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QUANTITATIVE DETERMINATION OF THE CARBOXYLIC GROUPS IN GUNA PROTEIN (CITRILLUS VULGARIS) USING COMPLEXOMETRIC TITRATION METHOD

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ABSTRACT

Complexometric titration was used to determine the quantitatively the carboxylic groups present in Guna protein resin(GPR).The method is sensitive enough to detect small changes in the number of functional groups in the protein .The various concentrations of the samples used showed that they contain in majority a tetra functional carboxylic content. The variation results from increase in concentration of samples under this investigation.

The results from this investigation have shown clearly that complexometric titration is an excellent tool for determination of carboxylic content of guna protein sample in this investigation. Small changes in functionality in terms of carboxylic content were also detected.

KEYWORDS

Carboxylic content,protein,functionality,Guna and complexometric titration.

INTRODUCTION

Polymer blending has been gaining increasing attention especially in relation to biopolymers. This serves as an alternative to grafting, use of depleting and scarce petrochemical sources and more so, the expensive production of homo polymer utilized in graft polymerization. Lately, extensive researches have been geared towards the blending of different polymers to arrive at new products having the desired properties of both components. One feasible method of producing plastic polymer that retain the necessary mechanical properties, but still maintaining high biodegradability is through blending of plastics with biomaterials or biopolymers . Protein is an abundant, inexpensive a highly biodegradable natural raw materials. Such blends therefore, need the aid of a reactive functional group, to enhance compatibility of the polymers involved in the reaction between the two phases and hence enhance the mechanical properties of the composites[3]. The compatibility of biopolymers, reactive it is increased with increase in the number functional groups and possible degradation. It is extremely important to be able to determine the number of accessible groups in order to judge the polymers interaction ability and the type of technological advancement to adopt. This and advances an understanding of the knowledge of their accessible reactive groups which furnishes with knowledge of interaction ability for the final products.

In this investigation, we determined the number of accessible carboxylic groups in guna protein using complex metric methods.

MATERIALS AND METHODS

MATERIALS

Calcium acetatate, ethylene diammine tetra acetic acid,0.1M sodium hydroxide were all supplied by British Drug House(BDH).Other materials used included distilled water, muroxide metal indicator, ethanol. Protein was extracted

from Guna seeds earlier and stored in cleaned polyethene bags.

METHODS

The method of Lidija et al (2000)[1] was adopted for this investigation as follows:

TITRATION METHOD:

Weight of air dried samples of protein ranging from 0.1-1.2g was taken and each transferred into a 200ml stopper flask 100ml of calcium acetate were added. The flask were properly shaken and left to stand overnight. And then the protein suspension filtered.

A suitable volume of the filtrate was pipette in to a beaker and the colour indicator murexide was added as a metallic indicator. The p^H value to 12 by the addition of 0.1M sodium hydroxide solution. The decrease in concentration of calcium acetate solution in contact with the protein was monitored with a jenway p^H meter model 3505.

EDTA solution was used as a titrant (standardization against zinc sulfate). The carboxylic content of the sample were determined according to the equation

$$COOH = \frac{Vqb - Vqa \times C \times F}{M} \times 1000 \; in \; m \; mol/g$$

Where;

V_{qb} =consumption titrating reagent for the blank in (ml)
V_{qa} =consumption titration for the sample value in (ml)
M=weight of sample in (g)
F = titration factor
C = concentration of the titrant in (mol/l)

All present represent the mean values of five parallel readings.

RESULTS AND DISCUSSIONS

The values of the carboxylic group content group content obtained by titration technique for different

Table1: Carboxylic content of chemically modified protein measured using titration;

SAMPLE	TITRATION METHOD (%CV) (m mol/g)	CABOXYLIC VALUE
A	0.0015	3.75
B	0.002	2.50
C	0.0033	4.16
D	-0068	4.25
E	.0078	3.90
F	.099	4.16
H	.099	3.57
I	.01344	4.2
J	.0108	3.6
K	.0226	4.7

CV: Caboxylic value

DISCUSSIONS

The values are shown as gradual increase with the increase in concentration of the sample. All the values in respect to the carboxylic content or functionality determinations have shown an approximate value of 4 that is tetra functionality.

Carboxylic groups of protein are able to act as sources of ion exchange capacities[5] and can be utilized in the determinations involving processes in heterogeneous polymer systems, polymer reactivity and accessibility of these groups.

The ion exchange properties of protein can therefore, be used as a tool to measure the quantity of carboxylic groups present, which is a matter of special importance in measuring the progress of reaction[2]. In this investigation the highest values of 4.25, 4.16 and 4.7 were observed in respect of samples c, d, and k respective, this are shown in **Tabe1**

The results in this study falls in line with other studies carried elsewhere for the number of carboxylic groups in cellulose pulp[4]. By and large, there is a corresponding increase in carboxylic content in samples C, D and K which is attributed to higher concentration of the sample with ultimate promotes the number of carboxylic groups. The methods is sensitive to detect small changes in functionality which was seen as in the case of sample B having the lowest carboxylic content of 2.50 approximately a tri-functional carboxylic functionality ,This is shown in **Table 1**.

CONCLUSION

The influence of ion exchange properties on the functionality of protein from guna seed was studied and this was linked to the number of carboxylic groups. Oxidation causes increase in the number of carboxylic groups. Higher concentrations lead to an increase in functional groups (carboxylic) and resulting in an increased compatibility with other polymers

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