SHREE VASISHTHA VIDHYALAYA

Subject : .....

Topic : .....

Submitted to: .....

Submitted by: Board Roll No.: .....

Acknowledgement

I would like to express my special thanks of gratitude to our principal Mr. Shubham Vats for her encouragement and for all the facilities that she provided for this project work.

I extend my hearty thanks to Mr. Umesh Pandey, Chemistry teacher, who guided me to the successful completion of this project. I take this opportunity to express my deep sense of gratitude for his guidance, constant encouragement, constructive comments, sympathetic attitude and immense motivation, which has sustained my efforts at all stages of this project work. I would like to thank my parents and friends who helped me in finalizing this project.

SHREE VASISHTHA VIDHYALAYA

CERTIFICATE

This is to certify that, Mr. Shubham Vats, student of Class 12th has successfully completed the CBSE Chemistry Investigatory project under the guidance of Mr. Umesh Pandey ,for the academic year 2023-24.

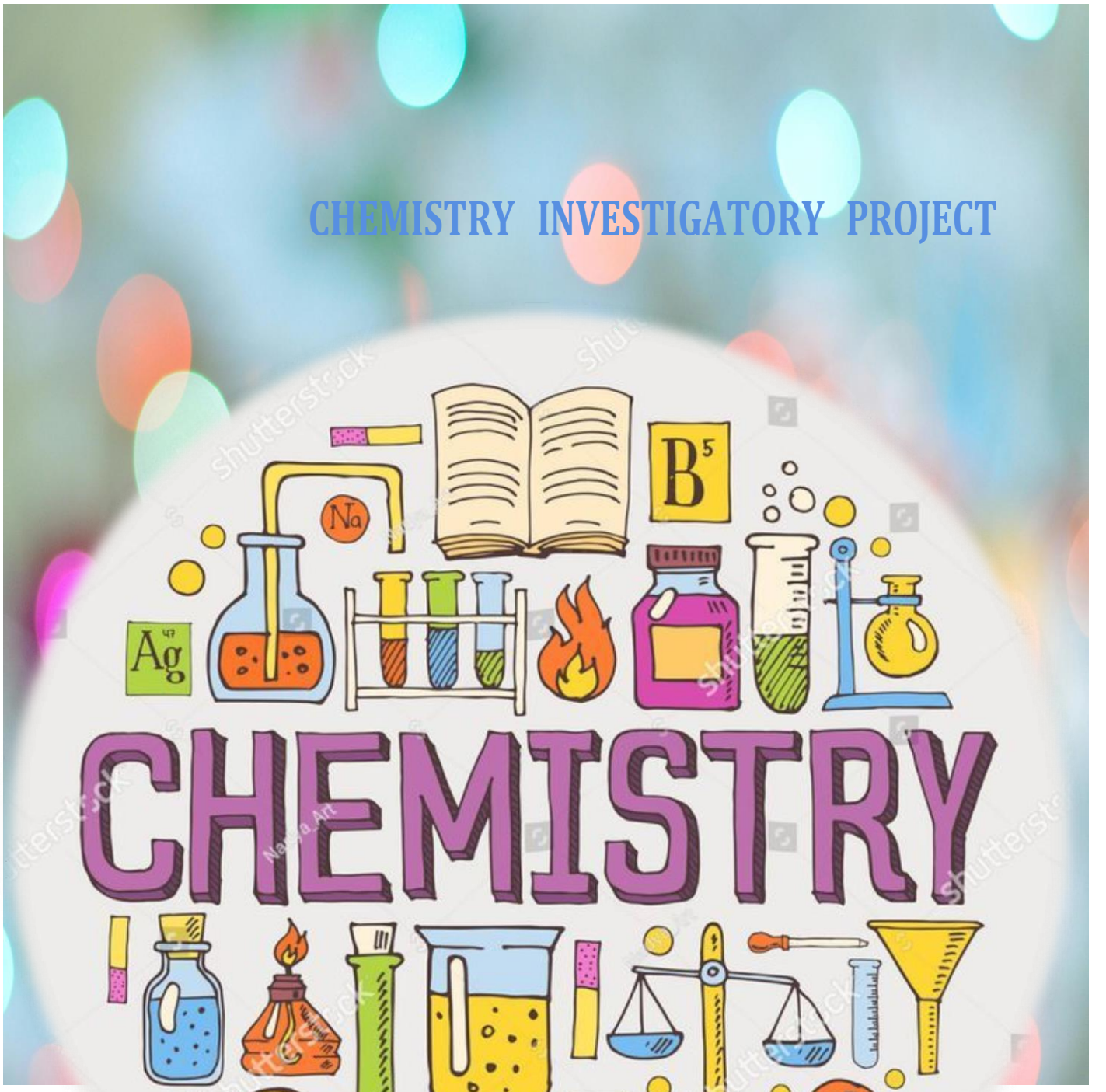
External Examiner

InternalExaminer

Principal

School Stamp

CHEMISTRY INVESTIGATORY PROJECT



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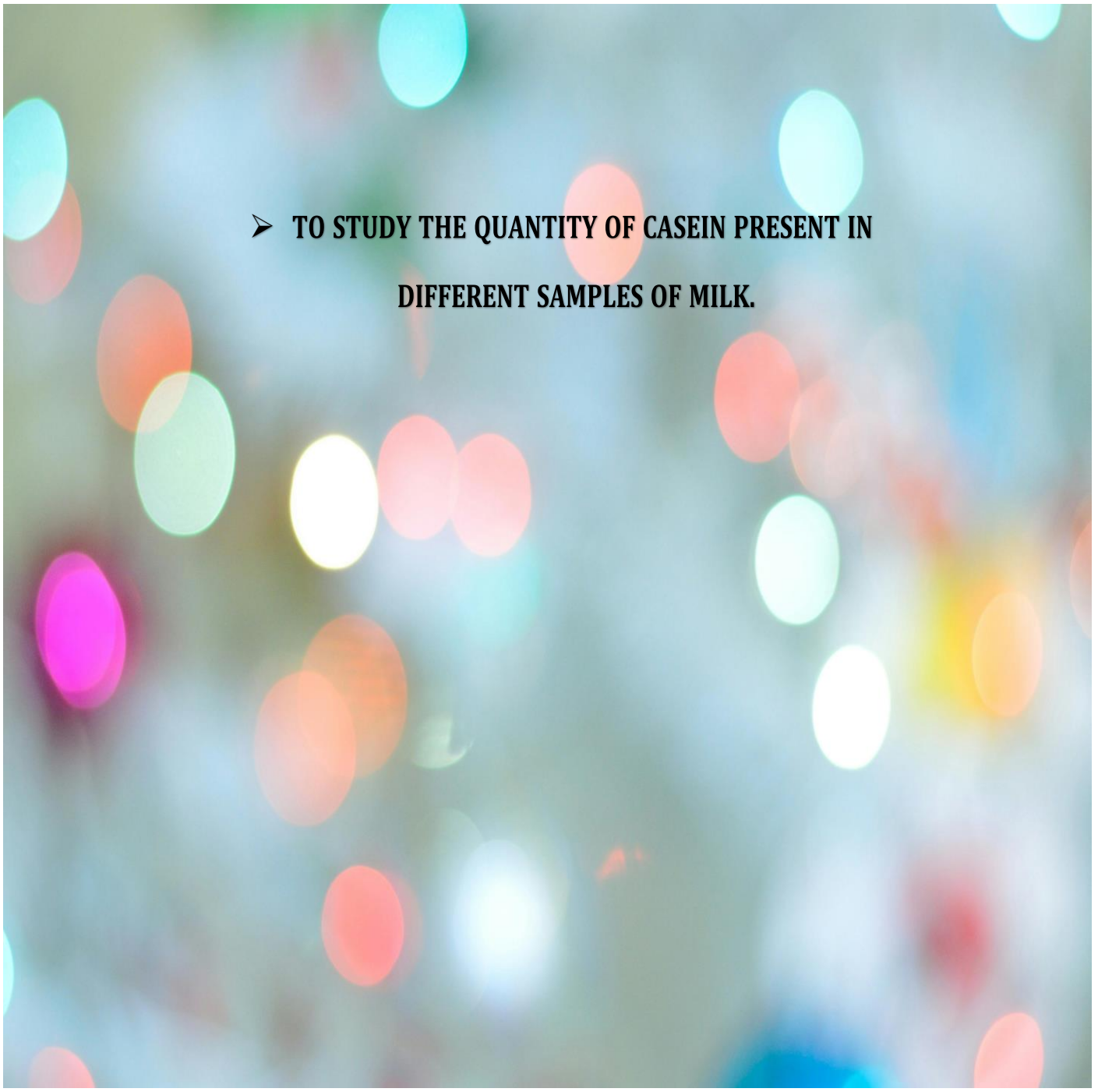

➢ TO STUDY THE QUANTITY OF CASEIN PRESENT IN
DIFFERENT SAMPLES OF MILK.

