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Formulation and Evaluation of Medicated Lollipop

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ABSTRACT:
Lollipops are described as a type of flavored medication that typically includes one or several ingredients mixed with sugar, meant to be placed in the mouth or throat. They are frequently utilized to produce local effects or to address infections in the stomach lining. The benefits of using lollipops as a method of delivery include higher bioavailability, smaller dosages, decreased absorption in the intestines, and avoidance of initial metabolism. The purpose of lollipops is to enhance patient adherence, understanding, and usability, among other factors. Over the last twenty years, there has been a growing demand for more data on patient compliance.

I. INTRODUCTION:

Lollipops are solid forms of medication encased in a sweet and flavored base that are designed to dissolve gradually in the mouth. These lollipops primarily include ingredients like sweeteners, flavorings, coloring agents, opacifiers, and stabilizers. They serve as slow-dissolving delivery mechanisms. The dissolution process occurs in the oral cavity within a timeframe of one to ten minutes. Lollipops are large boiled sugar candies of various flavors connected to a plastic stick, allowing for prolonged enjoyment through licking. The stick serves to keep the candy (medication) intact. Lollipops represent a solid, single-dose form of medication intended for dissolution in the mouth or throat. The creation of lollipops can be traced back to the 20th century, and they continue to be produced commercially. Most lollipop formulations are sold as over-the-counter medications. They offer a tasty way to administer medication and maintain a significant role in the pharmaceutical industry due to their many benefits, though they also have some drawbacks. Typically, they contain one or more active ingredients within a flavored and sweetened base. Lollipops are frequently utilized for localized effects in the mouth, but they may also provide systemic effects if the drug is effectively absorbed through the lining of the mouth.

Aim And Objectives :
Scopolamine hydrobromide is a drug with multiple uses. Below are some of its purposes and goals:

Therapeutic Aims
1. Motion sickness treatment: Scopolamine hydrobromide is utilized to avert and manage nausea and vomiting caused by motion sickness.
2. Sedation before surgery: It serves as a preanesthetic drug to help relax patients and ease their anxiety prior to surgical procedures.
3. Addressing gastrointestinal issues: This medication can be used to treat disorders like irritable bowel syndrome (IBS) and gastrointestinal spasms.
Pharmacological Objectives
1. Anticholinergic properties: Scopolamine hydrobromide functions by inhibiting the effects of acetylcholine, a neurotransmitter that plays a role in several bodily functions.
2. Relaxation of smooth muscles: It promotes the relaxation of smooth muscle in the gastrointestinal system, uterus, and other regions.

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3. Decreasing secretions: Scopolamine hydrobromide can lower secretions in both respiratory and gastrointestinal systems.

Research Objectives

1. Study of anticholinergic properties: Scientists may examine scopolamine hydrobromide to gain insight into its anticholinergic properties and possible uses.
2. Creation of new therapies: Scopolamine hydrobromide has the potential to be a foundation for developing new drugs targeting various health issues.
3. Exploration of pharmacokinetics and pharmacodynamics: Researchers could analyze the pharmacokinetics and pharmacodynamics of scopolamine hydrobromide to enhance understanding of its effects and improve its application.

History Of Lollipop:

The idea of a lollipop is so simple that it seems these treats have been invented and reimagined numerous times. The history of lollipops can be traced back at least to the Middle Ages, when people would enjoy sugary confections on sticks or with their hands. While the exact beginnings of the modern lollipop remain unclear, several American companies claimed ownership of it in the early 1900s. According to the book Deeper Views: Mysterious Small Things in the Universe, George Smith from New Haven, Connecticut, was credited with creating the large candies in 1908. Subsequently, a horse-related design followed. A patent for lollipops was granted in 1931. The word "lollipop" was first recorded by the British lexicographer Francis-Grosse in 1796.

