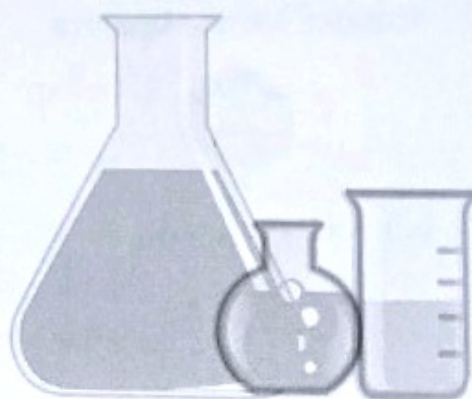


**TELANGANA TRIBAL WELFARE
RESIDENTIAL DEGREE COLLEGE (GIRLS),
MAHABUBABAD**



(BATCH: 2022-2023)

**CHEMISTRY PROJECT
PREPARATION OF SOYBEAN
MILK & ITS COMPARISON WITH
NATURAL MILK**

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STUDENT'S STUDY PROJECT



Topic: Preparation of Soyabean Milk and It's Comparison with
Academic Year: 2022-2023 Natural Milk

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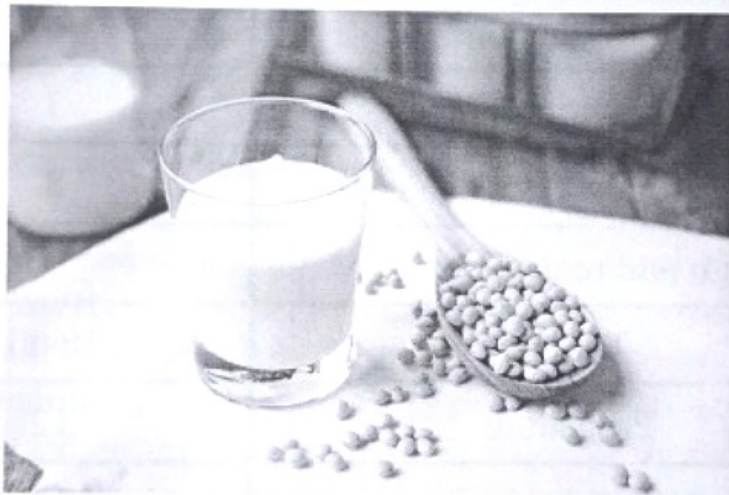
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TOPIC

Preparation of soya bean milk and its comparison with the natural milk with respect to curd formation, effect of temperature and taste.



INTRODUCTION

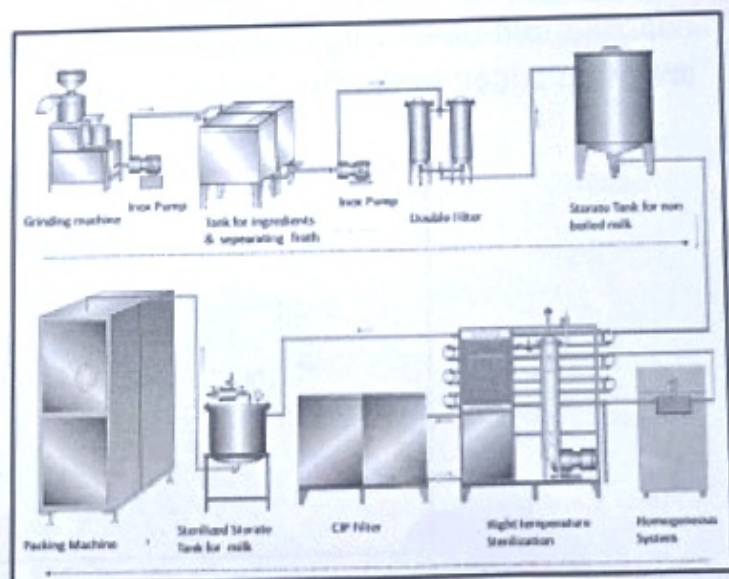
Soy milk is a high protein, iron-rich milky liquid produced from pressing ground, cooked soybeans. Creamy white soy milk resembles cow's milk but in fact differs from its dairy counterpart in a number of ways. Not only it is higher in protein and iron content, but it is cholesterol-free, low fat, and low sodium. It is, however, lower in calcium and must be fortified with calcium when given to growing children. Those who are allergic to cow's milk or are unable to digest lactose, the natural sugar found in cow's milk, find soy milk easy to digest since it is lactose-free. Those who are calorie-conscious can purchase reduced fat soy milk (called lite soy milk) but this is often lower in protein as well. Some do not enjoy the taste of original soy milk, so manufacturers now offer flavoured soy milk. Soy milk can be substituted for milk in nearly any recipe. Those who merely want to boost protein intake often add powdered soy milk to other beverages, others find it economical to purchase it in powder form and then make soy milk when they add water to the powder. Children under one year of age should be given a formula of soy milk specifically developed with their nutritional needs in mind. Soy milk requires only soybeans and water (and steam) for its creation. Soy milk is nearly always fortified with calcium, vitamins D, and certain B vitamins. Highly concentrated flavourings, such as vanilla, carob, chocolate, and almond are often added to the finished product.



