Tenability of Refractive Index of Optical Active D-glucose and Gum Arabic Blend

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Abstract

In this work used optically active to determine refractive index of D-glucose and gum Arabic blended when D-glucose and gum Arabic added at different concentrations. The results obtained showed that the value of specific rotation angle β equals 44^0 at low concentration, then value of β was found increase slowly to 44.65^0 and at higher concentration 50w% , above this limit the value of β remains const .This behavior has been reflected to refractive index (Δn) measurements ,the value of (Δn) for prepared sample was 1.56 at 20% concentration and 1.586 for 50% and this value remain unchanged for concentration above 50% this concluded the D-glucose and gum Arabic solution permits the Tenability of laser at concentration less than 50% above this the polarization its ineffective go produce noticeable change in refractive index, mean that the optically active its appeared at low concentration (0-50%) above 50% not seen any effect.

Key word: *D-glucose and gum Arabic blend, refractive index, optical*

I.INTRODUCTION

Optical activity has been a phenomenon that has caught the interest of scientists since 19th century with Biot and other scientists [1] It's define and the ability to rotate the polarization plane of electromagnetic waves, occurs in natural chiral materials where molecules lack internal mirror symmetry, such as cholesteric liquid crystals, sugar, and many bimolecular [2] . Optical rotation or optically active is considered to be positive (+) for dextrorotatory substances (i.e. those that rotate the plane of polarization in a clockwise direction) and negative (−) for laevorotatory substances .The intensity of optical activity is expressed in terms of a quantity, called specific rotation is the rotation, expressed in radians (rad), measured at the temperature t and at the wavelength λ given by a 1 m thickness of liquid or a solution containing 1 kg/m3 of optically active substance. For practical reasons the specific optical rotation is normally expressed in milliradians meter squared per kilogram (mrad·m^2 ·kg^{-1}) [3]**.** It's possible to study the optical rotation of active optical materials added to inactive optical materials at different concentrations (i.e glucose added to gum Arabic at different concentration)

II. EXPERIMENTAL PART

A. Preparation samples

The sample were prepared first with high degree of accuracy in order to obtain required concentration from glucose at Weight 1gram dissolved in 30ml distilled water and gum Arabic at weight 1 gram, 4gram and 8 gram all one dissolved in 30 ml distilled. The data of prepared sample listed in table(1) . Then the sugar concentration in the sample was calculated showed in table (2) .

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Table (1): Show the data of glucose and gum Arabic used

1g(sugar) /30ml(water)	1g(sugar) /30ml(water) + 1g(gum) /30ml(water)	1g(sugar)/30m(water) + 4g(gum) /30ml(water)	1g(sugar) /30ml(water) + 8g(gum) /30ml(water)

Table (2):Concentration of sugar in sample

100w%	50w%	20w%	11w%

B. Experimental procedure

He-Ne laser with wavelength of 532 Nm and out power 1Mw was used as light source passed through polarizer, which then being polarized laser beam which passes through the sample . Then light beam out from sample directed tarweed analyzer which rotated by angle θ .the polarizer which is fixed at angle 0^0 ,the analyzer was rotation from one any 90^0 to θ^0 at step 5degree *and the* corresponding to laser 1Mw which is measured by photo cell detector the value of specific rotation angle B can be determined at all concentration according to equation(1)

$$\beta = \frac{1}{2} \Delta\theta \quad \ldots\ldots\ldots\ldots (1)$$

Where $\Delta\theta = \theta_1$ is minimum angle of rotation and θ_2 maximum angle of rotation finally the refractive index has been derived from equation (2)

$$\beta = \frac{l\pi\Delta n}{\lambda} \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where λ its wave length of laser and l the thickens of cuvatte containing the sample

Finally we plotted the value of Δn against the sample concentration

C. equipments

Figure (1) shows the experimental set up of apparatus which has ben used in this work, the apparatus consists of a standard Ne-He laser, sample cells, power meter, Polarizer and analyzer.

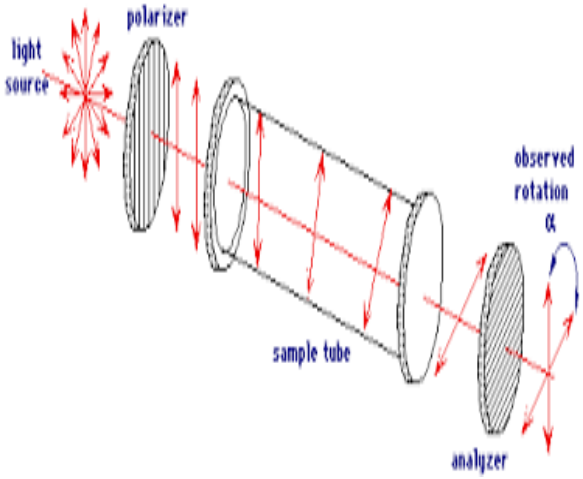

Figure (1):schematic diagram of polarimeter with sample tube containing an optical activity.

III. RESULT AND DISCUSSION

Table (3) show the result obtained from analysis data of sample , the angular rotation measurements for all concentration be side physical significance of computed refractive index Δn .The value of β increasing very slowly with increasing concentration from (11-50) % of glucose in solution sample, above 50w% the specific rotation (β) remain const this is reflected in to refractive index the lowst value of Δn is 1.564 at concentration 11% and increasing to value of 1.5658 at concentration 50% above 50% the Δn *not change* (1.569) shows in figure (2). This also may be interpret in the term of viscosity which increase linearly with increasing the sample concentration thus the change in Δn was found to be lower than medium concentration and Δn seems to hold at fixed value for high viscous sample in which the optical beam attenuates very strong in viscous medium and this will prevent any variation ,and hence change in Δn will be noticibe.

Table 3: show the result obtained by analysis the sample

Concentration%	Specific rotation (β)	$\Delta n \times 10^{-5}$
100	44.62	1.5698212
50	44.62	1.5698212
20	44.54	1.5658284
11	44.51	1.5647738

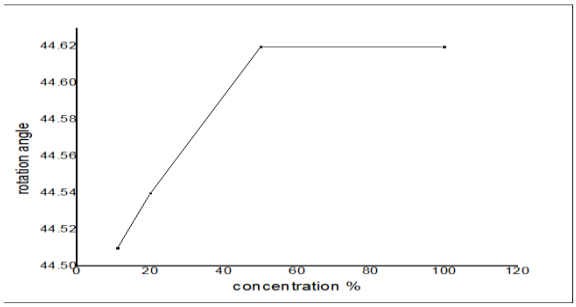

Figure 2: the refractive index variation as the function of the sample concentrations

IV. CONCLUSION

The results presented in this work show that Tenability of Refractive Index of Optical Active D-glucose and Gum Arabic Blend its perceptible at low concentration from11-50, and at higher concentration $\geq$ 50% $\Delta n, was\ found\ to\ be\ constant$

RECOMMENDATION

From this work I do recommended to expand the scope of this field to study other materials of economic benefits such as sesame ,ground nuts oil, soya oil ,…

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