Natural Blue Pigment Color Gel for Foods, beverages and Pharmaceuticals

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ABSTRACT:

Colorants are mainly used to impart a distinctive appearance to the pharmaceutical dosage forms. There are many types of pharmaceutical
formulations which need to be coloured such as tablets, tablets coatings, capsules (hard gelatine, soft gelatine), liquid orals, tooth pastes, ointments and
salves etc. The purpose of colouring varies with different formulations. Colouring may be required to increase the aesthetic appearance or to prolong the stability or to produce standard preparations or for identification of a particular formulation. So current study involves the preparation of blue colour gel which can be used in dairy products, beverage, food, and pharmaceuticals. *Clitoria ternatea* has an antioxidant property, prevent greying of hair and medicinal use etc. Parabens were used as a preservative because blue colour is sensitive to light, with added antioxidants and stored in amber colour container in cool place.

Keywords: *Clitoria ternatea*, blue color, antioxidant, medicinal use.

INTRODUCTION:

Color is a major component in food, beverages and pharmaceuticals. It has many applications in confectioneries and coatings for other food products. Vitamins and food supplements in tablet form and potential application in the cosmetics industry. At present, the demand for natural dyes is increasing due to increased awareness on therapeutic and medicinal properties and their benefits among public and also because of the recognized toxic effects of synthetic colors. Natural dyes are those derived from naturally dyes, plant-based pigments have medicinal values so are mostly preferred. The natural colors like orange, red, yellow, green and blue which commonly used as colorants in Pharmaceuticals, Beverages and Foods.

FD & C Designation	Name	Color	Molecular Formula
Blue No.1	Brilliant blue FCF	Blue	$C_{37}H_{34}N_2Na_2O_9S_3$
Blue No.2	Indigotin	Indigo	$C_{16}H_8N_2Na_2O_8S_2$
Green No.3	Fast green FCF	Turquoise	$C_{37}H_{34}N_2Na_2O_{10}S_3$
Red No. 3	Erythrosine	Pink	$C_{20}H_6I_4Na_2O_5$
Red No.40	Allura Red AC	Red	$C_{18}H_{14}N_2Na_2O_8S_2$

Yellow No.5	Tartrazine	Yellow	$C_{16}H_9N_4Na_3O_9S_2$
Yellow No.6	Sunset Yellow FCF	Orange	$C_{16}H_{10}N_3Na_2O_7S_2$

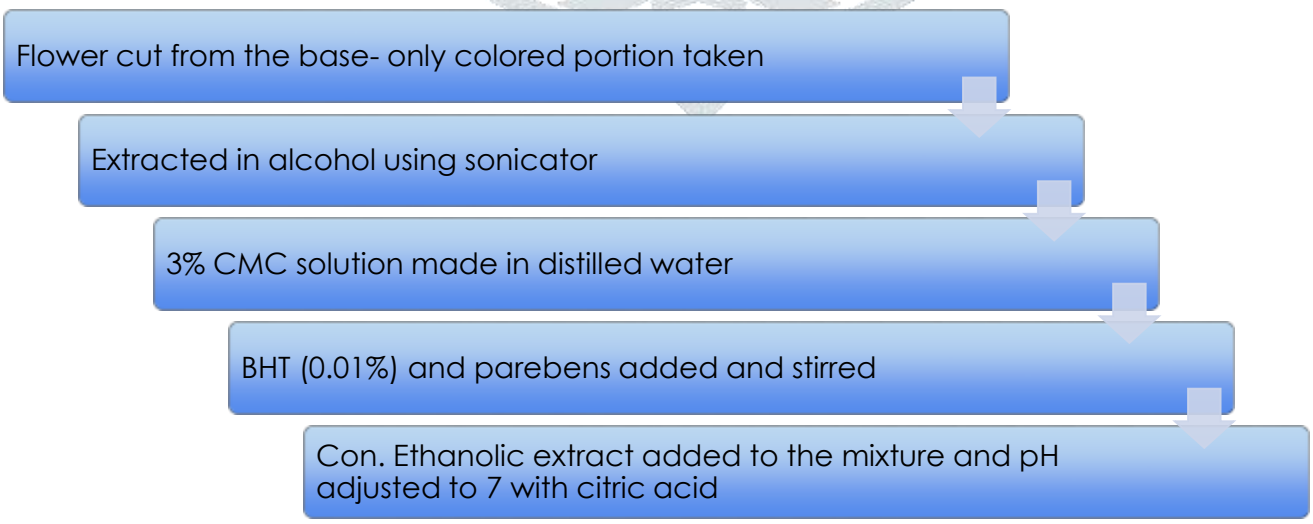
Blue color is obtained from natural source, flower petals of Clitoria ternatea (Fabaceae). *C. ternatea* is one of the major natural sources for blue (purple and white in less concentration) color pigment, anthocyanin gives high concentration of blue color pigments and due to natural source has antioxidant property and good solubility. Also used in traditional thia medicines, improves blood circulation, prevent hair loss and greying of hair, cleanses blood and improve night vision.

