Banat's University of Agricultural Sciences and Veterinary Medicine
"King Michael I of Romania" , Timişoara
ROMANIA

The Influence of Alkaline Electrolyzed Water on Plant Secondary Metabolites and their Implication in the Oxidative Stress Reduction Process

Tulcan Camelia, Tripon Maria Roberta, Gaspar Cristina, Boldura Oana Maria, Marc Simona, Radulov Isidora, Alexa Ersilia, Negrea Monica, Hutu Ioan and Mircu Calin

25th European Biotechnology Congress

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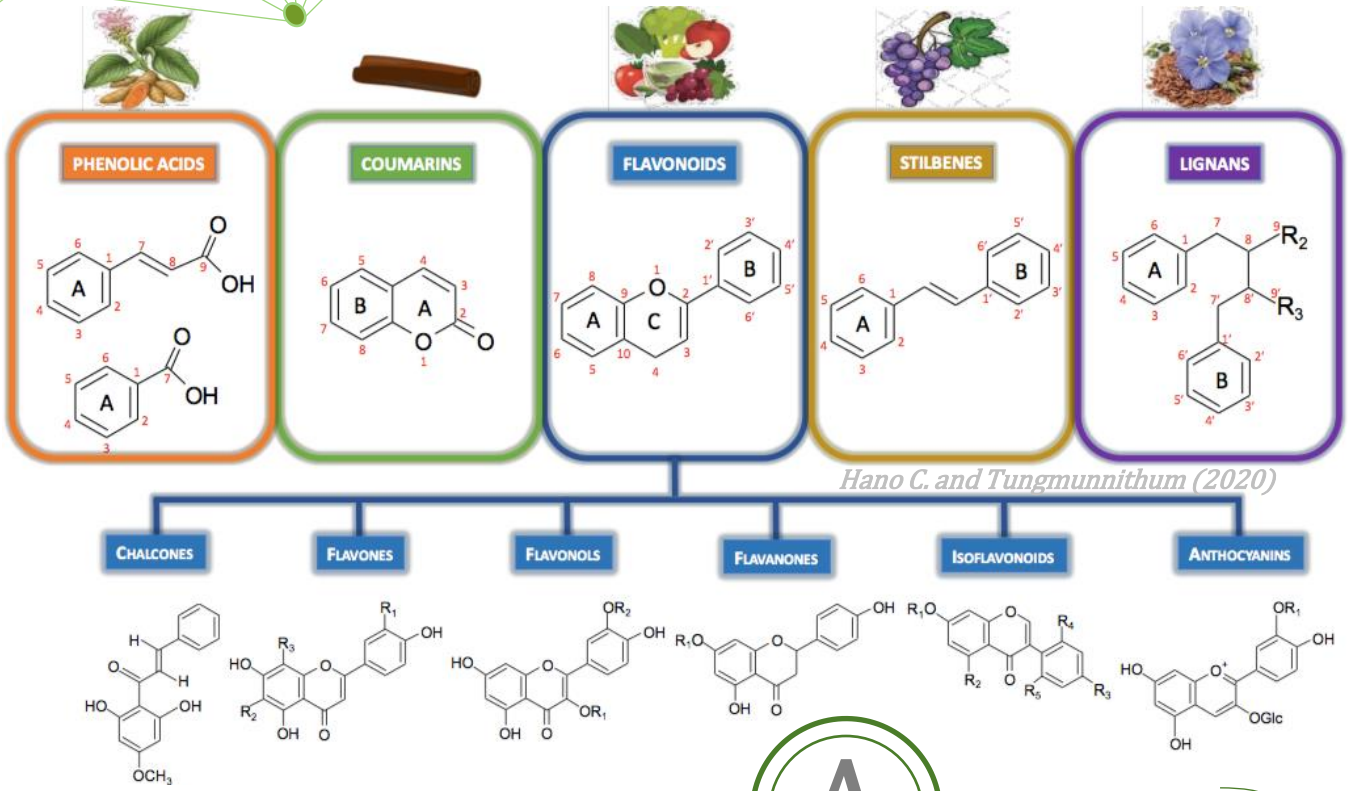


Hano C. and Tungmunnithum (2020)

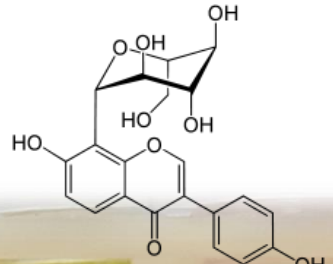
Polyphenols

are secondary metabolites in vegetal matrices, being a large and diverse group of substances present abundantly in all medicinal plants.