APPARATUS AND CHEMICALS REQUIRED

➢ APPARATUS

- **250ML BEAKERS**
- **FUNNEL, GLASS ROD**
- **PORCELAIN DISH**
- **CHEMICAL BALANCES**
- **TEST TUBES**
- **FILTRATION FLASK**
- **BURNER**

➢ CHEMICALS

- **DIFFERENT SAMPLES OF MILK**
- **1% OF ACETIC ACID SOLUTION**
- **SATURATED AMMONIUM SULPHATE SOLUTION**

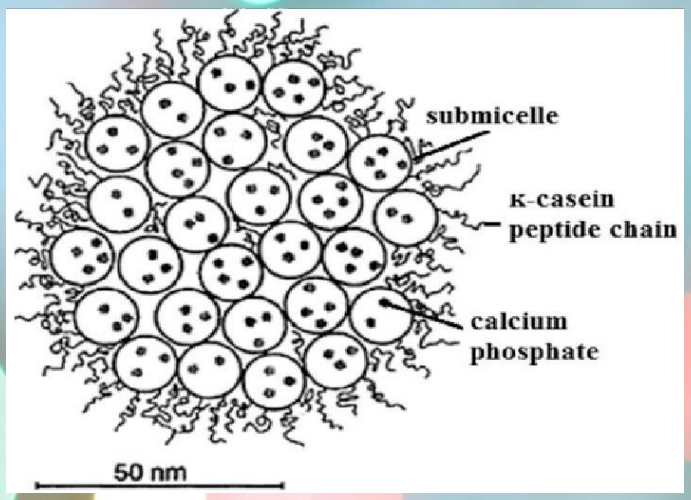
THEORY

- **Casein is the name of related phosphoproteins. These proteins are commonly found in mammalian milk, making up 80% of the 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. The most common form of casein is sodium caseinate.**

- **As a food source, casein supplies for amino acids, carbohydrates and two inorganic elements, calcium and phosphorus.**

- **Casein contains a fairly high number of proline residues, which do not interact. There are also no disulfide bridges. As a result hydrophobic, making it poorly soluble in water. It is found in milk as a suspension of particle 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.**

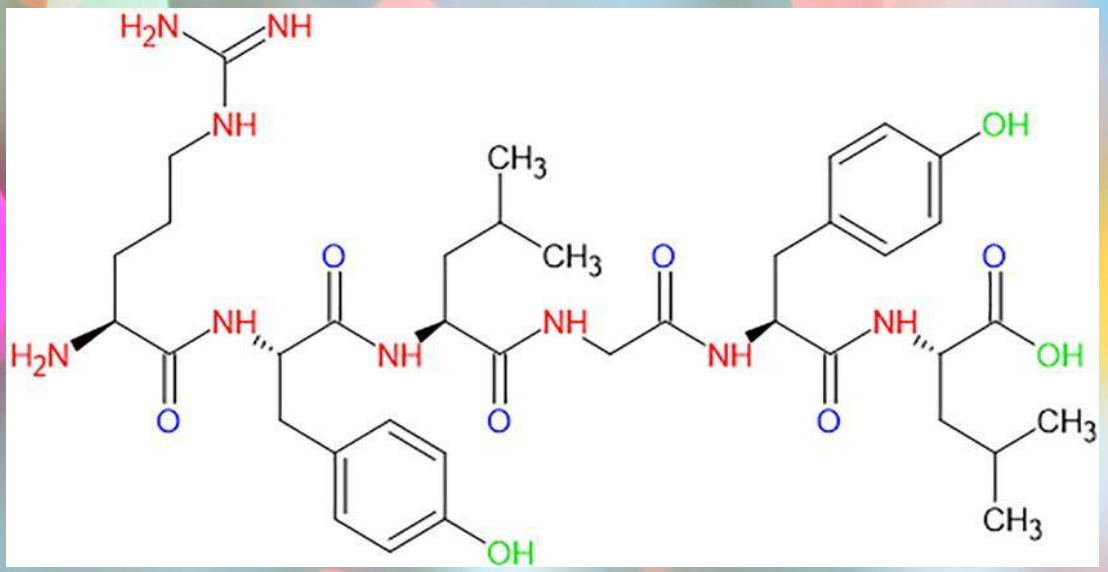
- **The caseins in the micelles are held together by calcium ions and hydrophobic interactions. Several models account for the special conformation of casein in the micelles. One of them proposes the micellar nucleus is formed by several sub micelles, the periphery consisting of K-casein. Another model 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 K-casein molecules.**


submicelle
κ-casein
peptide chain
calcium
phosphate
50 nm

- **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 these varies 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

- STRUCTURE OF CASEIN IS AS FOLLOWS



PROCEDURE

- 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 slowly and with stirring. Fat along with casein was precipitate out.
- 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.
- The milky solution was heated to about 40° C and 1% acetic acid solution drop-wise, when casein got precipitated.
- Filtered the precipitate, washed with water and the precipitate was allowed to dry.
- Weighed the dry solid mass in a previously weighed watch glass.
- The experiment was repeated with other samples of milk.

