

A.I.S.S.C.E.-2016

CHEMISTRY INVESTIGATORY PROJECT

ON

STUDY OF QUANTITY OF CASEIN PRESENT IN DIFFERENT SAMPLES OF MILK

SUBMITTED BY:-

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TEACHER'S SIGNATURE

EXTERNAL EXAMINER

CERTIFICATE

This is to certify that, Neelanjyan Dutta, a student of Indira Gandhi Memorial High School has submitted the chemistry project report entitled "Study of Quantity of Casein content in different samples of milk" submitted for partial fulfilment and practical examination to the department of chemistry, embodies a detailed study carried out by the student under my supervision. This project in my opinion is completed and is suitable for presentation.

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ACKNOWLEDGEMENT

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I can't forget to offer my sincere thanks to my family who helped me to carry out this project work successfully & for their valuable advice & support, which I received from them time to time.

Neelanjyan Dutta

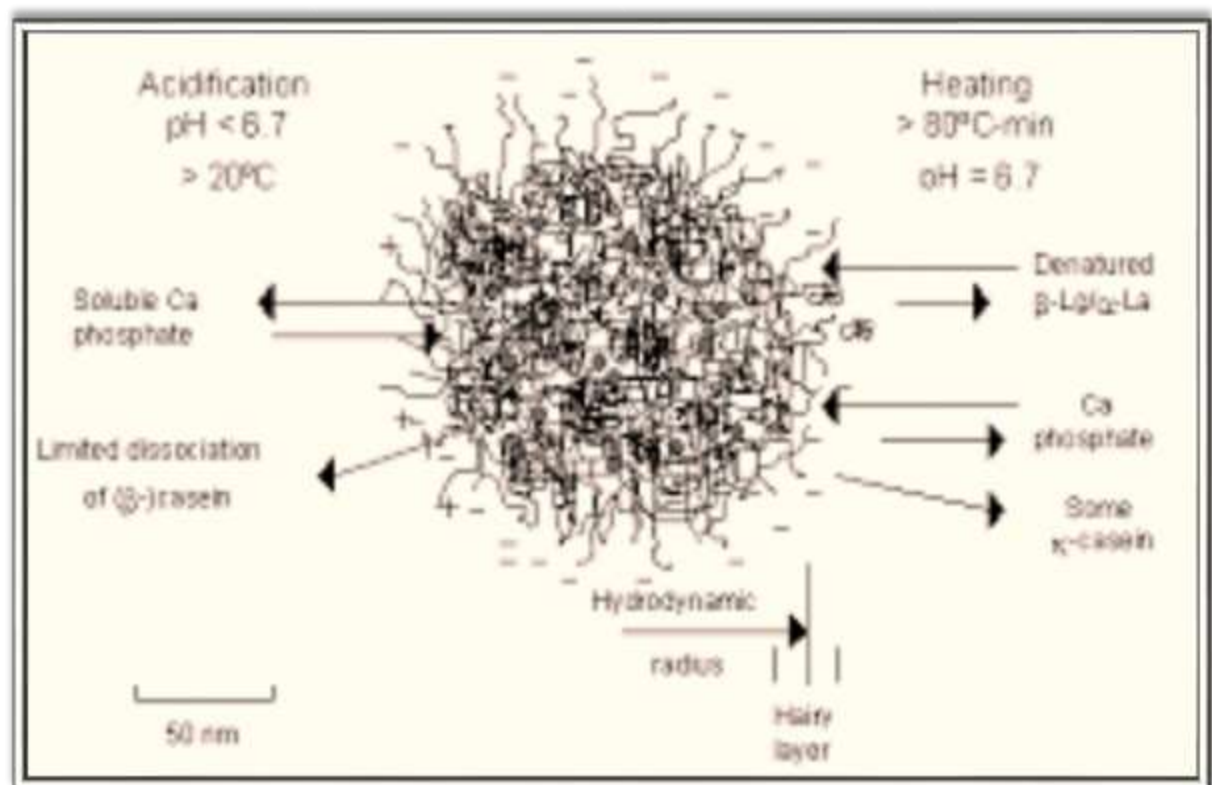
DECLARATION

I do hereby declare that this project work has been originally carried under the guidance and supervision of Mrs. Shovajita Sikdar, head of the chemistry department of Indira Gandhi Memorial High School, Kolkata, West Bengal.

Neelanjyan Dutta

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Introduction

Milk is a white fluid secreted by the mammary glands of living organisms. It is the food of exceptional inters probability. Milk is also known to contain all sorts of micronutrients essential for the body of an organism. The major milk protein casein is found only in milk and nowhere in the world. The composition of casein is not constant and depends upon the source of milk.

