

PREPARATION AND EVALUATION OF CAFFEINATED FAIRNESS CREAMSimanchal Panda* and Dr. Sruti Ranjan Mishra¹*¹Department of Pharmaceutical Technology, Jeypore College of Pharmacy, Jeypore (K), Odisha.

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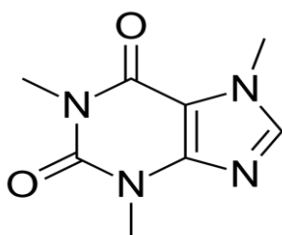
ABSTRACT

Though most of these fairness products are based on one simple formula of controlling dispersion of Melanin (the pigment that controls the skin colour), different companies are adding a number of other additives to position themselves differently from others and it is this positioning that makes the difference. General details Turnover of Indian fairness cream market Around Rs.710 crores Growth rate in demand for Fairness cream Around 10% per annum. The organic solvent chloroform is used to extract caffeine from an aqueous extract of tea leaves because caffeine is more soluble in chloroform (140 mg/ml) than it is in water (22 mg/ml). The emulsifier (stearic acid) and other oil soluble components (Cetyl alcohol, almond oil) were dissolved in the oil phase (Part A) and heated to 75° C. The preservatives and other water soluble components (Methyl paraban, Propyl paraban, Triethanolamine, Propylene glycol, caffeine) were dissolved in the aqueous phase (Part B) and heated to 75° C. After heating, the aqueous phase was added in portions to the oil phase with continuous stirring until cooling of emulsifier took place. caffeine has been found to have some antioxidant activity. Topical application of caffeine additionally dehydrates skin cells, making the skin temporarily appear smoother. a diuretic (making the skin temporarily appear smoother). Lastly, caffeine is a vasoconstrictor, and its topical application may reduce the appearance of under-eye puffiness and dark circles, although only those caused by vasodilation. **Results:** The pH of the cream base was found to be in range of 6.2-6.9 which is good for skin pH. The viscosity of was cream was in the range of 27021-27053 cps which indicates spreadibility of cream. Acid value 5.9, saponification value 25.7. Dye test, Homogeneity, Appearance, After feel Emolliency was determined and found to be satisfactory.

KEYWORDS: Spreadibility, saponification value, caffeine, cosmeceuticals, antioxidant, melanin.**MANUSCRIPT**

Caffeine is a central nervous system (CNS) stimulant of the methylxanthine class. It is the world's most widely consumed psychoactive drug. Unlike many other psychoactive substances, it is legal and unregulated in nearly all parts of the world. There are several known mechanisms of action to explain the effects of caffeine. The most prominent is that it reversibly blocks the action of adenosine on its receptor and consequently prevents the onset of drowsiness induced by adenosine. Caffeine also stimulates certain portions of the autonomic nervous system.^[1]

(DNA) and ribonucleic acid (RNA).



Caffeine is a bitter, white crystalline purine, a methylxanthine alkaloid and is chemically related to the adenine and guanine bases of deoxyribonucleic acid

The impact of coffee on health

Caffeine, chlorogenic acids and diterpenes are important components of coffee. Tolerance often acts as a modulator of the biological actions of coffee. There is a significant impact of coffee on the cardiovascular system and on the metabolism of carbohydrates and lipids. Contrary to previous beliefs, the various forms of arterial cardiovascular disease, arrhythmia or heart insufficiency seem unaffected by coffee intake. Coffee is associated with a reduction in the incidence of diabetes and liver disease. Protection seems to exist also for Parkinson's disease among the neurological disorders, while its potential as an osteoporosis risk factor is under debate. Its effect on cancer risk depends on the tissue concerned, although it appears to favor risk reduction. Coffee consumption seems to reduce mortality.^[2]

Origin of coffee

The coffee tree, scientifically known as *Coffea arabica*, is native to Abyssinia and Ethiopia, but grows well in

Java, Sumatra, and other islands of the Dutch East Indies; in India, Arabia, equatorial Africa, the islands of the Pacific, in Mexico, Central and South America and the West Indies. The plant belongs to the large sub-kingdom of plants known scientifically as the Angiosperms, or Angiospermæ, which means that the plant reproduces by seeds which are enclosed in a box-like compartment, known as the ovary, at the base of the flower. The word Angiosperm is derived from two Greek words, sperm sperma, a seed and aggeion, pronounced angeion, a box, the box referred to being the ovary.^[3]

