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Analysis of Casein from Diffent Samples of Milk

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Abstract: *Analysis of different samples of milk to determination amount of casein, protein, minerals, carbohydrates, fats and water content. Casein is a major constituent in milk and is a mixed phosphorous protein.Casein is present in milk as a caseinated in the form of micells. Micelle have negative charge and adding acid to milk the negative charges are neutralized.*
Ca^{2+} + caseinated + $2CH_3COOH_{(aq)}$ ----→ Casein + $(CH_3COO)_2Ca$
Addition of saturated ammonium sulphate solution to the milk casein was precipitated out. Then add 30ml water heat t5he precipitate at 400Cthen add 1% acetic acid drop wise precipitate is obtained and filter the precipitate , dry weigh. The weight of precipitate give the amount of Casein present in a milk. This procedure is repeated for different samples of milk. For analysis of amount protein present in milk done by adding the small amount of calcium oxide to 5 drops of milk in a test tube and 3 drops of water check the sample with litmus then heated the test tube in flame precipitate is obtained and filter the precipitate , dry weigh. The weight of precipitate give the amount of protein present in milk.this procedure is repeated for different samples of milk.
For analysis of fat Butyrometer is used . It shows amount of fat and water present in milk.
Likewise amount of casein, protein, minerals, carbohydrates, fats and water content is determined in different samples of milk .Cow, Buffalo, goat, Sheep, Horse, Camel and Donkey milk. Out of these samples Cow milk have good for neutrition. Type equation here.*Donkey milk is rich in Vitamins.*

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I. Introduction

Casein is the name of related phosphor protein. These proteins are commonly found in mammalian milk, making up 80% of proteins in cow milk and between 20% and 45% of the proteins in human milk. Casein has a wide variety of uses, from being a major component of cheese, to use as a food additive, to a binder for safety matches. As a food source, casein supplies for amino acids, carbohydrates and two inorganic elements, calcium and phosphorus.

Milk is a white liquid produced by the mammary glands of mammals. All mammals, including humans, will normally produce milk to feed their offspring, weaning those offspring onto solid food as they get older. Since milk is a generally viewed as a nutritious food with lots of vitamins, minerals, fats, proteins etc. thus used for drinking purpose. There are different sources of milk samples available, however sufficient information regarding their mineral present, especially protein, fat etc. Milk is processed into a variety of dairy products such as cream, butter, yogurt, kefir, ice cream, and cheese.

II. Composition Of Casein

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.[5] One of them proposes the micellar nucleus is formed by several submicelles, the periphery consisting of microvellosities of κ-casein.[6][7] Another model suggests the nucleus is formed by casein-interlinked fibrils.[8] Finally, the most recent model[9] 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 isoelectric point of casein is 4.6. Since milk's pH is 6.6, casein has a negative charge in milk. The purified protein is water-insoluble. While it is also insoluble in neutral salt solutions, it is readily dispersible in dilute alkalis and in salt solutions such as aqueous sodium oxalate and sodium acetate.

The enzyme trypsin can hydrolyze a phosphate-containing peptone. It is used to form a type of organic adhesive.[10]

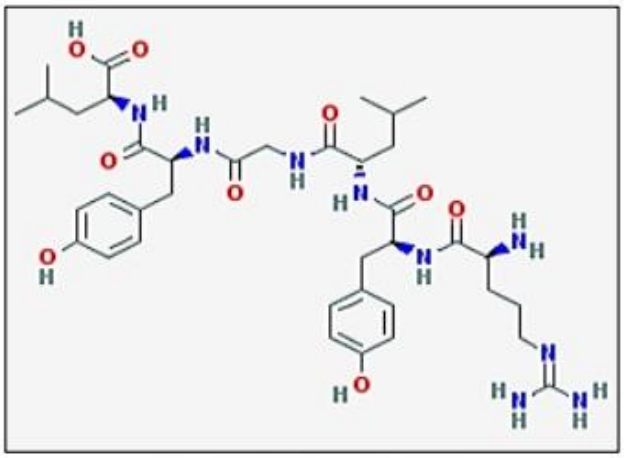

Figure 1: Structure of casein

III. Materials And Methods

1)CASEIN: To study of casein in different samples of milk.

Materials: Beaker, Filter Paper, Conical Flask, Glass Rod and Funnel. Saturated Ammonium sulphate, 1% Acetic Acid, Distilled Water and Different Sample of Milk.