Average composition of milk from different sources is given below:

<i>Source of milk</i>	<i>Water (%)</i>	<i>Mineral (%)</i>	<i>Protein (%)</i>	<i>Fats (%)</i>	<i>Carbohydrates (%)</i>
<i>Cow</i>	<i>87.1</i>	<i>0.7</i>	<i>3.4</i>	<i>3.9</i>	<i>4.9</i>
<i>Human</i>	<i>87.4</i>	<i>0.2</i>	<i>1.4</i>	<i>4.0</i>	<i>4.9</i>
<i>Goat</i>	<i>87.0</i>	<i>0.7</i>	<i>3.3</i>	<i>4.2</i>	<i>4.8</i>
<i>Sheep</i>	<i>82.6</i>	<i>0.9</i>	<i>5.5</i>	<i>6.5</i>	<i>4.5</i>

Casein is a major protein constituent in milk & is a mixed phosphor-protein. Casein has isoelectric pH of about 4.7 and 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.

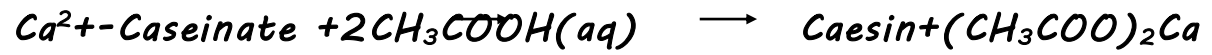
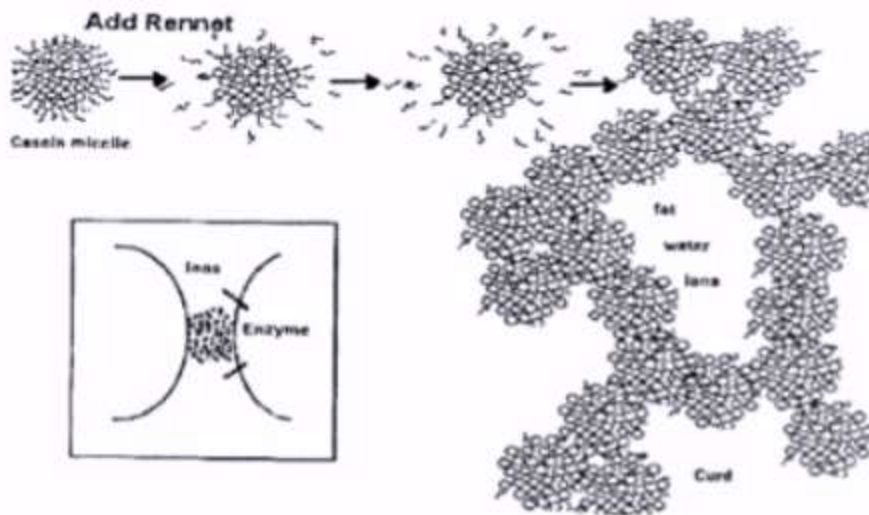
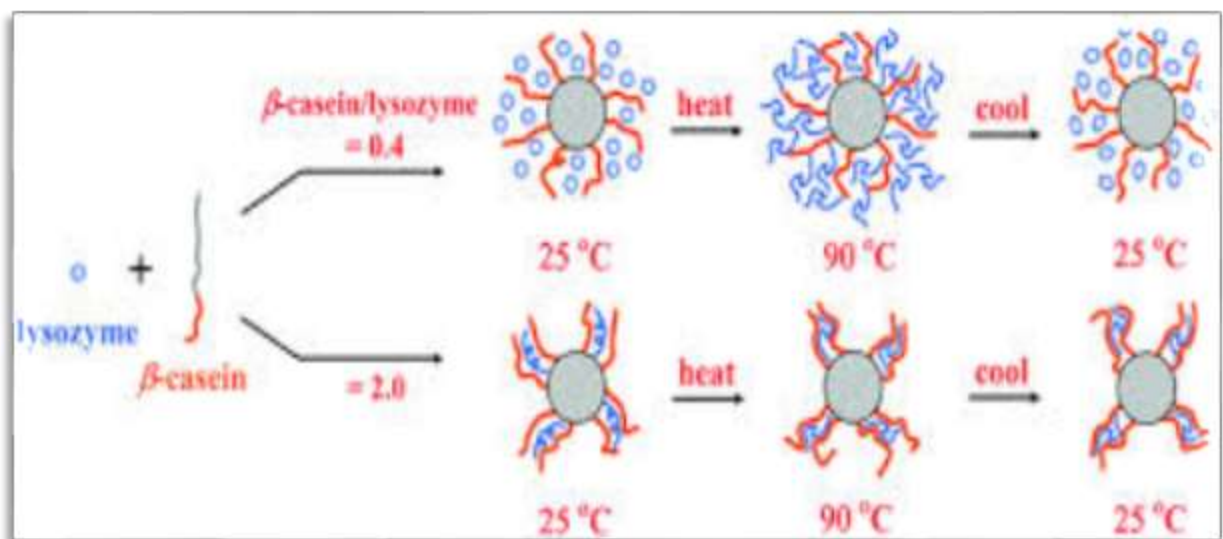


Diagram showing the action of rennet on the casein micelle. The enzyme in rennet cleaves the casein releasing a large peptide. The surface of the micelle changes from being hydrophilic and negatively charged to hydrophobic and neutral. As a consequence, the micelles aggregate to trap fat globules and microorganisms in developing curd.