Advantages Of Medicated Lollipops:

1) Easy to carry.
2) It is easy to swallow.
3) Paper is easy to eat.
4) It has bioavailability.
5) There is no need to drink water.
6) Lollipops are easy to prepare with minimal ingredients and time.
7) Patients with difficulty swallowing can be given lollipop.
8) The model is easy to change and can be adjusted for individual patients.
9) Bypassing the digestive system rice and liver cooperation, increasing oral intake. Bioavailability of the drug
is limited by Before anything else, the liver's pathway passes through fermentation.
10) The medicine doesn't get broken down either pH levels or intestinal enzymes in the mid-GI region.
11) Treat pain, reduce cough,
12) Treat throat or mouth ulcers.
13) Prevent allergies, mucus dissolution and mucus increase.

Disadvantages Lollipops Of Medicated:

1) Since the formulation must be hot, heat-sensitive drugs cannot be used in this formulation.
2) Medicines with the least bitter taste are required.
3) They can cause fatigue and dysfunction
An overdose of scopolamine hydrobromide can cause a range of symptoms due to its anticholinergic effects. Here are some potential symptoms.
4)Central Nervous System (CNS) Symptoms
1. Delirium: Confusion, disorientation, and altered mental status.
2. Hallucinations: Seeing or hearing things that aren't there.
3. Drowsiness or lethargy: Feeling extremely sleepy or lethargic.
4. Coma: In severe cases, an overdose can lead to coma.

Types Of Medicated Lollipops:

1. Hard Lollipops: You may think of hard lollipops as solidified syrup. To make this treat, sugar is heated alongside other ingredients before being poured into a mold. Once set, these candies become similar to hard lollipops. Many hard lollipop recipes utilize modified hard candy. This preparation should have a lower moisture level. By heating the sugar mixture, the liquid can evaporate during the entire process of making the candy. The

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lollipops consist of various sugars, including both structured and granulated types. The aforementioned lollipops have moisture levels between 0. 45% and 1. 8%, often referred to as liquid snow. Hard lollipops are expected to dissolve gradually and can be consumed consistently (or not) within approximately thirty minutes.

2. Soft Lollipops: Lollipops have health-related information about drug inhalation and are kept in the oral cavities or on the roof of the mouth. These types of medications frequently consist of one or more drugs mixed with a sweet, sugary base. Lollipops often utilize the buccal mucosa to achieve either local or systemic effects. There are numerous advantages to using lollipops as a form of medication, such as enhanced bioavailability, smaller meal requirements, decreased stomach discomfort, and initial metabolic bypass. The goal of the lollipop is to boost patient acceptance, adherence, and ease of use, among other benefits. There has been an increased need for patient adherence data in the last two decades. This is why the interest in their technology is at an all-time high. Pharmaceutical firms are currently concentrating on existing drug delivery methods since creating new ones has become prohibitively costly.

Mechanism of action of Medicated Lollipop:

With our lollipop delivery method, a medication is taken in more quickly through the mouth's lining compared to when it is ingested and absorbed through the digestive tract. The amount of medication can be easily managed by giving a lollipop until the intended effect is reached. They are enjoyable to eat. Furthermore, they do not need water, allowing them to be consumed anywhere and at any time.

Mechanisms of action:-

1. Local Effect: Many types of candy include substances meant to act directly in the throat or the mouth. Lollipops often contain anesthetics like nicotine or the pain relief medication lidocaine, which assist in soothing the muscles in the mouth and throat, providing relief from sore throats and other oral conditions.

2. Systemic Absorption: Some lollipops contain chemicals designed to be absorbed through the mouth.

Table 1: Types of Excipient Use In Medicated Lollipop And TheirRole.

Sr.No.	Ingredients	Examples	Role/Function
1	Candy-based, sugar-free vehicles	Ingredients include maltitol, dextrose, sucrose, maltose, lactose, mannitol, sorbitol, and PEG-600/800.	They are used to make desserts and to mask desserts.
2	Lubricants	Vegetable oils and fats such As PEG, calcium, magnesium, and stearic acid.	These are used to prevent sugar from remaining on your teeth
3	Binders	corn syrup, sugar syrup, gelatine, methylcellulose, tragacanth and polyvinylpyrrolidone.	These are used as holders for objects.
4	Colouring agent	Orange coloured pastered colour cubes, FD and colourants, water soluble and lakolene dyes, etc.	They would produce stunning beauty. paper dosage's sensory characteristics.