Microscopy of Coffee Leaves

The value of the microscopic analysis of coffee may not be apparent at first sight; but when one realizes that in many cases the microscopic examination is the only way to detect adulteration in coffee, its importance at once becomes apparent. In many instances the chemical analysis fails to get at the root of the trouble and then the only method to which the tester has recourse is the examination of the suspected material under the scope. The mixing of chicory with coffee has in the past been one of the commonest forms of adulteration. The microscopic examination in this connection is the most reliable. The coffee grain will have the appearance already described. Microscopically, chicory shows numerous thin-walled parenchymatous cells, lactiferous vessels and sieve tubes with transverse plates. There are also present large vessels with huge, well-defined pits.^[4]

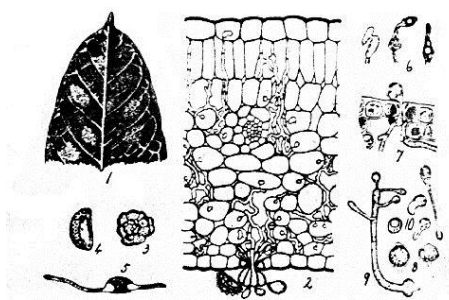


Fig. 1

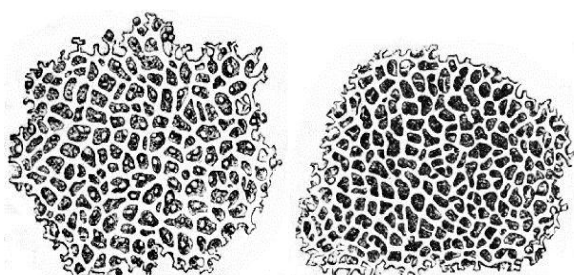


Fig. 2

Fig. 3

Fig. 1&2 Green bean, showing the size and form of the cells as well as the drops of oil contained within their cavities. Drawn with the camera lucida, and magnified 140 diameters.

Fig. 3. A fragment of roasted coffee under the microscope. Drawn with the camera lucida, and magnified 140 diameters.

Extraction of Caffeine from Tea/coffee leaves

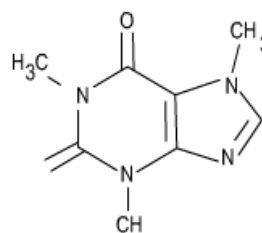
Objective

To extract caffeine from tea powder using polar - nonpolar solvent extraction technique.

Theory

The technique used to separate an organic compound from a mixture of compounds is called Extraction. Extraction process selectively dissolves one or more of the mixture compounds into a suitable solvent. The solution of these dissolved compounds is referred to as the Extract. Here the organic solvent chloroform is used to extract caffeine from an aqueous extract of tea leaves because caffeine is more soluble in chloroform (140 mg/ml) than it is in water (22 mg/ml). However, the tannins that are slightly soluble in chloroform can be eliminated by converting it to their salts (phenolic anions by adding sodium carbonate) (tannins are phenolic compounds of high molecular weight and being acidic in nature can be converted to salts by deprotonation of the -OH group) which remain in the water. Beverages cover a vast variety of addictive drinks out of which Tea and Coffee are the most popular acceptable drinks. Tea powder is extracted from tea leaves which contain tannins, which are acidic in nature, a number of colored compounds and a small amount of unrecompensed chlorophyll and an important stimulant called Caffeine. Because of the presence of Caffeine, tea and coffee are gaining popularity as an addictive stimulant. An average 30g of tea can contain 20-110 mg of caffeine thereby making tea a significant source of caffeine compared to other beverages. Caffeine can stimulate nervous system and can cause relaxation of respiratory and cardiac muscles. Caffeine is well known to increase both the alertness level and attention span. But like all other addictives, tea also shows withdrawal symptoms like headache, nervousness and insomnia for a regular consuming person.

Caffeine, 1,3,7 - trimethylxanthine, belongs to a wide class of compounds known as alkaloids. These are plant derived compounds with complex structure containing nitrogen and usually have roles in physiological activity. The melting point of Caffeine is 238°C.^[10]



Caffeine

Principle

Extraction is a method used for the separation of organic compound from a mixture of compound. This technique selectively dissolves one or more compounds into an appropriate solvent. The solution of these dissolved

compounds is referred to as the extract. In the case of Caffeine extraction from tea powder, the solubility of caffeine in water is 22mg/ml at 25°C, 180mg/ml at 80°C, and 670mg/ml at 100°C. Here the organic solvent Chloroform is used to extract caffeine from aqueous extract of tea powder because caffeine is more soluble in chloroform (140mg/ml) than it is in water (22mg/ml). The chloroform - caffeine mixture can then be separated on the basis of the different densities of chloroform and water because chloroform is much denser than water and insoluble in it. Residual water is separated from chloroform by drain out the chloroform through separating funnel, thus chloroform passed through the funnel while polar solvents such as water is still remains in the funnel. Water and chloroform is slightly soluble in each other. So, after separating the solvents, residual water will remain the organic layer. Mainly anhydrous sodium sulfite is used for the removal of water from organic layer. Anhydrous sodium sulfite is an insoluble inorganic solid which will absorb water, thus drying it.