Manufacturing Process of Soya Milk

The soybean is a low acid food and as such, is a good host for the breeding of harmful bacteria. Thus, the manufacturing process is "aseptic," meaning that at a certain point in its production, the soy milk is sealed off from any air because it might introduce dangerous bacteria into the product. The development of successful, affordable aseptic production of soy milk has been of tremendous importance in the mass production of this beverage. The initial phases of the production of soy milk do not have to be sealed off to air; only later does this happen.

- Procuring the raw materials
- De-hulling
- Inactivating the indigestible enzyme
- Grinding
- Extracting
- Blending
- Aseptic sterilizing
- Homogenizing
- Cooling
- Storing
- Packaging



Natural Milk v/s Soybean Milk

Comparison Chart (Per 100 ml milk sample)

S. No		Natural Milk	Soymilk
1.	Sources	Mammals (Cow, Buffalo)	Soya Beans
2.	Lactose	Present	Absent
3.	Vegetarian	Yes	Yes
4.	Vegan	No	Yes
5.	Protein	3.22 g	3.27 g
6.	Carbohydrates	5.26 g	6.28 g
7.	Polyunsaturated Fat	0.195 g	0.961 g
8.	Calcium	113 mg	25 mg
9.	Magnesium	10 mg	25 mg
10.	Saturated Fat	1.865 g	0.205 g
11.	Potassium	143 mg	118 mg
12.	Sodium	43 mg	51 mg
13.	Cholesterol	5 mg	Absent
14.	Sugar	5.1 gm	0.6 g
15.	Energy	60 kcal	54 kcal

EXPERIMENT

AIM

Preparation of soya bean milk and its comparison with the natural milk with respect to curd formation, effect of temperature and taste.

REQUIREMENTS

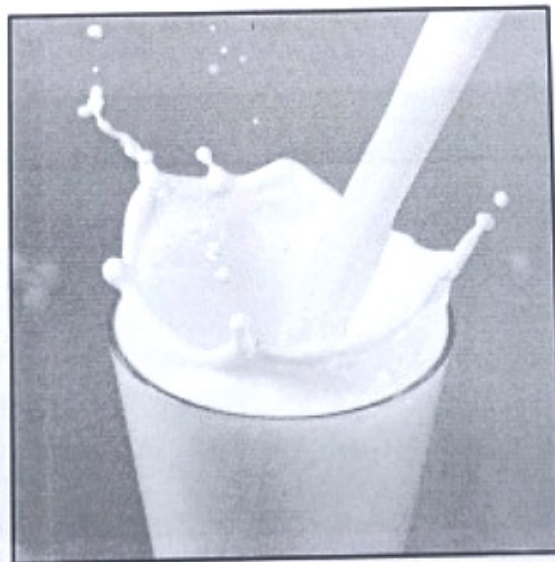
- ✓ Beakers
- ✓ Pestle and mortar
- ✓ Measuring cylinder
- ✓ Glass rod
- ✓ Tripod-stand
- ✓ Thermometer
- ✓ Muslin cloth
- ✓ Burner
- ✓ Soya beans
- ✓ Fresh curd
- ✓ Distilled water

THEORY

Natural Milk

Natural milk is an opaque white fluid secreted by the mammary gland of female mammals. The main constituent of natural milk are proteins,

carbohydrates, minerals, vitamins, fats and water and is a complete balanced diet in itself fresh milk is sweetish in taste. However, when it is kept for a long time at a temperature of $35 + 5^{\circ}\text{C}$ it becomes 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 starts separating out as precipitate. When the acidity in milk is sufficient and temperature is around 36°C , it forms semi solid mass, called curd.



Soya Milk

Soya milk, also known as soy milk, is a plant-based milk substitute made from soybeans. It is a popular dairy milk alternative for people who are lactose intolerant, have milk allergies, or choose to follow a vegan or vegetarian diet. Soya milk is created by soaking, grinding, and boiling soybeans, then separating the solids from the liquid. The resulting liquid can be used in a similar way to cow's milk in various culinary applications, including drinking, cooking, and baking.

Soya milk is a good source of protein and is often fortified with vitamins and minerals like calcium and vitamin D to make it nutritionally comparable to cow's milk. It has a mild, slightly nutty flavour and can be consumed plain or in flavoured varieties. Soya milk is used in various products, including tofu, soy yogurt, and as an ingredient in many plant-based dairy alternatives like cheese and ice cream. It's a versatile and nutritious option for those seeking an alternative to traditional dairy milk.