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5	Flavouring agent	Ingredients include menthol, eucalyptus oil, spearmint, cherry taste, among others.	You are meant to taste these.
6	Whipping agent	Egg 6. Whipping-agent albumin, milk protein, gelatine, xanthan gum, starch, pectin, algin, and carrageenan.	They are utilised in candy confections.
7	Humectant	Trimethyl Propylene glycol, sorbitol, and glycerine.	They enhance the digestive tract.

Pre -Formulation Studies Of Drugs:-

Initial formulation refers to the process of evaluating a medication either with or without added substances, using both chemical and physical techniques. Preformulation research marks the initial stage in the drug production process. This effort aims to identify the suitable thermodynamic characteristics of new medications. Evaluate, for compliance, with various excipients.

Characterization Of Scopolamine Hydrobromide:

Physical Characteristics

Appearance: White to off-white crystalline powder

Odor: Odorless

Solubility: Soluble in water and ethanol

Melting Point: ~198-204°C (decomposes)

Table 2: Formulation Table for Medicated Lollipop.

INGREDIENTS	L0	L1	L2	L3	L4	L5
SUCROSE	5gm	5gm	-	5gm	5gm	5gm
CASEIN	-	-	-	1gm	1gm	1gm
METHYL PARABEN	1gm	1gm	1gm	1gm	1gm	1gm
STARCH	1gm	1gm	-	-	-	-
GLYCERIN	1ml	-	-	1ml	-	-
WATER	2ml	2ml	2ml	2ml	2ml	2ml
MANITOL	-	-	5gm	-	-	-
Sunset Yellow FCF	q.s	q.s	q.s	q.s	q.s	q.s

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Method Of Preparation:

Syrup Maltitol Base: Maltitol syrup is a sweetener often used as a substitute for sugar. It is an encapsulated sugar alcohol made from hydrogenated maltose obtained from corn, wheat or barley. Maltitol syrup is often used in sugar, free and reduced sugar products because it has fewer calories and a lower glycemic index than regular sugar.

THE METHOD OF PREPARATION OF MALTITOL SYRUP INVOLVES THE FOLLOWING STEPS

1) Dissolve maltitol powder in water: Add maltitol powder to hot water and stir until dissolved. The amount of malti-tol powder and water used depends on the desired syrup concentration.

2) Heat the mixture: The maltitol and water mixture is heated to a temperature of around 120-130°C (248- 266°F) to evaporate excess water and concentrate the syrup.

3) Cool the syrup: After reaching the desired consistency, cool the syrup to room temperature, package and store.

PREPARATION OF MEDICATED LOLLIPOPS

1) Prepare 15 grams of medicine lollipop.

2) The method of achieving heat condensation process.

3) Prepare the syrup base in a beaker, dissolve the amount of maltitol in water, heat and stir at 120-130°C for about 90 minutes.

4) Add glucose and continue stirring for 2 hours, increasing the temperature to 160 °C.

5) Transfer the product to a cold plate and reduce the temperature to 90°C until you get Plastic products

. 6) Add chemicals, polymers, pigments, fragrances and mix the ingredients for 30 minutes.

7) Adjust the product of the string and roller movement, and then set the size to 5 grams.

8) Let the lollipop air dry for 2 hours. in the drying room. The prepared lollipops are closed and wrape-d in polyethylene bags. 9) A total of three groups of samples were prepared using lollipop: hydrophilic colloids,hydroxypropyl methylcellulose (HPMC) K4M and K100M, methylcellulose, sodium carboxymethylcellulose and those without added salt.

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Evaluation Of Medicated Lollipop:

Physical Parameters:

1. Hardness: Demonstrate the tablet's capability to withstand material impact during transport. The Monsanto hardness tester assesses the hardness of the tablet. The measurement is expressed in kg/cm². This sample shows a hardness range of 8 to 11 kg/cm², which signifies strong durability.

2. Friability (F):A Roche friability tester should be utilized for conducting the friability examination. First, weigh twenty tablets precisely, and then place them in a drum rotating at 26 revolutions per minute. After a duration of five minutes, weigh the tablets again and calculate the percentage of weight lost. Every formula shows friability values below 1%, indicating that they possess excellent lollipop characteristics.