Natural milk is an opaque white fluid Secreted by the mammary glands of Female mammals. 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 condition casein of milk starts separating out as a precipitate. When the acidity in milk is sufficient and temperature is around 36 degree, it forms semi-solid mass, called curd.



AIM

To study the quantity of Casein in different samples of milk.

REQUIREMENTS

- *Beakers(250 ml)*
- *Filtration Flasks*
- *Measuring Cylinders*
- *Glass rod*
- *Spatula*
- *China Dish*
- *Dropper*
- *Weight Bore*
- *Different samples of Milk*
- *10% Acetic Acid*

PROCEDURE

1. *A clean dry beaker has been taken, followed by putting 20 ml of cow's milk into it and adding 20 ml of saturated ammonium sulphate solution slowly and with stirring. Fat along with Casein was precipitate out.*
2. *The solution was filtered and transferred the precipitates in another beaker. Added about 30 ml of water to the*

precipitate. Only Casein dissolves in water forming milky solution leaving fat undissolved.

3. The milky solution was heated to about 40°C and add 10% acetic acid solution drop-wise, when casein got precipitated.
4. Filtered the precipitate, washed with water and the precipitate was allowed to dry.
5. Weighed the dry solid mass in a previously weighed watch glass.
6. The experiment was repeated with other samples of milk.

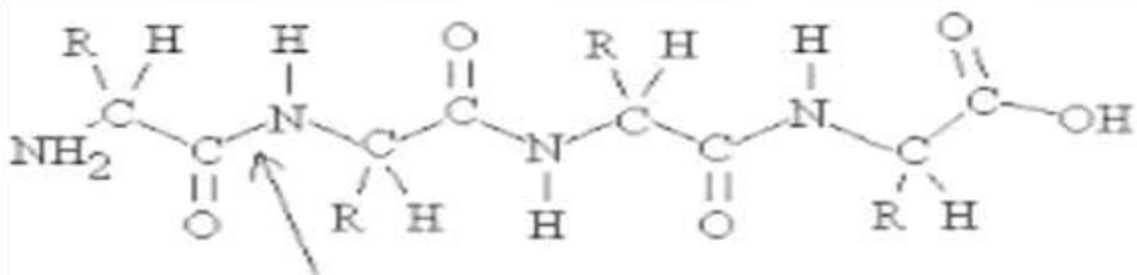
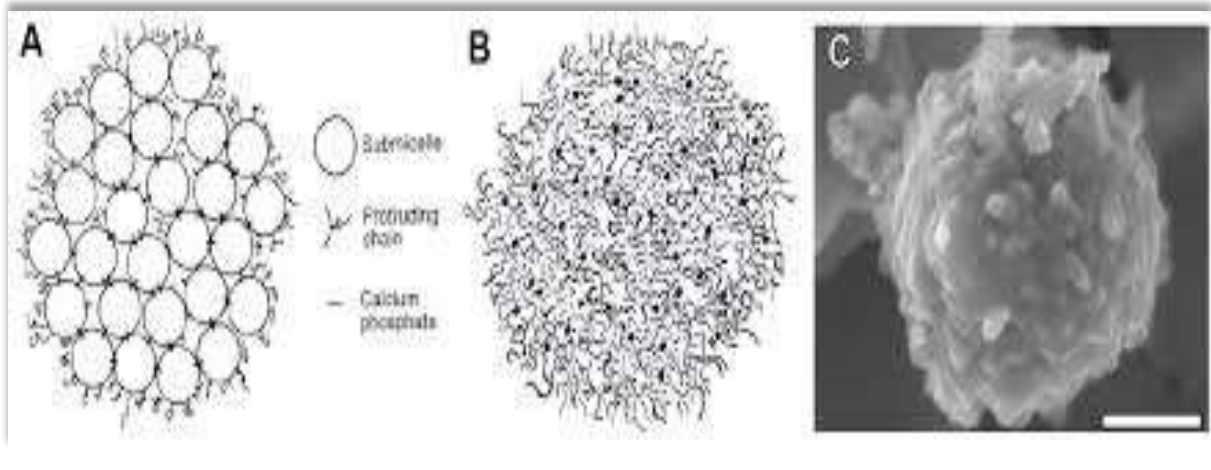


Figure 1. Protein Chain with Peptide Bond
R = amino acid group



OBSERVATIONS

<i>Sample No.</i>	<i>Source</i>	<i>Content of Protein</i>	<i>% of Casein</i>
1.	<i>Cow Milk</i>	<i>0.60</i>	<i>3.00</i>
2.	<i>Goat Milk</i>	<i>0.65</i>	<i>3.25</i>
3.	<i>Buffalo Milk</i>	<i>0.85</i>	<i>4.20</i>
4.	<i>Amul Milk</i>	<i>0.75</i>	<i>3.88</i>

CONCLUSION

Different samples of milk contain different percentage of Casein.

BIBLIOGRAPHY

- *Comprehensive Practical Chemistry Class-12; Laxmi Publications.*
- *Advanced Organic Practical Chemistry; By O.P. Aggarwal*

**EXTERNAL EXAMINER
REMARKS**

