resemblance with surfactant-type micelles in a sense that the hydrophilic parts reside at the surface and they are spherical. However, in sharp contrast to surfactant micelles, the interior of a casein micelle is highly hydrated. The caseins in the micelles are held together by calcium ions and hydrophobic interactions. Any of several molecular models could account for the special conformation of casein in the micelles.

One of them proposes the micellar nucleus is formed by several sub micelles, the periphery consisting of micro vellosities of κ-casein. Another model suggests the nucleus is formed by casein-interlinked fibrils. Finally, the most recent model proposes a double link among the caseins for gelling to take place. All three models consider micelles as colloidal particles formed by casein aggregates wrapped up in soluble κ-casein molecules. The iso electric point of casein is 4.6. Since milk's pH is6.6, casein has a negative charge in milk. The purified protein is water-insoluble.

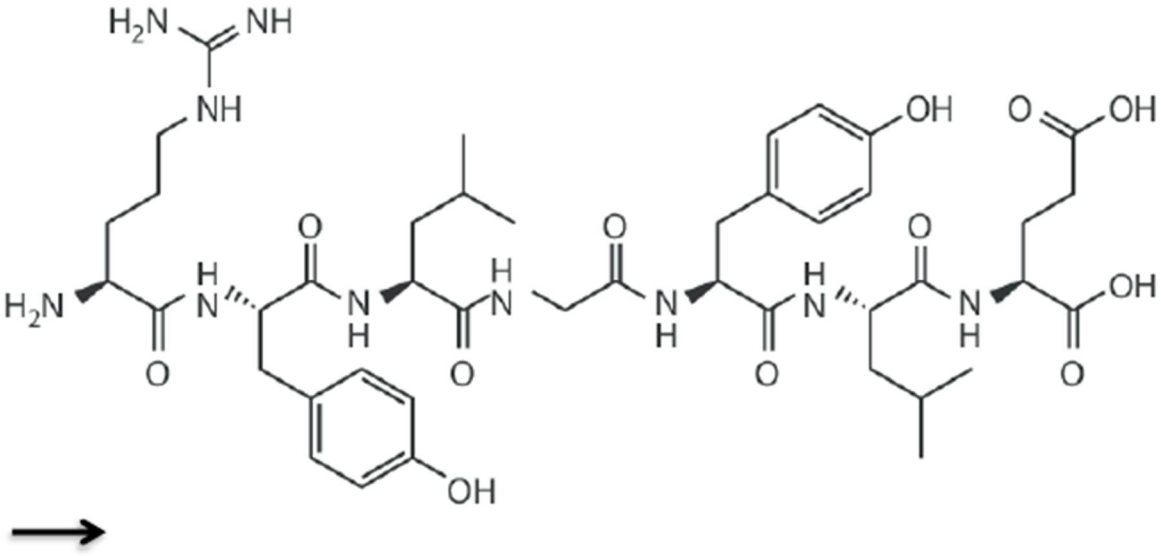
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While it is also insoluble in neutral salt solutions, it is readily dispersible in dilute alkalis and in salt solutions such as aqueous sodiumoxalate and sodium acetate. The enzyme trypsin can hydrolyze a phosphate-containing peptone. It is used to form a type of organic adhesive.

Ca^{2+}-Caseinate + $2CH_3COOH(aq.) \rightarrow Casein(s) + (CH_3COOH)_2Ca$

A. Structure of Casein



III. OBJECTIVE

To study the quantity of casein present in different samples of milk .

IV. MATERIALS REQUIRED

1) Conical flask
2) Beakers
3) Funnel
4) Measuring cylinder(100 mL)
5) Watch glass
6) Filter paper
7) 1% acetic acid
8) Different samples of milk
9) Glass rod

A. Chemicals

1) Different sample of milk
2) Ammonium sulphate solution
3) 1% Acetic acid solution

V. PROCEDURE

1) A clean dry beaker has been taken follow by putting 20 ml of cow milk into it on adding 20 ml of saturated ammonium sulphate solution slowly and with string fat along with casein was precipitated out.
2) The solution was filtered and transfered precipitate in another beaker. adding about 30 ml water to precipitate. only casein dissolve in water forming milky solution leaving fat undissolve.
3) The milky solution was heated to about 40 degrees celsius and adds 1 % acetic acid solution dropwise and when casein get precipitated.