PROCEDURE

1. Soak about **150g** of soya beans in sufficient amount of water so that they are completely dipped in it.
2. Take out swollen soya beans and grind them to a very fine paste and filter it through a muslin cloth.
3. Clear white filtrate is soya bean milk. Compare its taste with buffalo milk.
4. Take **50 ml** of soya bean milk in three other beakers and heat the beakers to **30°C, 40°C and 50°C** respectively.
5. Add $\frac{1}{4}$ spoonful curd to each of these beakers. Leave the beakers undisturbed for 8 hours and curd is formed.
6. Similarly, take 50ml of buffalo milk in three beakers and heat the beakers to **30°C, 40°C and 50°C** respectively.
7. Add $\frac{1}{4}$ spoonful curd to each of these beakers. Leave the beakers undisturbed for **8 hours** and curd is formed.

OBSERVATION

Type of Milk	Beaker No.	Temperature	Quality of Curd	Taste of curd
Buffalo Milk	1.	30°C	Perfectly Dense, Semi Solid	Sour
	2.	40°C	Comparatively watery	Less Sour
	3.	50°C	Highly watery	Tasteless
Soybean milk	1.	30°C	Almost Dense	Almost Sour
	2.	40°C	Semi solid, Little bit watery	Sour
	3.	50°C	Highly water content	Tasteless

RESULT

- ⊙ Natural milk is sweet in taste while soybean milk is not.
- ⊙ Curd formed from natural milk at higher temperature is sourer.
- ⊙ The rate of formation of curd in natural milk and soybean milk increases with increase in temperature.

- ✓ For natural milk, the best temperature for formation of good quality curd is = 50°C.

- ✓ For soybean milk, the best temperature for formation of good quality curd is = 40°C



Advantages of Soymilk

⊙ **Nutrient-Rich:**

Soymilk is a good source of essential nutrients such as protein, fiber, calcium, vitamin D, and vitamin B12. Many commercial brands fortify their products to make them even more nutritious.

⊙ **Low in Saturated Fat:**

Soymilk is naturally low in saturated fat, making it a heart-healthy option, especially when compared to whole milk.

⊙ **Lactose-Free:**

Soymilk is naturally lactose-free, making it an excellent choice for those who are lactose intolerant or have a dairy allergy.

⊙ **Cholesterol-Free:**

Soymilk contains no cholesterol, which is beneficial for heart health. It may even help lower bad cholesterol levels.

⊙ **Plant-Based Protein:**

Soymilk is an excellent source of plant-based protein, making it a valuable option for vegetarians and vegans. It provides all the essential amino acids needed by the human body.

⊙ **Bone Health:**

Fortified soymilk can be a good source of calcium and vitamin D, which are essential for maintaining healthy bones and preventing osteoporosis.

⊙ **Menopausal Symptoms:**

Some women find relief from menopausal symptoms like hot flashes and night sweats when they consume soy products because they contain natural plant compounds called phytoestrogens.

⊙ **Digestive Health:**

The fiber content in soymilk can contribute to healthy digestion and regular bowel movements.

⊙ **Weight Management:**

Soymilk can be a useful component of a weight management plan due to its lower calorie content compared to whole milk.

⊙ **Environmental Benefits:**

Soybeans have a lower environmental impact compared to dairy cattle farming. Choosing soymilk over cow's milk can reduce greenhouse gas emissions and save water resources.

⊙ **Versatility:**

Soymilk can be used in various recipes, including smoothies, coffee, baking, and cooking, making it a versatile dairy milk substitute.

⊙ **Long Shelf Life:**

Soymilk often comes in shelf-stable containers, which means it can be stored for an extended period without refrigeration until opened, reducing food waste.

Disadvantages of Soymilk

While soy milk offers various benefits, it also has some potential disadvantages and considerations to be aware of:

⊙ **Allergies:**

Soy is one of the top eight allergens, and some individuals may have soy allergies. In such cases, consuming soy milk can lead to allergic reactions, which may range from mild symptoms to severe anaphylaxis.

⊙ **Flatulence and Digestive Issues:**

Soymilk contains complex carbohydrates that can be harder to digest for some people, leading to gas, bloating, or other digestive discomfort.

⊙ **Thyroid Function:**

Some studies suggest that excessive soy consumption may interfere with thyroid function, particularly in individuals with iodine deficiency. This can affect hormone regulation and potentially lead to thyroid issues.

⊙ **Antinutrients:**

Soy contains substances known as antinutrients, such as phytic acid, which can inhibit the absorption of certain minerals like calcium, iron, and zinc. However, this effect can be minimized through various food preparation methods.

⊙ **Taste and Texture:**

Some individuals may find that the taste and texture of soymilk differ from cow's milk, which can be a disadvantage if they are not accustomed to the flavour.

CONCLUSION

Both natural milk and soybean milk have almost same constituents except the presence of lactose in natural milk. Soybean milk can easily be used as an effective alternative for people whose diet is lactose free. But on the other hand, natural milk curd requires lesser time than soybean milk curd and also requires temperature slightly greater than room temperature.

PRECAUTION

- ⊙ Handle the laboratory apparatus carefully.
- ⊙ Observe the readings of the thermometer carefully.
- ⊙ Carefully soak the soybeans for 24 hours.
- ⊙ Use only muslin clothes for the filtration.
- ⊙ Measure carefully the quantity of sample taken for observation.

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