PROCEDURE:-

Take a clean dry beaker put into it 20cc of cow's milks and 20 ml of saturated ammonium sulphate solution slowly and with stirring. Fat along with casein will precipitate out. Filter the solution and transfer the precipitates in another beaker. Add about 30 ml of water to the precipitate. Only casein dissolves in water forming milky solution leaving fat undissolved. Heat the milky solution to about 40 C and add 1% acetic acid solution drop wise, when casein gets precipitated. Filter the reprecipitate, wash with water and let the precipitate dry.Weigh the dry solid mass in a previously weighed watch glass. Repeat the experiment with other samples of milk.

2) FAT: To determine amount of fat in different sample

Materials: Beaker, Centrifuge, Butyrometer, Funnel and Glass Rod.

Sluphuric Acid, Amyl Alcohol, Distil Water and Different Sample of Milk.

PROCEDURE: Put 10 ml of sulphuric acid in butyrometer. Add 11 ml of milk from the average sample. Add 1 ml of Amyl alcohol. Shake the Butyrometer to dissolve the milk elements. Put the Butyrometer in the centrifuge.

3) PROTEIN: To determine amount of Protein in different sample of milk.

Materials: Beaker, Test Tube, Litmus Paper and Burner.

PROCEDURE: Calcium Oxide, Distil Water and Different Sample of Milk. Add a small amount of calcium oxide and 5 drops of milk to a test tube. Add 3 drops of water. Damper the litmus paper with water. Carefully heat the test tube in a flame. If protein is present in a food (positive test for protein), the litmus paper will change colour from red to blue.

IV. Observations And Result

1) Volume of milk taken in each case = 20 ml

2) Weight of milk taken = W_1g

3) Weight of casein isolated = W_2g

4) Percentage of casein = Weight of casein X 100

Weight of milk

Sl. No.	Types of Milk	Volume of Milk	Weight of Milk W1gm.	Weight of Casein W2gm.	% of Casein
1	Arokya Milk	20 ml	14.2	1.19	8.38%
2	Nandini Milk	20 ml	18.2	1.088	5.78%
3.	Cow Milk	20 ml	18.17	0.62	3.1%
4.	Buffalo Milk	20 ml	18.1	0.66	3.3%
5.	Goat Milk	20 ml	17.86	0.56	2.8%
6.	Sheep Milk	20 ml	18.17	0.9	4.9%
7.	Horse Milk	20 ml	17.2	0.93	1.3%

8.	Camel Milk	20 ml	18.23	0.923	2.7%
9.	Donkey Milk	20 ml	18.30	0.64	3.4%

The yield of casein precipitated from the various milk samples of goat milk, cow milk, buffalo, goat, sheep, horse and camel milk contains 7.8gm, 4gm, 6.4gm,6.5gm, 3gm and 0.626 gm respectively. Similarly, the milk samples availed from the market such as milk like Arokya and Nandini was 1.19 gm and 1.088 gm respectively. This shows that the casein precipitated from the cow milk contains more amount of casein protein than the goat and buffalo milk samples. The lower amount of casein in the buffalo milk is may be due to the more fat content in it.

Sl. No.	Types of Milk	Water %	Protein %	Fat %	Carbohydrates %
1	Arokya Milk	28	3.1	4.5	2%
2	Nandini Milk	27	3.1	4.9	2%
3.	Cow Milk	28.5	3.1	4.4	4.9%
4.	Buffalo Milk	27.5	4.0	7.5	4.8%
5.	Goat Milk	30	4.5	4.6	4.8%
6.	Sheep Milk	29	5.0	6.0	4.5%
7.	Horse Milk	27	3.3	1.9	6.3%
8.	Camel Milk	28	21.30	33.00	35.80%
9.	Donkey Milk	28	1.5	0.3	5.8%

Amount of casein in different samples of milk has been studied systematically.
This shows that the casein precipitated from the cow milk contains more amount of casein protein than the goat and buffalo milk samples etc.

V. Conclusion

This study clearly indicated that the amount of casein precipitated from the cow milk was higher than that of the other milk samples. The quantitative analysis of casein precipitated from the various milk samples provide the ample scope to the cottage cheese manufacture.Thus, the cow milk is suitable for the best muscle growth and basic body building achievements.

"Different samples of milk contain different percentage of casein."

PRECAUTIONS

1) Handle apparatus and chemicals carefully.
2) Add ammonium sulphate solution very slowly.
3) Stir Milk while adding chemicals.
4) Do not disturb milk after adding ammonium sulphate solution and wait same time for fat and casein to precipitate out.
5) Take the amount readings carefully with digital weighing machine only.

References

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