F = W initial value × 100 / W initial value - W final value.

3. Thickness and Diameter:

Thickness and distance should be gauged using a vernier caliper. This will be established by measuring the width and thickness of ten candies from each recipe. Assess how much each candy's thickness varies by ±5% from the mean value. The typical thickness of candies should be viewed as ranging from 5 to 5. 4 mm, with all candies displaying consistent thickness.

4. Weight Variation: Check the lollipops at random to verify that they are all uniform. Measure the weight of 20 different lollipop recipes separately and find the average weight and the percentage change in weight. It is necessary to determine the maximum quantity of lollipops that vary from their average weights by over one percentage point. The weight percentage has more than doubled. The overall weight of the lollipop now stands at 1000 mg. Thus, as per the USP guidelines, the maximum allowable variation for each lollipop is 10%. The average weight ranges from 4. 98 to 5. 31.

5. Drug Content:

After immersing the lollipops in 100 milliliters of purified water for half an hour, remove the excess liquid. Measure 1 milliliter of the prepared solution into a volumetric flask and dilute it to 10 milliliters (100µg/ml) for spectrophotometric analysis at a wavelength of 224 nm. The drug concentration should be consistent across all formulations, falling between 94. 85±0. 39% and 97. 33±1. 15%.

6. Moisture Content:

Using a mortar, the samples were assessed and crushed into a fine powder. This enabled one gram of the sample to be put in a desiccator for an entire day. Evaluations were conducted the following day. By subtracting the final weight of the candy from its starting weight, the moisture content can be calculated. These candies can be regarded as fluid ice and typically have a moisture content ranging from 0. 5% to 1. 5%.

7. Disintegration Test:

Research on shredding was carried out using a crusher. Place a lollipop in every tube, then transfer the complete arrangement to a beaker containing a buffered phosphate solution with a pH of 6. 8, without using a disc, for a duration of thirty minutes. Take the product out of the liquid. After the lollipops are retrieved, they will melt in your mouth in approximately 1 to 10 minutes.

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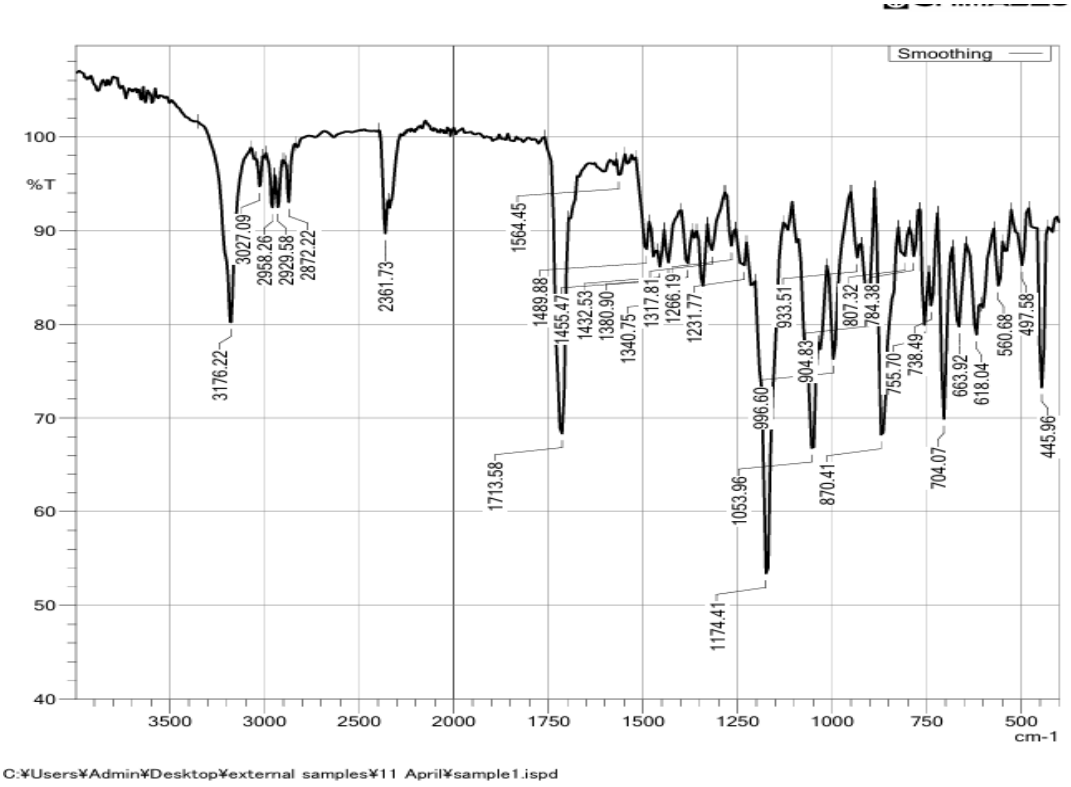
8. Taste Masking Test:

