DETERMINATION OF OPTIMUM EXTRACTION TIME FOR VEGETABLE TANNIN MATERIAL USING A MODIFIED ALCA EXTRACTOR

by

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Özet

Halen meriyette bulunan beynelmilel karakterdeki ekstraktörlerden, Almanya, Avrupa ve Türkiyede Koch, Ingiltere ve camiasında Procter, Amerika Birleşik Devletlerinde ALCA, kullanılarak bitgisel sepi maddelerinin kuantitatif analizleri yapılmaktadır. Araştırmaların hedefi kendi buluşumuz olan "modified ALCA ekstraktoru için en uygun ekstraksion zamanının tayini" idi. Çalışmalar Almanyadan temin ettiğimiz valonea, quebracho odunu, spruce bark, sumak, mimosa, ve Türkiyeden temin edilen pinus brutia, pinus pinea, kabuk nümuneleri üzerinde yapıldı.

Summary

At present, three international extractors are in use for determination of vegetable tanin material by quantitative analysis. Germany, Europe, and Turkey are using the Koch; England and British Commonwealth, the Procter; and U. S. A., the ALCA extractor. The principal research described in this paper is "Determination of Optimum Extraction Time for Modified ALCA Extractor", which I constructed. The work was done with samples of valonea, quebrachowood, spruce bark, sumac leafs and mimosa bark all obtained from Germany, and the ross of pinus brutia, pinus pinea, which were collected from Turkey. By these experiments, it was found that the optimum extraction time for vegetable tanin materials was shorter when using the modified ALCA.

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Introduction

In one of my earlier works, I constructed a modified ALCA extractor [1,2] for quantitative analysis of vegetable tannin materials. Currently, quantitative analysis of vegetable tannins is made by one of three extractors: Koch [3] used by Germany, Europe, and Turkey; Procter [4] used by England and British Commonwealth; and ALCA [5] used by the U. S. A. Only the Koch extractor was used for comparison in the investigation of extractable liquid employed in the experiments.

Literature indicates that the Koch and Procter extractors give similar analytic results [6]. In research using the modified ALCA extractor, better results were obtained and it was easier to operate in comparison with the other three conventional extractors. The same extraction time as Koch's (3 hrs /1 L and 6 hrs /2 L) was used in one of my earlier works [1]. During the time of this earlier work, it was not known whether or not the length of Koch's extraction time was suitable for use of the modified ALCA extractor. For that reason, the main problem of this work was "Determination of Optimum Extraction Time for Vegetable Tannin Materials Using a Modified ALCA Extractor". Work can be done with different vegetable tannin materials with any temperatures using the modified ALCA extractor. However, with old ALCA it is not possible to work with any other temperature except 95° C.

Experiments

Vegetable tannin materials were ground into meal, then extracted with modified ALCA and with the conventional Koch extractors. With the modified ALCA, the extraction time was at first 2 hrs /1 L, then same material was extracted using 2.5 – 3 – 3.5 – 4 hrs /1 L. Next I worked 5–6–7 hrs /2 L. For comparison, the Koch was used with the same materials and extraction time was 3 hrs /1 L. From these analyses, Table I was prepared showing tannin per cent, nontannin per cent (using shaking method), total soluble solids, and optimum extraction time for valonea, quebracho wood, spruce bark, ross of pinus brutia, pinus pinea, sumac, and mimosa. Also results of the comparative experiment made with Koch extractor are given on Table I. All samples contained 14 percent water.

On the table, it is shown that for valonea the oprtimum extraction time with modified ALCA for 1 L was 3 hrs. and 37.4 per cent tannin was obtained. Optimum extraction time for 2 L was 6 hrs. and again 37.4 per cent tannin was obtained. 33.6 per cent tannin for 3 hrs/1 L was found by comparative Koch extractor. For results of the experiments using other samples, refer to the same table.

The averages of 7 different tannin materials are given at the bottom of the table.