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Fig.1.Heatig 40°C

4) Filter and precipitate washed with water and the precipitate was allowed to dry.



Fig.2.Filtration

5) Weight the dry solid mass in previously weight watch glasses.

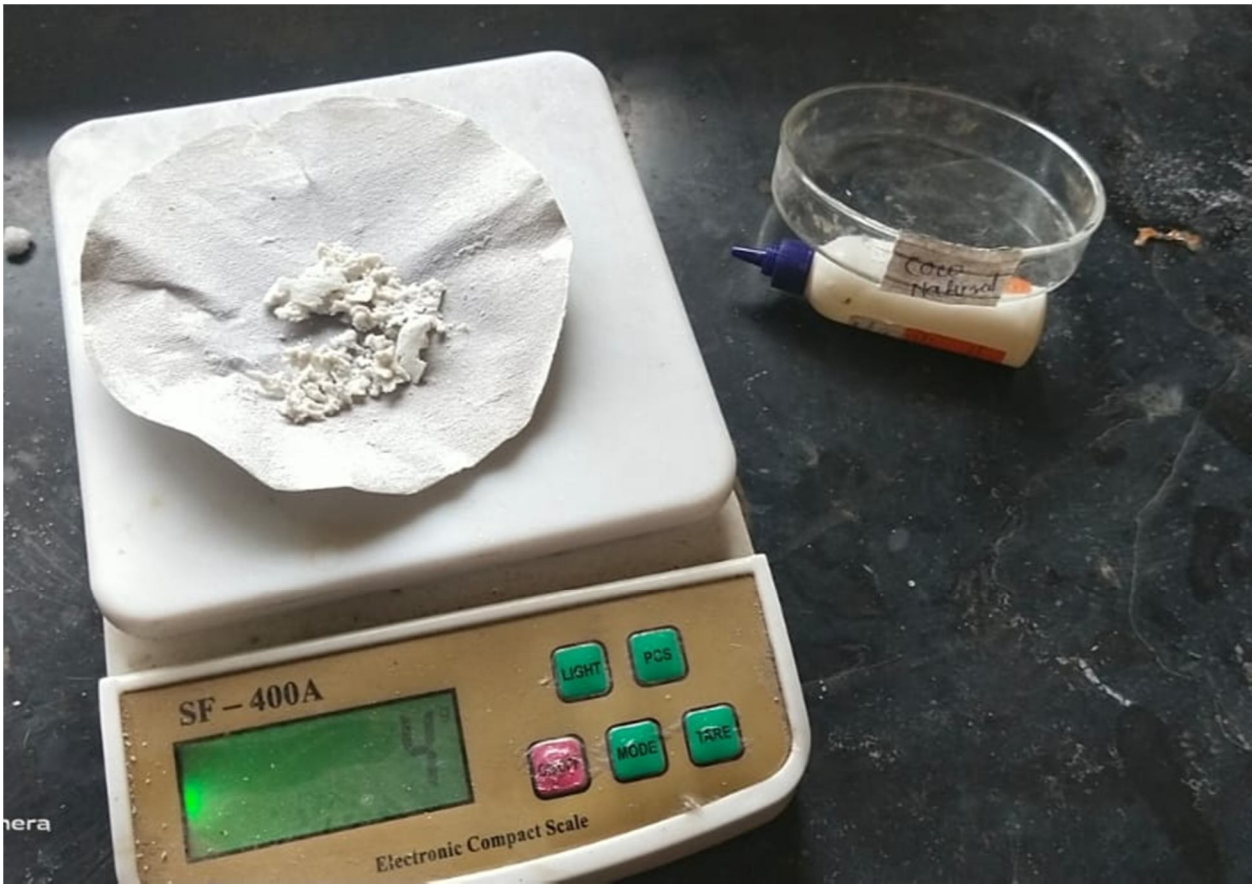


Fig.3.Wet Product wt.

