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Formulation of Capsule from Popping Ball of C. Papaya Leaf Extract Usage in Dengue

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Abstract: *Spherification is a modern cuisine technique that involves creating semi-solid spheres with thin membranes out of liquids, As a result of this, a burst-in-mouth the effect is achieved with the liquid. Both flavour and texture is enhanced with this culinary technique. Spheres can be made in various sizes as well as various firmness. This makes it possible to encase liquids within the solid spheres. Calcium chloride and sodium alginate are the two basic components used for this technique. Sodium alginate is taken from seaweed, while calcium chloride is a type of salt used in cheese making. The sodium alginate is used to gel the chosen liquid by dissolving it directly into the fluid. This will cause the liquid to become sticky, and proper dissolving must be done by mixing. The liquid is then left to set to eliminate any bubbles. Once ready, a bath is prepared with calcium chloride and water. The liquid is then dropped into the bath using a spoon or syringe depending on the desired sphere size. Once set, the spheres are then removed and rinsed with water to remove any excess calcium chloride. This process causes the gel to form a membrane when it comes into contact with the calcium chloride, encasing the liquid. (reference 3).*

Keywords: Spherification, Sodium alginate, Calcium chloride, C. papaya extract, Ionization gelation

I. INTRODUCTION

Material used for popping ball's -

1. Papaya leaves extract
2. Sodium alginate
3. Sodium benzoate
4. Calcium chloride
5. Sodium citrate
6. Distilled water

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7. Jaggery
8. Flavouring agents

Preparation of C. papaya leaf extract:

- The gathered plants were rinsed in consecutively tap water to remove dirt or debris and dried in the shade for about 15 days.
- The dried leaves were broken up and ground into a powder using a mortar and pestle.
- The powder was then soaked in organic solvents such as hexane, ethyl acetate, methanol, and ethanol before being put through a Soxhlet device for solvent extraction.
- The collected material was then frozen at 4 degrees Celsius for later analysis.

Method of preparation of popping ball's:

1. Take 250ml of herbal juice + 2gm of sodium alginate 1gm sodium benzoate 3gm of jaggery, and grind the mixture until a thick solution is obtained.
2. Freeze the solution overnight to remove the air bubble.
3. Make the calcium chloride solution (300ml water+ 2gm of calcium chloride)
4. Add a drop of sodium alginate solution to the calcium chloride solution.
5. Transfer the measured papaya extract of your sodium alginate to a clean cup or small basin. You shouldn't pick up too much foam. Refrigerating sodium alginate and food solution for at least an hour, preferably overnight, is advised for defoaming. If too many bubbles are in the solution, ball formation in the succeeding phases may be impeded.
6. Have a second-hand clock, stopwatch, or timer available. To determine the pH of the papaya extract solution, compare the colour of a pH test strip dipped into the solution to the colour chart on the box. Make a note of it in the spreadsheet. Ingest a tiny amount of the papaya extract solution using the syringe or a medication dropper. If the foam is on top of the solution remove it by dipping the needle under it and then sucking it. Wipe any foam or surplus solution from the syringe's sides on the container's rim to prevent contamination.
7. The time of the drop's immersion in the solution is crucial; therefore, let it sit for 60 seconds (sec). After 60 seconds, carefully remove the ball from the solution using a clean spoon, carefully removing as little of the solution as possible to avoid injuring the ball.
8. Place the ball on the plastic wrap on top of graph paper, then count the number of lines it crosses to determine the ball's diameter and height. Make sure to write down your results in the table. The diameter in millimetres can be determined by counting the number of lines the ball crosses. The number of lines the ball crosses will be multiplied by two if the lines on your graph paper are 2 mm apart. Graph paper with lines spaced 2 mm apart is a good illustration; if a ball occupies around 2.5 lines, its diameter is 5 mm (2.5 times 2 mm = 5 mm).
9. Repeat steps 1–9 twice to get 3 popping balls from the papaya extract and calcium chloride solution. Please remember that the objects we refer to as "balls" need not be perfectly round to be included in the "measured balls" tally.
10. Mix 0.5 grams of sodium citrate into the papaya extract and sodium alginate solution. Using a clean spoon, include the sodium citrate, and then wait 60 seconds to let any air bubbles created during mixing escape.
11. Remember that if the balls didn't form spheres before you added sodium citrate, they might start to increase the chemical, but they might stop again if you add too much. When the balls are no longer round (because they have flattened out and no longer retain their round shape), proceed to step 8 again.