OBSERVATION TABLE

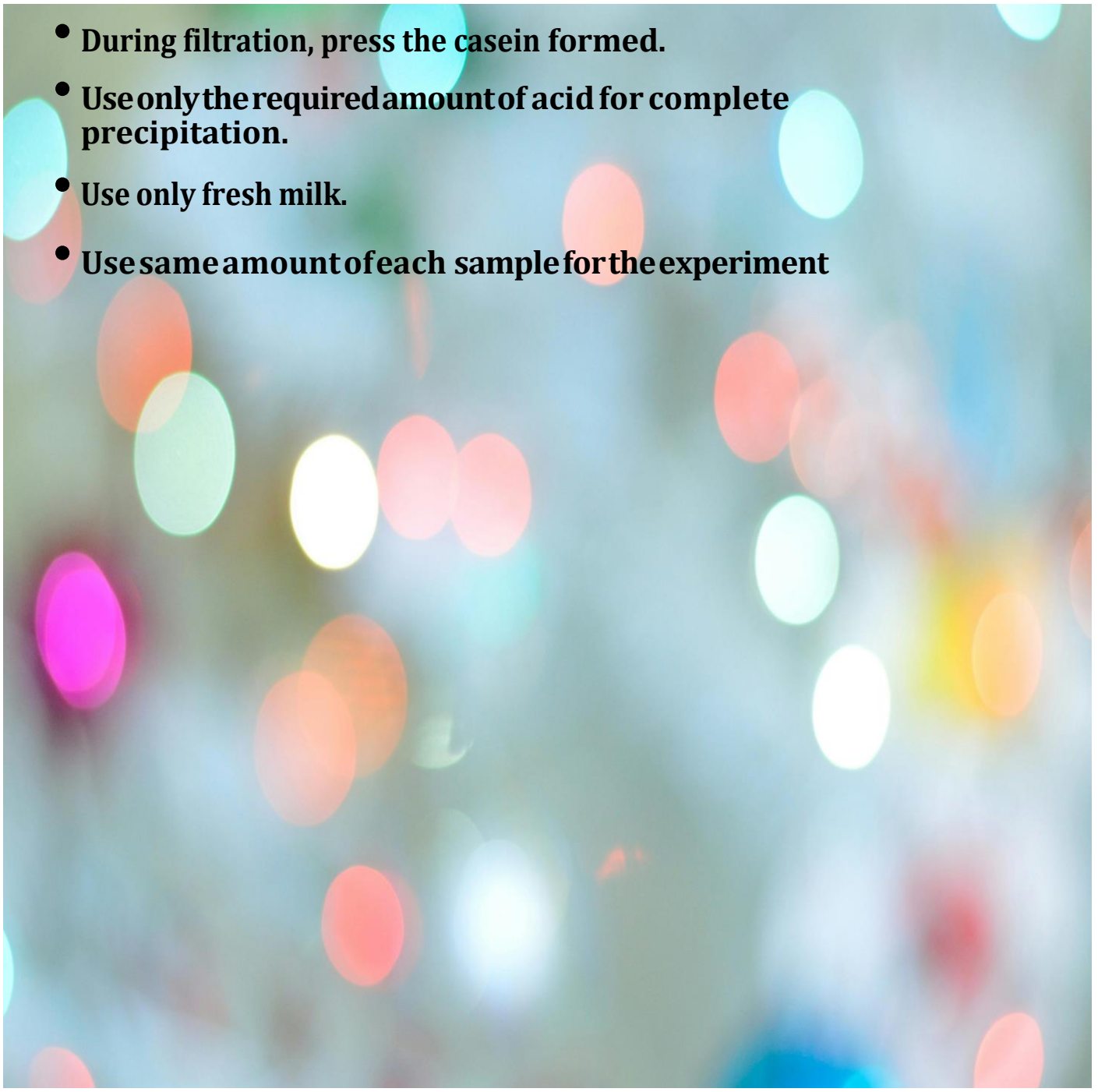
Volume of each milk sample is 20 mL.

