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Toothpaste

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INTRODUCTION

Toothpastes are complex mixtures of abrasives and surfactants; anticaries agents, such as fluoride; tartar control ingredients; pH buffers; humectants (to prevent dry-out and increase the pleasant mouth feel); and binders, to provide consistency and shape. Binders keep the solid phase properly suspended in the liquid phase to prevent separation of the liquid phase out of the toothpaste. The dental paste preparations of herbal toothpaste designed using different bases for treatment of gingivitis, periodentitis and dental plaque.During our Physicochemical evaluation studies all the formulations were found to have PH, good tube extrudability, good Spreadability and viscosity characteristics.

HISTORY

Toothpastes have been used since the ancient past[1] and are one of main irreplaceable components of oral health care. The design of toothpaste formulations began in China and india, as 300-500 BC. During that period, squashed bone, pulverized egg and clam shells were utilized as abrasives as a part of tooth cleaning. Modern toothpaste formulations were developed in the 19th century. Later on, chalk and soap were incorporated to those formulations. After 1945, several formulation advancements of different detergents had begun; sodium lauryl sulfate had been used as emulsifying agent. In recent years, the focus has shifted towards the release of active ingredients during formulation developments to prevent and /or treat oral illness.

MANUFACTURING PROCEDURE

Medicated tooth paste was prepared using, clove oil, Tulsi oil, Neem oil, Guar gum, calcium carbonate, sodium lauryl sulphate, Xylitol, Sodium chloride, methyl paraben, menthol, titanium dioxide, glycerine, Amaranth solution. Neem leaf oil and fruit of clove oil possesses the antibacterial activity, bad breath of mouth is prevented by tulsi oil. Sodium lauryl sulphate used gives foaming, Xylitol as a sweetening agents, methyl paraben as a preservative, Amranth solution as a colouring agent, glycerine as a humectants.
The binder Is premixed with solid abrasive and triturate, which is then mixed with the liquid phase containing humectants, oils, Then add preservative and sweetener into a mixer. After formation of homogeneous paste, the flavour and the detergent added last under slow speed agitation to minimize foaming, mixed, milled de-airated and tubed.

Abrasives

- Detergent (1-2%)
- Binding agents (1%)
- Humectants (10-30%)
- Flavouring, sweetening and colouring agents (1-5%)
- Preservatives (0.05-0.50%)
- Fluoride and other therapeutic agents
- Water

Toothpaste ingredients are usually shown on packs w/w – that is weight for weight, or grams per 100 grams. Toothpastes are the most widely used oral health care product and there is considerable choice available to the consumer. Toothpaste types range from general decay, plaque and tartar control types to specific formulations for sensitive teeth, for smokers, special children's formulations and the tooth whitening pastes.

FORMULATION OF TOOTHPASTES:

The most common form is sodium fluoride (NaF), but mono-fluoro-phosphate (MFP) and stannous fluoride (SnF) are also used. The fluoride amount in toothpaste is usually between 0.10-0.15 %. Fluoride is most beneficial when the mouth is not rinsed with water after tooth brushing.

EVALUATION OF TOOTHPAST

1. **Physical Evaluation**

a. Colour
Colour of the prepared toothpaste was evaluated for its colour. The colour was checked visually.

b. Odour
Odour was found by smelling the product.

c. Taste
Taste was checked manually by tasting the product.

Following conclusion can be drawn from the results obtained in the present work of investigation. The dental paste preparations of herbal toothpaste designed using different bases for treatment of gingivitis, periodentitis and dental plaque. During our physicochemical evaluation studies all the formulations were found to have PH, good tube extrudability, good Spreadability and viscosity characters.

EVALUATION TEST FOR TOOTHPASTE

When evaluating toothpaste, there are specific test limits and standards that ensure the product is safe, effective, and of high quality. Here are some general test limits and criteria used in the evaluation of toothpaste:

Test For fluoride content:

- Ion-Selective Electrode (ISE) Method: Prepare the toothpaste sample by weighing a specific amount and dissolving it in a suitable buffer solution.
- Filter the solution to remove any undissolved particles.
- calibrate the fluoride ion-selective electrode with standard fluoride solutions of known concentrations.
- Measure the fluoride ion concentration in the toothpaste solution using the calibrated electrode.

