Economical Extraction of Globulin protein And milk sugar From Whey

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ABSRACT

Effective and economical methods of utilizing whey are essential if cheese plants and dairy are to remain competitive with other segments of the food processing industry. The drying of whey is limited by some adverse economic considerations. As large volumes of water would have to be removed, thus requiring Considerable consumption of our diminishing energy resources. So we here are economically extracting globular proteins from whey by isolation process that is utilized in food, pharmaceutical, and health-care products because of their unique functional attributes.

Key words: whey, lactose, isolation, protein

I INTRODUCTION

Whey is one of two major proteins found in cow's milk. Whey protein is produced during the process of making cheese, which begins when special enzymes are added to milk causing it to separate. The curds are used to make cheese, leaving behind whey protein in the liquid portion. This liquid whey is then pasteurized and dried into a powder for various uses but this process of converting whey into powder is comparatively costly so most of cheese and paneer making company and especially small dairy consider it as waste. The objective of isolating whey into globulin is to provide another outlet for the utilization of the vast quantities of whey that are a by-product of cheese making.

Whey protein, with its high protein quality score and high percentage of BCAAs (Branched chain amino acids), has long been popular in the exercise industry as a Muscle-building supplement. However, research suggests it may have far wider applications as a functional food in the management of conditions such as cancer, Hepatitis B, HIV, cardiovascular disease, osteoporosis and even chronic stress. ***[1]***

In section II, I have discussed the whole process from getting whey to extracting globulin (whey) protein and milk sugar.

In section III, I have discussed caution taken during experiment and protein test.

In section IV, I have discussed application and benefits of whey protein.

In Section V, I have finally concluded and given future direction.

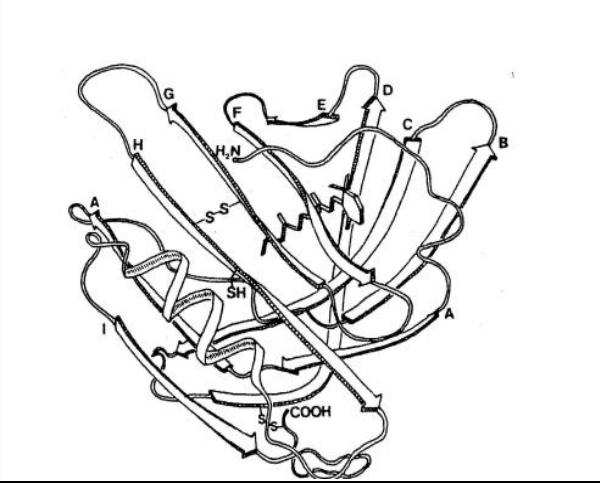

Fig 1.Structure of β-Globulin protein

II PROPOSED WORK

Procedure

Equipment:

10% acetic acid solution, 10-mL Graduated cylinder, disposable pipettes, filter paper, 50 Ml Whey, nylon hose, Buchner funnel, spatula, filter flask

Globulin Isolation

1) Heat the 50mL whey in 250mL beaker to 75 °C for 5 minutes.
2) This (step 1) precipitates the globulin protein from whey.
3) Use a filter funnel, flask, and filter paper to separate the solid precipitate from the hot solution.
4) Transfer the globulin to a weigh boat and record mass on data sheet.***[2]***

Lactose Isolation

5) Filter the hot mixture, collecting the filtrate in a 250mL beaker.
6) Stir the filtrate continuously while boiling it down to about 10mL, and then add 50mL of 95% Ethanol.
7) Carefully heat the solution to 70 °C. (Ethanol boils at 78°C.)
8) Filter the warm Ethanol solution, collecting the filtrate in a 125mL Erlenmeyer flask. Stopper the flask and place it for 24 hours.
9) Filter off the crystals of Lactose. Allow them to dry for one hour. ***[2]***

Melting Point Determination

- Fill a melting point tube with the sample (a thin-walled capillary tube) sealed at one end.
- Attach the capillary tube to a thermometer.

- Place the capillary in the melting point stage with oil bath.
- Turn on the power and allow the hot-stage temperature to rise fairly rapidly to within 15-20^{o}C below the expected melting point of the compound.
- During the determination of the actual melting point range, heat the melting point hot-stage slowly at a uniform rate, about 2 degrees per minute.
- Records the temperature at which the substance begins to liquefy and that at which it becomes completely liquefied.

III PRODUCT TEST

Equipment:

In addition to standard liquid handling supplies a visible light spectrophotometer is needed, with maximum transmission in the region of 595 nm, on the border of the visible spectrum (no special lamp or filter usually needed). Glass or polystyrene (cheap) cuvettes may be used, however the color reagent stains both. Disposable cuvettes are recommended.

Procedure:

Reagents

1. Bradford reagent: Dissolve 100 mg Coomassie Brilliant Blue G-250 in 50 ml 95% ethanol, add 100 ml 85% (w/v) phosphoric acid. Dilute to 1 liter when the dye has completely dissolved, and filter through Whatman paper just before use.
2. (Optional) 1 M NaOH (to be used if samples are not readily soluble in the color reagent). ***[3]***

The Bradford reagent should be a light brown in color. Filtration may have to be repeated to rid the reagent of blue components. The Bio-Rad concentrate is expensive, but the lots of dye used have apparently been screened for maximum effectiveness. "Homemade" reagent works quite well but is usually not as sensitive as the Bio-Rad product.

Assay

1. Warm up the spectrophotometer before use.
2. Dilute unknowns if necessary to obtain between 5 and 100 µg protein in at least one assay tube containing 100 µl sample
3. If desired, add an equal volume of 1 M NaOH to each sample and vortex (see Comments below). Add NaOH to standards as well if this option is used.
4. Prepare standards containing a range of 5 to 100 micrograms protein (albumin or gamma globulin are recommended) in 100 µl volume.

5. Add 5 ml dye reagent and incubate 5 min.
6. Measure the absorbance at 595 nm.

Analysis

Prepare a standard curve of absorbance versus micrograms protein and determine amounts from the curve. Determine concentrations of original samples from the amount protein, volume/sample, and dilution factor, if any.***[4]***

VI APPLICATIONS

- Whey protein is a nutritionally complete protein that is rapidly digested and absorbed so used in daily diet.
- Whey protein is one of the best sources of branched-chain amino acids (BCAA), including leucine. ***[4]***
- Formation and potential uses of milk proteins as nano delivery vehicles for nutraceuticals ***[5]***
- Lactose's bland flavor has lent to its use as a carrier and stabilizer of aromas and pharmaceutical products
- Lactose is not fermented by yeast during brewing, which may be used to advantage.
- Lactose is added to pills as a filler because of its physical properties (i.e., compressibility) and low price.
- Many of food product uses whey protein.

V CONCLUSION AND FUTURE WORK

Whey is waste of many small scale cheese making industries and dairy. And day by day price of milk and milk product increases which is fine source of protein.

we extract globulin protein from whey economically. That is a nutritionally complete protein that And Compared too many other proteins, on a gram-to-gram basis, whey protein delivers more branched-chain amino acids, including leucine important for muscular health and cure of many diseases. And at last again we extract milk sugar/lactose also, having various uses in food and pharmaceutical industry.

In future, many other utilization and Economical technique of extraction of whey may find out. One may produce wine after extraction of lactose from whey.

VI. REFERENCES

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