What are the effects of caffeine in skincare products?

Topical application of caffeine or caffeine sodium benzoate have been shown by Lu *et. al* earlier this year to have a sunscreen effect, enhance UVB-induced apoptosis, and inhibit UVB-induced skin carcinogenesis when applied to the skin of mice. The exact mechanism by which caffeine achieves these aims is not yet known, but it may be related to the fact that the caffeic acid found in caffeine has been found to have some antioxidant activity. Topical application of caffeine additionally dehydrates skin cells, making the skin temporarily appear smoother. a diuretic (making the skin temporarily appear smoother). Lastly, caffeine is a vasoconstrictor and its topical application may reduce the appearance of under-eye puffiness and dark circles, although only those caused by vasodilation. The first is that caffeine strongly resembles theophylline, another xanthine that exhibits anti-inflammatory effects. However, it has been found that when a special liposome-encapsulated system that enhanced caffeine absorption is in place for at least two months, theophylline can diffuse through the skin and reduce the subcutaneous fat. It was additionally once believed that aminophylline, which comes from theophylline, was effective in fighting cellulite; however, according to Begoun, researchers have disproved this theory. The second reason caffeine may show up in cellulite products is because oral consumption of caffeine has been related to weight loss, although these results come from oral consumption of caffeine, not topical application.

Drug Formulation

The emulsifier (stearic acid) and other oil soluble components (Cetyl alcohol, almond oil) were dissolved in the oil phase (Part A) and heated to 75° C. The preservatives and other water soluble components (Methyl paraben, Propylene glycol, caffeine) were dissolved in the aqueous phase (Part B) and heated to 75° C. After heating, the aqueous phase was added in

portions to the oil phase with continuous stirring until cooling of emulsifier took place.

ingredients	Formulations % w/w
Stearic acid	13
Cetyl alcohol	2
Almond oil	4
Glycerol	3
Methyl paraben	0.02
Caffeine	1
Water	qs

Evaluation of Cream^[11]

pH of the Cream

The pH meter was calibrated using standard buffer solution. About 0.5g of the cream was weighed and dissolved in 50.0 ml of distilled water and its pH was measured.

Viscosity

Viscosity of the formulation was determined by Brookfield Viscometer at 100 rpm, using spindle no 7.

Dye test

The scarlet red dye is mixed with the cream. Place a drop of the cream on a microscopic slide covers it with a cover slip and examines it under a microscope. If the disperse globules appear red the ground colourless. The cream is o/w type. The reverse condition occurs in w/o type cream i.e. the disperse globules appear colourless in the red ground.

Homogeneity

The formulations were tested for the homogeneity by visual appearance and by touch.

Appearance

The appearance of the cream was judged by its color, pearlscence and roughness and graded.

After feel

Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.

Type of smear

After application of cream, the type of film or smear formed on the skin were checked.

Removal

The ease of removal of the cream applied was examined by washing the applied part with tap water.

Acid value

Take 10 gm of substance dissolved in accurately weighed, in 50 ml mixture of equal volume of alcohol and solvent ether, the flask was connected to reflux condenser and slowly heated, until sample was dissolved completely, to this 1 ml of phenolphthalein added and titrated with 0.1N NaOH, until faintly pink color appears after shaking for 30 seconds.

Acid value = $n \times 5.61 / w$

n - number of ml of NaOH required, w - weigh of substance.

Saponification value

Introduce about 2 gm of substance refluxed with 25 ml of 0.5 N alcoholic KOH for 30 minutes, to this 1 ml of phenolphthalein added and titrated immediately, with 0.5 N HCL.

Saponification value = $(b-a) \times 28.05 / w$

a - volume in ml of titrant, b - volume in ml of titrant, w - weigh of substance in gm.

RESULTS

The pH of the cream base was found to be in range of 6.2-6.9 which is good for skin pH. The viscosity of was cream was in the range of 27021-27053 cps which indicates spreadibility of cream. Acid value 5.9, saponification value 25.7 Irritancy test was not conducted in this project work. *Dye test* This dye confirms that formulation is o/w type emulsion cream. *Homogeneity*: formulation of base produce uniform distribution in cream. This was confirmed by visual appearance and by touch. *Appearance* When formulation kept for long time, it found that no change in colour of cream base *After feel* Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream base was found *Type of smear* After application of cream base, the type of smear formed on the skin were non greasy *Removal* The cream applied on skin was easily removed by washing with tap water. The formulation found to be satisfactory.

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