CERTIFICATE

This is to certify that ..... of class XII (Science) of Kendriya Vidyalaya Birbhum has completed the Investigatory Project in Chemistry titled "Study Of Quantity of Casein present in Different Samples of Milk" himself under the supervision and guidance of Chemistry Teacher during the year 2018-19. The progress of the project has been continuously reported and has been in my knowledge consistently

ACKNOWLEDGEMENT

First of all, I am deeply thankful to my Chemistry teacher ..... for extending his valuable and scholarly guidance throughout the preparation of this project. I wish to extend my sincere thanks to Mr. ..... respected Principal, Kendriya Vidyalaya Birbhum for his continuous motivation and moral support for completing the work.

I am also thankful to all my respected teachers, library staff, office staff and staff members of the Chemistry Laboratory of the school.

I am also thankful to the teachers and staff members of the department of Chemistry for extending their humanitarian and scholastic assistance in finding out the solutions of some query during my work.

Last but no the least I am indebted to my friends, classmates and parents for encouraging and never let me down in my confidence while completing the project.

INTRODUCTION

What is Casein ?

Casein is the protein found in all mammals' milk. Mammals include cow, goat, sheep, yak, buffalo, camel and humans.

Milk is a complete diet as it contains minerals, vitamins, proteins, Carbohydrates, Fats And Water . Average composition of milk fro different sources is given below :

SOURCE OF MILK	WATER (%)	MINERALS (%)	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	0.7	3.3	4.2	4.8
Sheep	82.6	0.9	5.5	6.5	4.5

Casein in the most predominant protein in milk and is a mixed phosphor protein. Casein has a isoelectric pH of about 4.7 can be easily separated around this isoelectric pH. It readily dissolves in dilute acids and alkalies.

Casein is present in milk as calcium caseinate in the form of micelles. These micelles have negative charge and on adding acid to milk the negative charges are neutralized.

$$Ca^{2+} + \text{-Caesinate} + 2CH_3COOH(aq) - \text{Caesein} + (CHCOO)_2Ca$$

Natural milk is an opaque white fluid Secreted by the mammary glands of Female mammal .The main constituents of natural milk are Protein, Carbohydrate, Mineral Vitamins, Fats and Water and is a complete balanced diet .Fresh milk is sweetish in taste .However, when it is kept for long time at a temperature of 5 degree it become sour because of bacteria present in air. These bacteria convert lactose of milk into lactic acid which is sour in taste. In acidic conditions casein of milk separate out as precipitate. When the acidity in milk is sufficient and temperature is around 36 degree, it forms curd.

APPLICATIONS:

In addition to being consumed in milk casein is used in the manufacture of adhesives, binders, protective coatings, plastics(such as knife handles and knitting needles), fabrics, food additives, and many other products.It is commonly used by body builders as slow digesting whey proteins and also as an extremely high source of glutamine (post workout). Another reason, it is used in bodybuilding is because of its anti-catabolic effect,meaning that casein consumption inhibits protein breakdown in the body. Casein is frequently found in non dairy substitutes to improve consistency especially when melted.

AIM :

To study quantity of casein in different samples of milk.

THEORY :

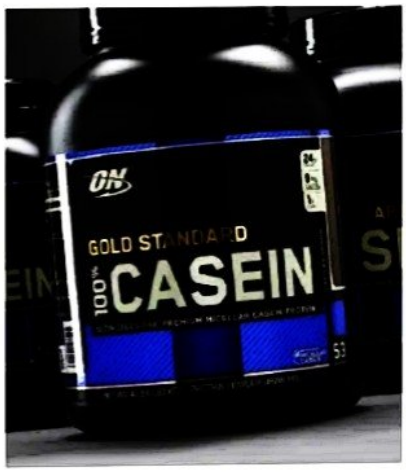
Milk contains 3% to4% casein suspended in water in colloidal form.It si precipitated in weakly acidic medium

APPARATUS REQUIRED :

Funnel, funnel stand , glass rod , filter paper, weight box , test tubes, pestle and mortar.

CHEMICALS REQUIRED :

(i) Different samples of milk.
(ii) Saturated ammonium sulphate solution.
(iii) 1 % acetic acid solution.



PROCEDURE :

1. Wash the beaker (250 ml) with the distilled water and dry it.

2. Take 20 ml of buffalo's milk in 250 ml beaker and find its weight.

3. Add 20 ml saturated solution of ammonium sulphate slowly with stirring. Fat and casein will separate out as precipitate.

4. Filter the above solution and transfer the precipitate in another beaker.

5. Treat the above precipitate with 30 ml distilled water. Casein dissolves forming milky solution whereas fat remains as such.

6. Warm the above contents of the beaker to 40 - 45°C on a low flame. Now, add 1% acetic acid solution drop wise with stirring when casein gets precipitated.

7. Filter the precipitated casein and wash with distilled water and dry it.

8. Find the weight of dry precipitate.

9. Repeat the whole experiment with cow's milk, goat's milk and sheep's milk.

OBSERVATIONS :

- Volume of milk taken in each case

  = 20 ml

- Weight of milk taken

  $= W_1$ g

- Weight of Casein isolated

  $= W_2$ g

- Percentage of casein =

$$\frac{Weight\ of\ casien}{Weight\ of\ Milk} * 100$$

SL.NO	Type of Milk	Volume of Milk Taken (ml)	Weight of Milk (g)	Weight of Casein (g)	Percentage Of Casein
1	Buffalo's milk	20	23.09	0.632	2.73 %
2	Cow's milk	20	35.66	0.55	1.64 %
3	Goat's milk	20	23.09	0.77	3.67 %

RESULT :

(i) Different Samples of milk contains different percentage of casein.

(ii) Highest percentage of casein is present in Goat's milk.

PRECAUTIONS :

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

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