The gel contains extract of pigments of *C. ternatea*, gelling agent, antioxidant and preservative. The gel has better pourability and stored in amber color container in cool and dry place away from light.

OBJECTIVE:

At present various sources are used for extraction for natural pigments, of which red, yellow, green and orange have got varied sources, but blue pigment has got limited source as color because of anthocyanins are pH dependent. Study aims to isolate blue color fraction from ***Clitoria ternatea*** flowers. Literature study revels that's flowers are edible and consumed in Indonesia cuisine and hence safe foe consumption. Study aims in development of cost-effective and stable natural color for foods, beverages and pharmaceuticals. As it is dependent on pH, as the change in pH the color changes and at different pH it can be used as a different color also.

PROCEDURE:



METHODOLOGY:

PREPARATION OF GEL

(A) Collection of *C. Ternatea* flowers

The bright blue color flower of *Clitoria ternatea* plant was collected from the botanical garden of AISSMS COLLEGE OF PHARMACY and authenticated from Botanical survey of India. The petals of the flower were cut (only the blue part was selected and not the green part which contaminate the extract).

(B) Extraction of pigments

The pigments are non-polar compounds and hence extracted better by non-polar solvents i.e., Ethanol. The petals are macerated into the ethanol (90%) for 7-8 days with occasionally stirring. The ethanolic (concentrated) extract is then filter off with use of Waltman's filter paper.

(C) Formulation

This ethanolic extract is formulated into the gel by using 3% CMC (carboxyl methyl cellulose) solution as viscosity important agent (gel is easily pourable due to less viscous). The pH of this gel is adjusted to neutral (pH7) by using 1% citric acid solution (because natural blue color is pH sensitive and it easily change its color, in acidic pH color changes to violet and in basic pH color changes to greenish. It is stable at pH 6-7, gives blue color). Parabens are added to preserve the gel in the ratio of Methyl paraben: propyl paraben (1:3). BHT (Butylated hydroxytoluene) was added to prevent the oxidation of anthocyanins.

(D) Storage

The storage of the gel is at 0-5 ^{0}C in amber color bottle away from light. The gel is temperature and light sensitive and should be keep away from it otherwise it will start degrade.

IDENTIFICATION TECHNIQUES:

(1) Color and odor:

The physical parameter like color and odor was examined by visual inspection.

(2) Viscosity

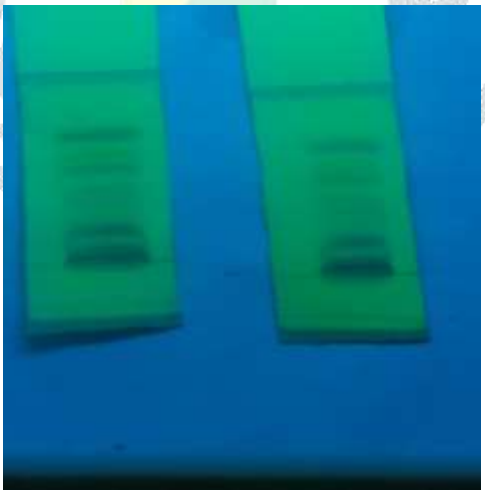
Viscosity of formulated gel was determined by Brook field viscometer. The viscosity of the gel showed easy spreadability by small amount of shear. It has greater resistance and good torque.

(3) pH of Gel

The 5 gm of gel was taken and diluted with water and the pH was checked on pH meter. The pH was found to be in the range of 6-7.

(4) TLC (thin layer chromatography):

The concentrated solution of ethanolic extract was plotted on silica gel plate in the form of band for betted separation of anthocyanins. The solvent system was n-butanol: glacial acetic acid: water (1:6:3). After the plate ran through the solvent system, plate was dipped into the ferric chloride solution. Plate air dried and observed under the UV-chamber. The separation of anthocyanins and flavonoid was observed.