Equipment Needed: Fluoride ion-selective electrode, buffer solutions, standard fluoride solutions, beakers, magnetic stirrer.

a. Limits: Typically, the fluoride concentration should be between 1000 to 1500 ppm (parts per million).
b. Standard: As per regulatory guidelines such as those from the American Dental Association (ADA) or the International Organization for Standardization (ISO).

Tests For Abrasive Character:

The cleansing action of dentifrices mainly depends on their abrasive property. The abrasion should not lead to any damage to the enamel and hence the test for checking the abrasive property has been done on the extracted teeth. The teeth are brushed by mechanical means with paste or powder and the effect of dentifrices on the teeth is studied by comparing the results before and after brushing.

a. Limits: The RDA value should generally be below 250 to avoid excessive abrasion of tooth enamel.
b. Standard: ISO 11609 specifies methods for measuring abrasivity.

Determination Of pH Of The Product:

A 10% solution of the paste in water is made and the pH of the dispersion is measured using a pH meter. The pH should be in the range of 6.8 to 7.4 in order to maintain the consistency of the product.

a. Limits: The pH should be between 5.5 and 10.5 to ensure it is not too acidic or alkaline, which could harm teeth and gums.
b. Standard: ADA guidelines recommend maintaining a neutral to slightly basic pH .

Microbial Contamination:

a. Limits: Total viable count (TVC) should be within acceptable limits, typically <100 CFU/g for pathogens like Staphylococcus aureus, Pseudomonas aeruginosa, and Candida albicans.
b. Standard: Good Manufacturing Practice (GMP) guidelines and ISO 21149.

Determination Of The Volatile Matter And The Moisture Content:

This test is done in order to determine the amount of volatile matter and moisture content in the product. In this method, a specified amount of the product is taken and is kept for drying till a constant weight is obtained. The weight of the product before and after drying is measured and the loss in weight is calculated which determines the percentage of moisture content and volatile matter.

Determination Of Consistency Of The Product:

This test is done in order to determine the consistency of the product for the maintenance of its flow property all throughout its storage period. The consistency of the product mainly depends on the 'theological properties such as particle size, viscosity etc.

a. Limits: Viscosity should be in a range that ensures ease of use and proper dispensing from the tube.
b. Standard: Tested using rheometers as per ISO 11609.

Determination Of Foaming Character:

This test for the foaming character is applicable only to foaming tooth powders and pastes. In this test, specific amount of the product is mixed with a known amount of water. The solution is then shaken sometimes in order to produce foam. The foam produced is then collected and studies on its nature, washability and stability are carried out.

a. Limits: Adequate foam production should be sufficient for effective cleaning, typically assessed qualitatively.
b. Standard: No strict numerical standard, but should meet consumer expectations.

Limit Test For Heavy Metals:

The test is done in order to check the presence of any heavy metals such as arsenic and lead which may lead to toxicity. The occurrence of these metals can be avoided by carrying out the limit tests for heavy metal, for raw materials, which may reduce usage of these materials.

a. Limits: Levels of heavy metals (like lead, arsenic, cadmium, and mercury) must be below regulatory limits.
b. Standard: Regulatory bodies such as the FDA, EU regulations, or other national health authorities provide specific limits.

CONCLUSION

The majority of toothpastes combine the caries protection of fluoride with other therapeutic agents to control plaque, tartar and gum disease. The inclusion of antibacterial agents can help individuals improve their plaque control. Many toothpastes include triclosan, which has been shown to offer a clinically useful improvement in gum health. Other pastes specifically target "tartar" (hardened plaque) and use pyrophosphate to inhibit the mineralisation of dental plaque and hence the buildup of tartar (calculus). Toothpastes with desensitising agents are also available for sensitive teeth.

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