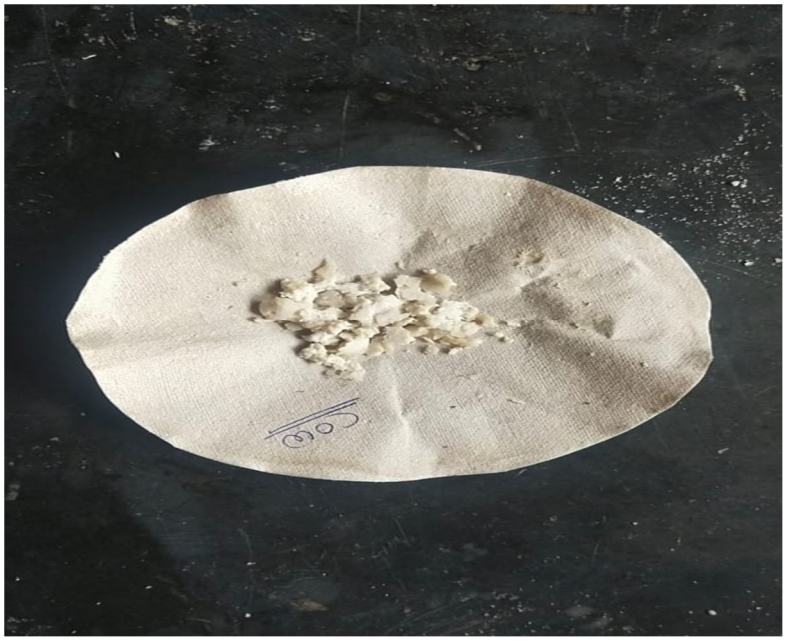


Fig.4.Final Product

6) Same process of occure in other animal milk.

Animal Name	Quantity Of Milk	Acetic Acid (PPT Form)	Ammonium Sulphate
Cow	20 ml	4 gram	20 ml
Buffalo	20 ml	5 gram	20 ml
Goat	20 ml	19 gram	20 ml
	Warm 20 ml	18gram	20 ml

Note:
The goat milk this process not properly work in this project
In this process firstly add acetic acid mix it well and the heat them PPT get form

Calculation:
Let them ammonium sulphate present in powder form then convert in dilute solution

The conversion of powder to dilute solution
According to Google
800ml →761 gram
200ml→?
Then

761×20/800=19.025 gram

20ml=19.025 gram

Dissolving ammonium sulphate in water after then filter out

VI. OBSERVATIONS

MILK (ANIMAL NAME)	MILK (HEATED) WT. OF CASEIN	(NORMAL MILK) WT.OF CASEIN
COW	_	1 GRAM
GOAT	1.4 GRAM	1.2 GRAM
BUFFALO	_	0.8 GRAM

VII. USES

A. Buffalo milk provides high amount of calcium, a mineral needed for bone development.
B. Casein is a major protein found in milk, comprising about 89% of buffalo milks total protein content.
C. Cow milk helps in improving the metabolism of the body and therefore prevents weight gain.
D. Cow milk is a good source of protein and calcium, as well as nutrients including vitamin, B12 and iodine.
E. Goat milk is a powerhouse of protein, healthy fats, vitamins, iron and other essential nutrients.
F. Goat milk keeps your bones and teeth stronger, due to its high calcium content.

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VIII. RESULT

According to our analysis of various samples of milk, we conclude that:
Goat milk heated wt. of casein 1.4 gram.
Goat normal milk wt. of casein 1.2 gram.