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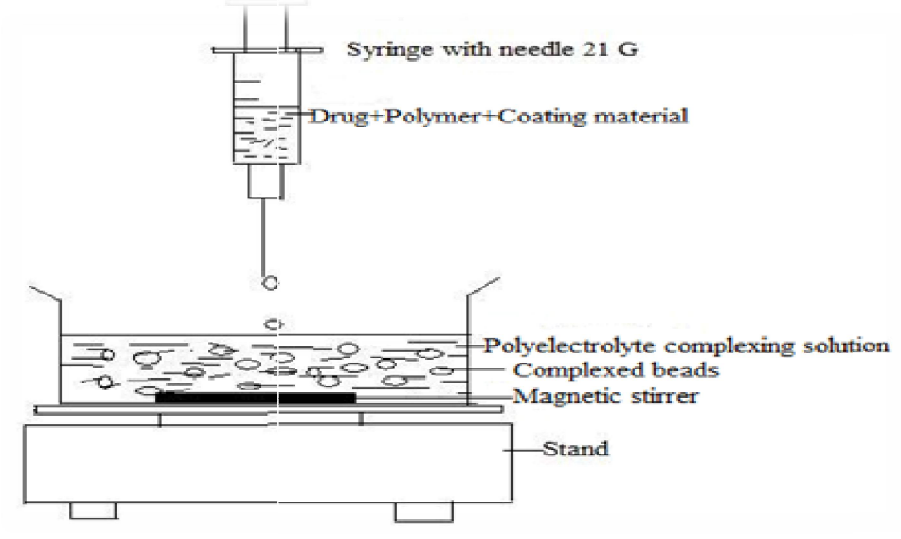

Ionotropic gelation method

Ionotropic gelation is based on the ability of polyelectrolytes to cross link in the presence of counter ions to form hydrogel beads also called as gelispheres. Gelispheres are spherical crosslinked hydrophilic polymeric entity capable of extensive gelation and swelling in simulated biological fluids and the release of drug through it controlled by polymer relaxation. The hydrogel beads are produced by dropping a drug-loaded polymeric solution into the aqueous solution of polyvalent cations. The cations diffuse into the drug-loaded polymeric drops, forming a three dimensional lattice of ionically crosslinked moiety. Biomolecules can also be loaded into these gelispheres under mild conditions to retain their three dimensional structure. Polyelectrolyte solution [Sodium Alginate] ↓ Added drop wise under magnetic stirring by needle ↓ Counter ion solution [Calcium chloride solution (+)/Sodium tripolyphosphate (-)] ↓ Gelispheres.In Ionotropic gelation technique, there has been a growing interest in the use of natural polymers as drug carriers due to their biocompatibility and biodegradability. The natural or semisynthetic polymers i.e. Alginates, are widely use for the encapsulation of drug by this technique. These natural polyelectrolytes contain certain anions/cations on their chemical structure, these anions/cations forms meshwork structure by combining with the counter ions and induce gelation by cross linking. In spite of having a property of coating on the drug core these natural polymers also acts as release rate retardant.

Alginates-

Alginate is a non-toxic, biodegradable, naturally occurring polysaccharide obtained from marine brown algae, certain species of bacteria. Sodium alginate is a sodium salt of alginic acid a natural polysaccharide and a linear polymer composed of 1,4-linked β-DMannuronic acid (M) and α-D-gluronic acid (G) residues in varying proportions and arrangements. Sodium alginate is soluble in water and form a reticulated structure which can be crosslinked with divalent or polyvalent cations to form insoluble meshwork. Calcium and zinc cations have been reported for cross-linking of acid groups of alginate.(reference 4)

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