Table I

DETERMINATION OF OPTIMUM EXTRACTION TIME BY MODIFIED ALCA EXTRACTOR AND COMPARISON WITH KOCH

(*All samples contained* 14 *per cent water*)

Material	Extractor	Time Hr.	Vol. L.	Soluble Solids Per Cent	Nontannin Per Cent	Tannin Per Cent	Tannin % Tennin % + Nontanin %
Valonea	Mod. ALCA	2	1	51.0	15.8	35.2	69.1
	"	2 1/2	1	51.7	16.0	35.7	69.0
	"	3	1	53.2	15.8	37.4	70.4
	"	3 1/2	1	51.8	15.6	36.2	70.1
	"	4	1	51.2	15.6	35.8	69.8
	"	6	2	53.5	16.1	37.4	69.8
	"	7	2	53.0	15.7	37.3	70.5
	Koch	3	1	48.9	15.2	33.6	69.0
Quebracho Wood	Modified ALCA	2	1	28.3	2.7	25.6	90.4
		3	1	28.0	2.5	25.5	91.4
	"	3 1/2	1	27.7	2.7	25.0	90.5
	"	4	1	27.9	2.9	25.0	90.5
	"	5	1	28.1	3.2	24.9	88.9
	"	6	2	28.2	2.7	25.5	90.6
	"	7	2	28.2	2.8	25.4	90.1
	"	8	2	27.9	3.4	24.6	87.9
	Koch	3	1	27.6	3.1	24.5	89.0

Material	Extractor	Time Hr.	Vol. L.	Soluble Solids Per Cent	Nontannin Per Cent	Tannin Per Cent	Tanin % Tannin % + Nontannin %
Pinus	Mod. ALCA	2	1	22.0	9.2	12.8	58.4
Brutia	"	2 2/1	1	22.5	9.6	13.2	58.5
Ross [7,8]	"	3	1	24.4	9.2	15.2	62.1
	"	3 1/2	1	24.2	6.2	17.9	74.4
	"	4	1	23.9	6.7	17.2	72.1
	"	6	2	24.5	8.2	16.3	66.6
	"	7	2	24.8	6.8	18.0	72.6
	Koch	3	1	21.4	8.9	12.5	57.2
Spruce	Mod. ALCA	2	1	20.0	7.2	12.8	63.8
Bark	"	3	1	20.5	7.5	13.0	63.5
	"	3 1/2	1	20.0	7.8	12.2	60.5
	"	4	1	20.6	8.5	12.1	58.5
	"	5	1	30.7	8.9	11.8	57.0
	"	6	2	21.4	8.5	12.9	60.2
	"	7	2	21.4	9.6	11.8	55.2
	"	8	2	21.2	8.8	12.4	58.5
	Koch	3	1	18.8	6.3	12.6	66.8
Pinus	Mod ALCA	2	1	21.3	6.6	14.8	69.3
Pinea	"	2 1/2	1	21.6	6.9	14.7	68.3
Ross [7,8]	"	3	1	21.9	3.2	18.7	85.0
	"	3 1/2	1	22.0	3.3	18.7	85.0
	"	4	1	21.8	4.8	17.0	77.8
	"	6	2	21.9	3.9	18.0	82.1
	"	7	2	24.4	5.7	18.8	76.7
	Koch	3	1	21.5	4.6	16.9	78.7
Mimosa	Mod. ALCA	2	1	47.4	11.2	36.1	76.2
Bark	"	3	1	47.5	10.3	37.2	78.1
	"	3 1/2	1	47.4	10.6	46.8	77.8
	"	4	1	47.5	10.4	37.1	77.8
	"	5	1	47.5	12.7	34.8	73.5
	"	6	2	48.5	12.6	35.9	74.0
	"	7	2	48.0	12.6	35.5	73.6
	"	8	2	48.7	13.1	35.6	73.4
	Koch	3	1	45.5	8.9	36.6	80.5

Material	Extractor	Time Hr.	Vol. L.	Soluble Solids Per Cent	Nontannin Per Cent	Tannin Per Cent	Tannin% / Tannin% + Nontannin %
Sumac Leaves	Mod. ALCA	2	1	41.0	15.2	25.8	62.8
	"	3	1	41.4	14.6	26.8	65.0
	"	3 1/2	1	42.2	14.7	27.5	65.3
	"	5	1	41.4	14.6	26.8	64.4
	"	6	1	41.7	14.2	27.5	66.0
	"	6	2	42.5	15.9	26.7	62.7
	"	7	2	43.1	14.5	28.7	66.5
	"	8	2	43.1	15.6	27.5	63.8
	Koch	3	1	37.6	11.4	26.2	69.7

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Table des matières