Initially, ten healthcare workers were requested to swish a typical quinine solution (20–160 mcg/mL) in their mouths for 30 seconds before spitting it out. The discomfort will be evaluated by the participants on a scale of 1 to 5. After half an hour, the participants will be asked to assess the flavor of the identical candy and make a comparison with the same amount. The usual ratio for masking the flavor of a 0. 5% drug candy is half the quantity.

9. In Vitro Dissolution Studies: Employing a 900 cc USP II paddle dissolving apparatus set at 37 ± 0. 5° and 100 rpm, the dissociation process was studied. Portions of the dissolving medium should be taken out for a short time and substituted with the same quantity of fresh, warmed (that is, 37 ± 0. 5°) medium. Once properly diluted and filtered, the chemical makeup of each sample is analyzed.

10. IR (Infrared):-

1. Sample :-



	Item	Value
1.	Sample name	sample
2.	Sample ID	sample
3.	Option	-
4.	Intensity Mode	%Transmittance

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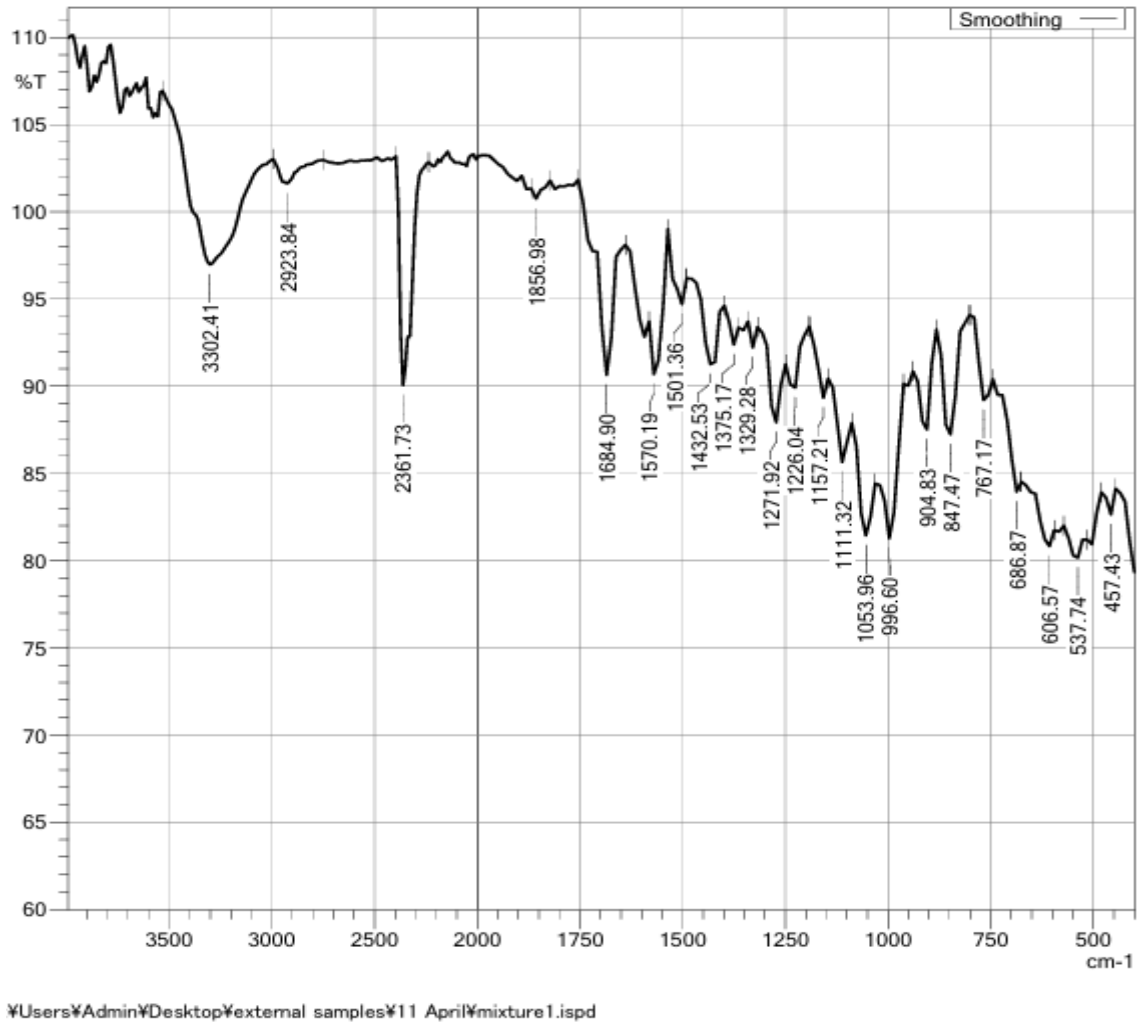
5.	Apodization	None
6.	No. of Scans	49
7.	Resolution	4 cm-1