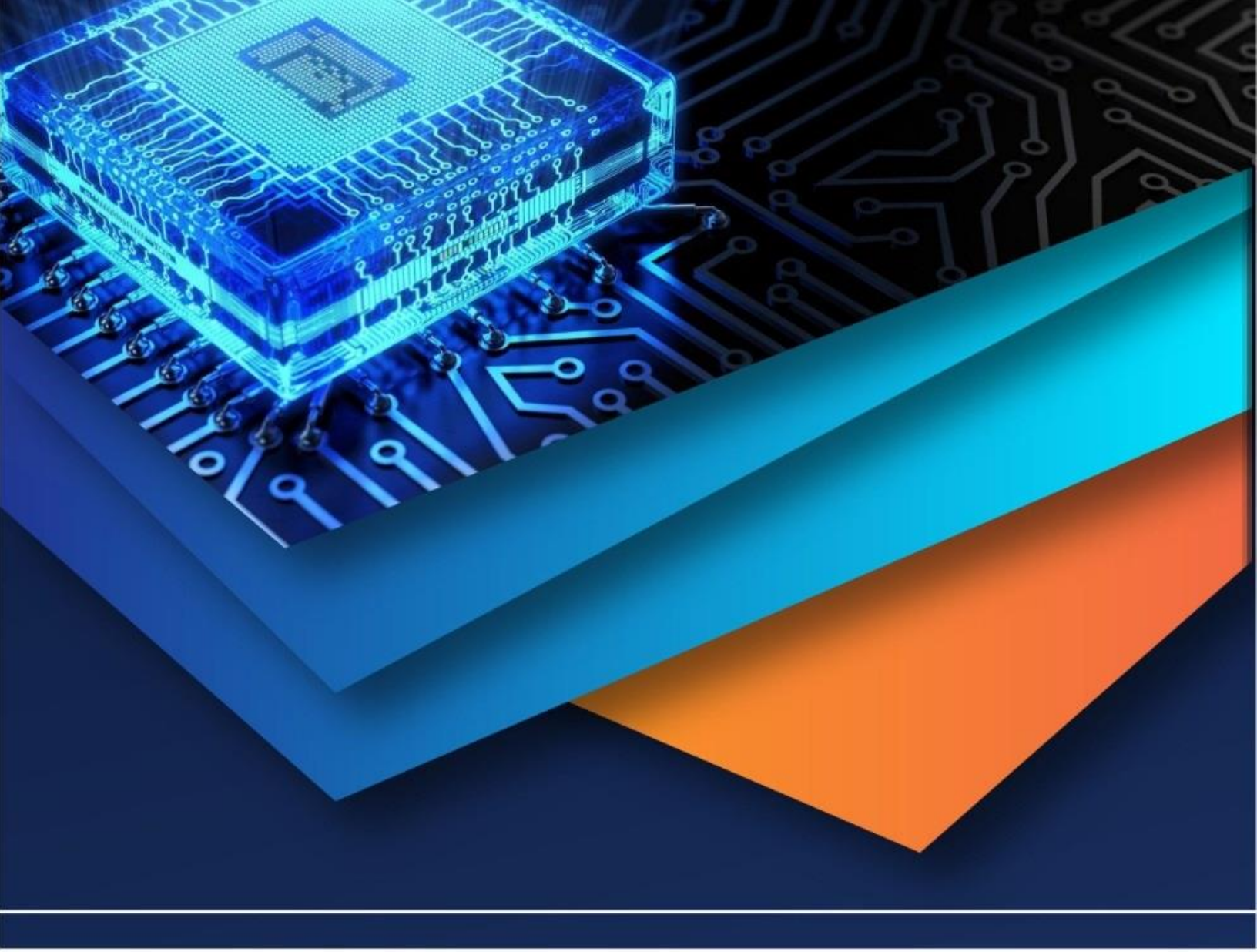
IX. PRECAUTIONS

A. During filtration, press the casein formed.
B. Use only the required amount of acid for complete precipitation.
C. Use only fresh milk.
D. Use same amount of each sample for the experiment.

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