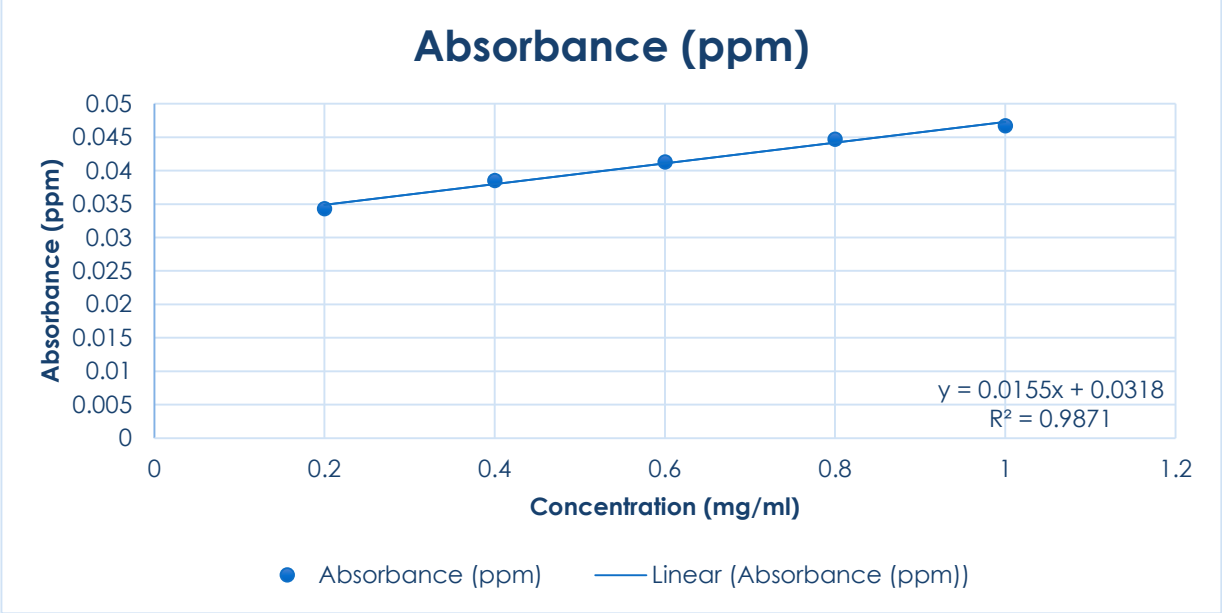
(5) Total phenolic content:

The total phenolic content of the extract was determined by the Folin–Ciocalteu method. Briefly, 200 µL of crude extract (1 mg/mL) were made up to 3 mL with distilled water, mixed thoroughly with 0.5 mL of Folin–Ciocalteu reagent for 3 min, followed by the addition of 2 mL of 20% (w/v) sodium carbonate. The mixture was allowed to stand for a further 60 min in the dark, and absorbance was measured at 650 nm. The

total phenolic content was calculated from the calibration curve, and the results were expressed as mg of gallic acid equivalent per g dry weight.

In the study, total phenolic content was estimated with gallic acid as standard. Results showed that the ethanolic extract of *Clitoria ternatea* possessed significant amount of the phenolic content and from the calibration curve regression coefficient was found to be 0.9871.

Concentration (mg/ml)	Absorbance (ppm)
0.2	0.0343
0.4	0.0385
0.6	0.0413
0.8	0.0447
1.0	0.0467



(6) Total flavonoid content:

The total flavonoid content of crude extract was determined by the aluminum chloride colorimetric method. In brief, 50 µL of crude extract (1 mg/mL ethanol) were made up to 1 mL with methanol, mixed with 4 mL of distilled water and then 0.3 mL of 5% NaNO2 solution; 0.3 mL of 10% AlCl3 solution was added after 5 min of incubation, and the mixture was allowed to stand for 6 min. Then, 2 mL of 1 mol/L NaOH solution were added, and the final volume of the mixture was brought to 10 mL

with double-distilled water. The mixture was allowed to stand for 15 min, and absorbance was measured at 510 nm. The total flavonoid content was calculated from a calibration curve, and the result was expressed as mg quercetin equivalent per gram dry weight.

RESULT:

The gel was tested on various dairy products like milk, curd etc. and also on water. The color observed was stable in all products at pH 7 which giving the attractive blue color to the products. Long term storage was tested for 3 months and observed that the gel was stable in cool condition.

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