2.Mixture:-



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	Item	Value
1.	Sample name	mixture
2.	Sample ID	mixture
3.	Option	-

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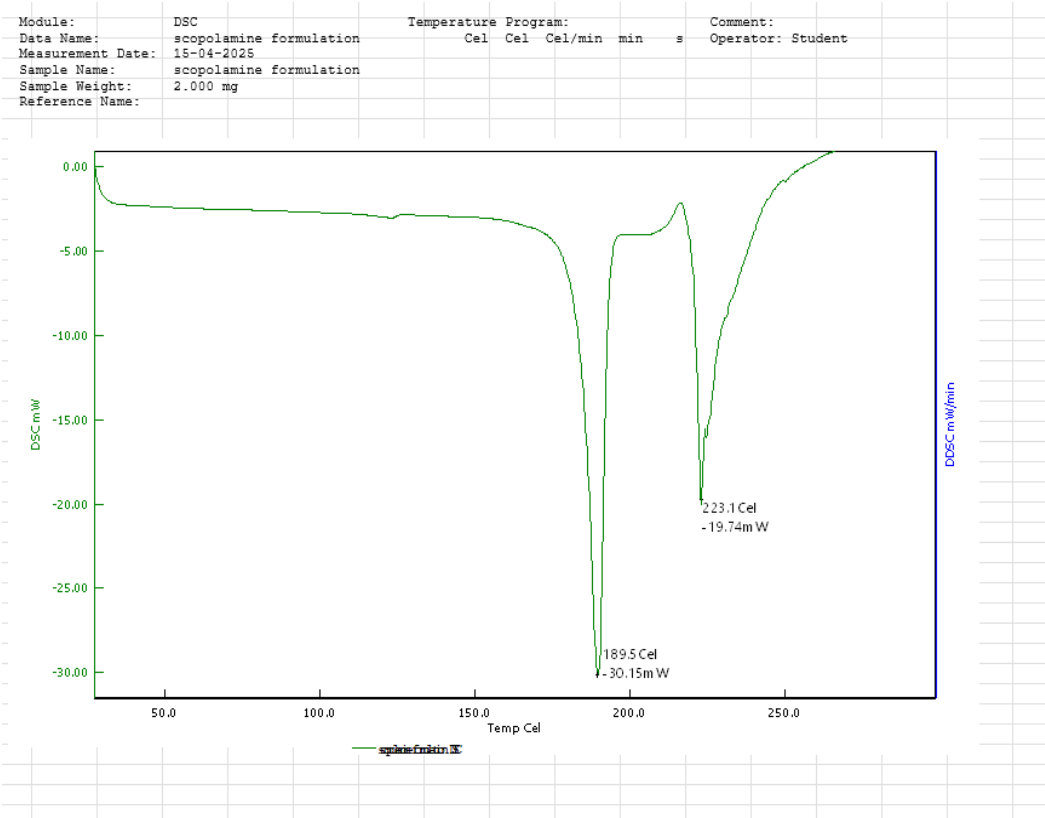
4.	Intensity Mode	%Transmittance
5.	Apodization	None
6.	No. of Scans	49
7.	Resolution	4 cm-1

