



# THE PHYSICOCHEMICAL STUDIES OF GUM KARAYA FROM GADCHIROLI DISTRICT, MAHARASHTRA (INDIA)

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## Abstract

The Physicochemical properties of gum karaya collected from Gadchiroli District of Maharashtra were studied. The following results are obtained for the gum karaya sample. Moisture (12.47%), solubility at 30<sup>0</sup>C (17%), melting point temperature (237-241<sup>0</sup>C), tannin (0%), relative density varies from (1.0010-1.0070) for 0.2-1.0% respectively, relative viscosity varies from (12.26-16.58) for 0.2-1% respectively pH varies from 4.27-4.49 for 1 and 5% respectively.

**Keywords:** Physio-Chemical studies, Gum Karaya, Gadchiroli, Maharashtra

## Introduction

Gadchiroli is one of the triabl district of Maharashtra state which is situated in the South-Eastern corner of Maharashtra. It lies between 19<sup>0</sup>31' & 19<sup>0</sup>45'N latitude and 80<sup>0</sup>45' longitude. The geographical area of Gadchiroli district is 14412 Sq.Km. where 11694 Sq.Km. land is included in the reserved forest category which consists of various medicinal plants.

Karaya (*sterculia urens*) is a plant species in the family of Malvaceae. Karaya is native to India. It is distributed in India (Asam, Bihar, Eastern and Western Peninsula, North-East of Belgaum, Maharashtra and southern Gujrat)<sup>1</sup>.

The gums are harvested from the stems and branches of the resource gum trees as dry exudates<sup>2</sup>. Gum Karaya is the least soluble gum due to its acid stability, high viscosity and suspension properties. Gum karaya is well

suited for stabilizing low pH emulsions such as sauces and dressings<sup>3</sup>. The gum particles do not dissolved in water but adsorbed water and swell extensively to more than 60 times the original volume. To produce viscous colloidal sol. The swelling behavior of gum karaya is caused by the presence of acetyl groups present in its structure<sup>4</sup>.

The gum varies in colour from white to pale yellow depending upon the quantity of tannin present in the sample. White colour indicates the absence of tannin in gum samples.

- 1 Kumar, V. Phytosociological study of Waghai Forest Range in Dang District, South Gujrat, India (2016)
- 2 FAO Gums, resins and latexes of plant origin. Non-wood Forest products 6. Rome: Food Agriculture organization of the United Nations, M-37 (1995)
- 3 Verbeken, D., Dierckx, S., Dewettinck, K. . Exudate gums: occurrence, production, and applications. Appl. Microbial. Biotechnol.. 63:10-21 (2003) 63:10-21
- 4 D Le Cerf; F Irinei; G Muller. Carbohydrate polymer, 1990, 13, 375-386

## Experimental

### Gum tapping and sample collection

Tapping of gum from tree is done by blazing and stripping of the tree bark. Maximum amount of gum produce within first 24 hours blazing and continues for two days. Which solidifies in the form of gum tears. These solid tears in the form of dry nodules are collected as

the samples in clean and dry well washed borosil container with stopper.

### Preparation of Samples

The dried samples hard nodules were further ground and converted into fine powder which should pass 0.4 mm mesh screen. The prepared samples were kept in tight containers and stored at room temperature until required for subsequent analysis<sup>5</sup>.

### Moisture Contents

For moisture content take 5.0 gm ground sample keep it on air over for cooling before weighing. Moisture contents is expressed as percentage of mass which loss original mass.

### Solubility

The gums are uncrystalizable, therefore determine at room temp 30<sup>0</sup>C by adding 10 mg of sample to 10 cc of distilled water leaving the mixture overnight<sup>6</sup>.

### Melting temperature

1 gm of ground sample is taken in glass capillary tube & the melting point temperature determine rapidly until reproducibility.

### Tannin Content

0.1 CC FeCl<sub>3</sub> solution was added to 20 cc of 2% aqueous solution of gum sample and mixture is centrifused – absence of black precipitated indicated the absence of tannin<sup>7</sup>.

### Relative Density

Density measurement is done at 30<sup>0</sup>C by using density bottle with capacity of 25 cc for this purpose 0.2, 0.4, 0.6, 0.8 and 1.0% (w/v) sample in aqueous solutions are used.

### Relative Viscosity

Relative viscosity of gum sample is measured in filtered 0.2, 0.4, 0.6, 0.8 and 1.0% aqueous solution using U shaped viscometer<sup>8</sup>.

5 Yusuf A.K. studies on (Baganuwa) JORIND (2011) : 10-17

6 Carier S.J. Great Britain: Pharmacy Pitman Press; solution. In : Tutorial. (2005)

7 FAO. Compendium of food additive specifications addendum 7. June 1999, Rome. (1999)

8 AOAC; Association of official analytical chemists, official method of Analysis, 15<sup>th</sup> Ed, Wasington DC. (1990)

### pH

pH of 1% and 5% aqueous gum solution (w/m) is calculated by using glass electrode digital pH eter, 10%, 15%, 20% & 25% these percentage from sol. Thus pH not detected.

### Result and discussion

Table 1- Physico-chemical parameters obtained for the karaya Gum.

Physico-Chemical Parameters	Values
1. Colour	White
2. Odour	Odourless
3. Test	Testless
4. Moisture	12.47%
5. Solubility (30 <sup>0</sup> C)	17%
6. M.P.	237 <sup>0</sup> C - 241 <sup>0</sup> C
7. Tannin	0%

Table 2- Variation in density with concentration of gum sample (at 30<sup>0</sup>C)

Sr. No.	Concentration	Density
1	0.2%	1.0010
2	0.4%	1.0013
3	0.6%	1.0020
4	0.8%	1.0043
5	1.0%	1.0070

Table 3- Variation in relative viscosity with concentration of gum samples (at 30<sup>0</sup>C)

Sr.No.	Different Concentration of Gum Sample	Variation in Relative Viscosity
1	0.2%	12.26
2	0.4%	13.18
3	0.6%	14.15
4	0.8%	15.29
5	1.0%	16.58

Table 4- Variation in pH with different concentration of Gum sample (at 30<sup>0</sup>C)

pH	Value
1%	4.27
5%	4.49
10%	N.D.
15%	N.D.
20%	N.D.
25%	N.D.

\*N.D. – Not detectable

**Conclusion**

The gum karaya exudates collected from Gadchiroli (Maharashtra) are tasteless and odourless nodules or lumps. The gum samples are found to be water soluble at warm condition which form viscous solutions indicating that they are natural gums of the hydrophilic colloid group.

The greater solubility of these gums indicates the absence of cross linking between polymeric chains. The density measurement suggests degree of compact packing of macro molecules in the gums. The melting point temperature ranges of 237<sup>0</sup>C-241<sup>0</sup>C indicates that the gum samples are of good thermal stability.

**References**

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- [8] AOAC; Association of official analytical chemists, official method of Analysis, 15<sup>th</sup> Ed, Wasington DC. (1990)