S.NO.	TYPE OF MILK	WEIGHT OF CASEIN PRESENT	PERCENTAGE OF CASEIN (i.e. g/100ml)
1.	COW MILK	0.60	3.00%
2.	GOAT MILK	0.55	2.75%
3.	BUFFALO MILK	0.85	4.25%
4.	AMUL MILK	0.75	3.75%

RESULT

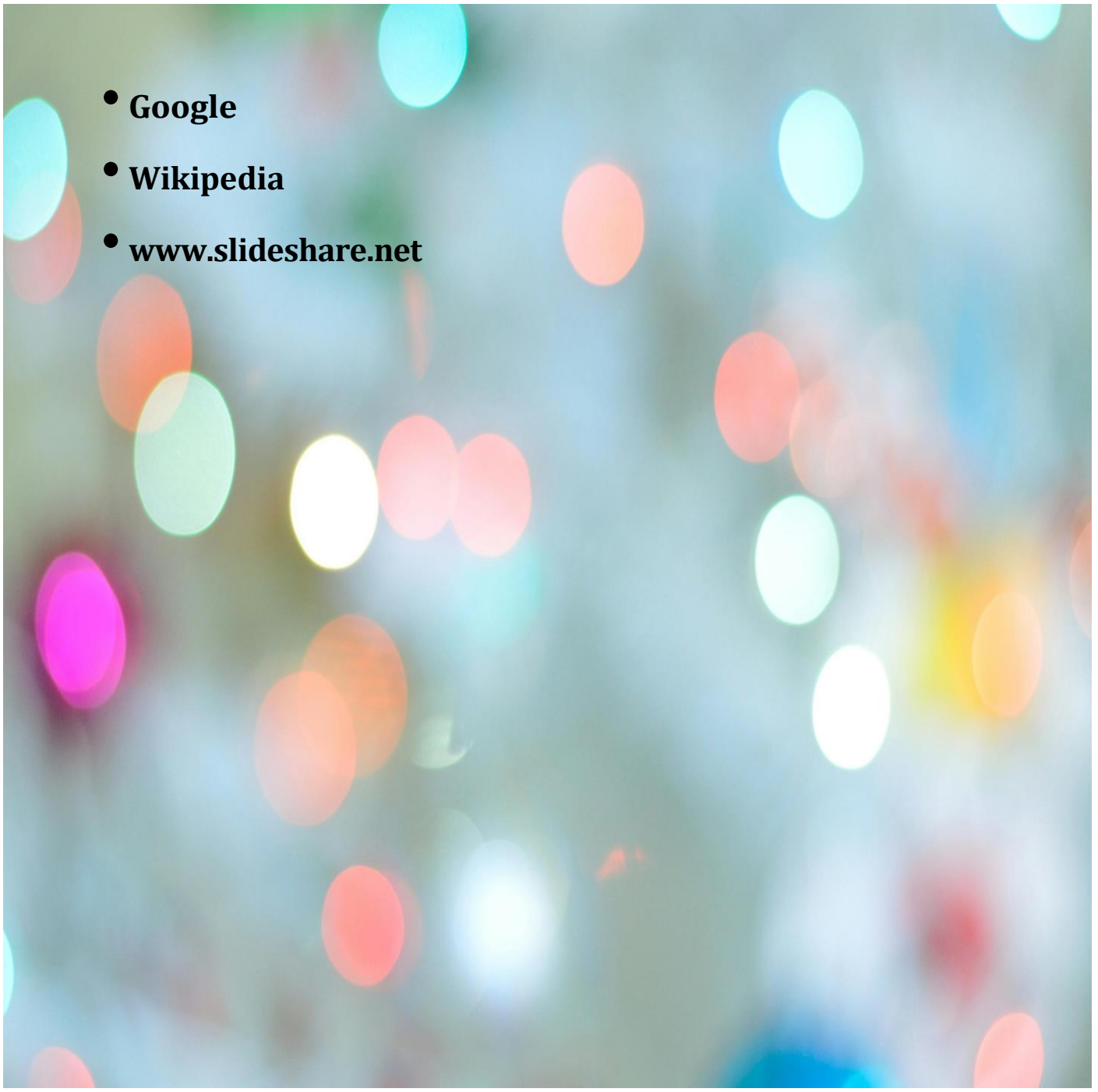
- **According to our analysis of various samples of milk, we conclude that:**
- **Cow milk contains 3.00 % casein**
- **Goat milk contains 2.75 % casein**
- **Buffalo milk contains 4.25 % casein**
- **Amul milk contains 3.75 % casein**
- **According to above results, we conclude that buffalo milk is most beneficial for human beings**

PRECAUTIONS



- **During filtration, press the casein formed.**
- **Use only the required amount of acid for complete precipitation.**
- **Use only fresh milk.**
- **Use same amount of each sample for the experiment**

BIBLIOGRAPHY




THANK YOU