11.DSC:(differential scanning calorimetry):-

1) Scopolamine Formulation:-



2) Scopolamine:-

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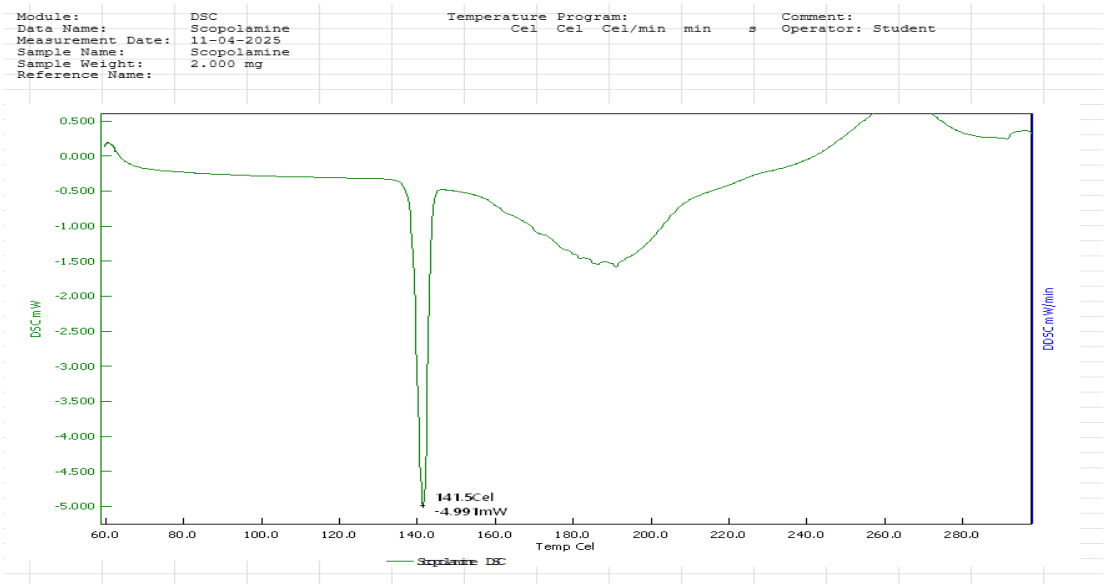

II. CONCLUSION:-

Making lollipops is an easy and quick way to prepare them. Medicinal lollipops could be an appealing option for treating young patients.

The oral route is the most favored application method because it ensures patient adherence, is simple to use, and offers versatility. Medicinal lollipops are perfect for pediatric individuals, providing enhanced information.

Content with the extensive work in the pharmacy and planning to maintain the same course, lollipops serve as a distinctive and handy means of administering medication, particularly for those who struggle to swallow pills or wish for a more enjoyable way to take their medicine.

Conventional prescriptions have certain drawbacks and can be challenging for children and older adults with swallowing difficulties. Lollipops are particularly effective in this situation, delivering potent medication while minimizing exposure time and enhancing bioavailability.

The benefits of medicinal lollipops include user-friendliness, portability, and low detectability. This makes them ideal for a variety of patients, including children, seniors, and individuals with specific health conditions.

Scopolamine hydrobromide is a well-known and efficient treatment for preventing and alleviating motion sickness. By obstructing muscarinic receptors in the brain, especially within the vestibular system, it significantly lessens symptoms like nausea, dizziness, and vomiting that arise from motion-related issues.

It is often provided as a transdermal patch, offering long-lasting relief and convenience for those traveling.

Though it is generally safe to use, users should consider potential side effects such as a dry mouth, sleepiness, and blurred eyesight. In summary, scopolamine hydrobromide is a dependable option for controlling motion sickness, particularly during extended trips.

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