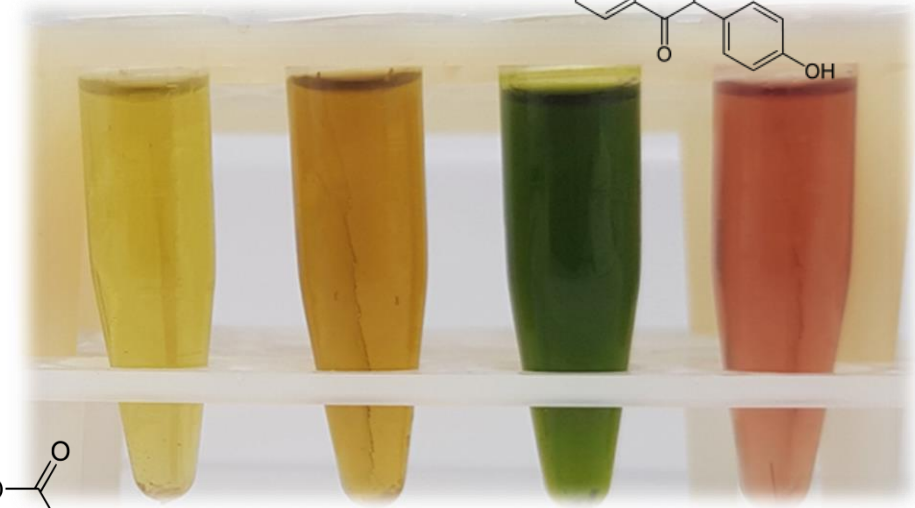
- **A**ntioxidant
- **A**nti-inflammatory
- **B**iological effects

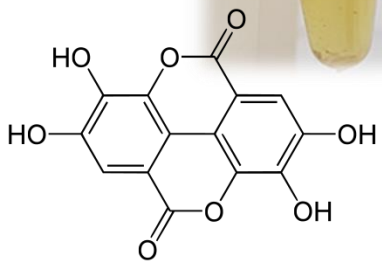
> prevention of pathological conditions

Hyssopus officinalis



Chelidonium majus





EXTRACTION TECHNIQUE ?!

Allium ursinum

Thymus serpyllum

POLYPHENOLS: METHODS OF EXTRACTION

KARISHMA RAJBHAR*, HIMANSHU DAWDA and USHA MUKUNDAN

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MUMBAI – 400086 (M.S.) INDIA

(*Received : 04.11.2014; Revised : 17.11.2014; Accepted : 20.11.2014*)

The hydrophilic polyphenols including aglycones, glycosides, and oligomers, are extracted using water, polar organic solvents such as methanol, ethanol, acetonitrile and acetone, or their mixture of water. The liquid extracts are sometimes partitioned with solvents such as ethyl acetate, depending on the solubility

Original Articles

Extraction of Polyphenolics from Plant Material for Functional Foods—Engineering and Technology

John Shi, Haseeb Nawaz, Joseph Pohorly, Gauri Mittal, Yukio Kakuda & Yueming Jiang

Pages 139-166 | Published online: 06 Feb 2007

Download citation https://doi.org/10.1081/FRI-200040606

Some polyphenolics are water soluble and some are lipid soluble. In general, catechins are lipid soluble and procyanidins are water soluble;

Because procyanidins are water soluble, they can be extracted by water without introducing any organic solvents.

Food Science and Technology Research, **25** (1), 123–129, 2019
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doi: 10.3136/fstr.25.123

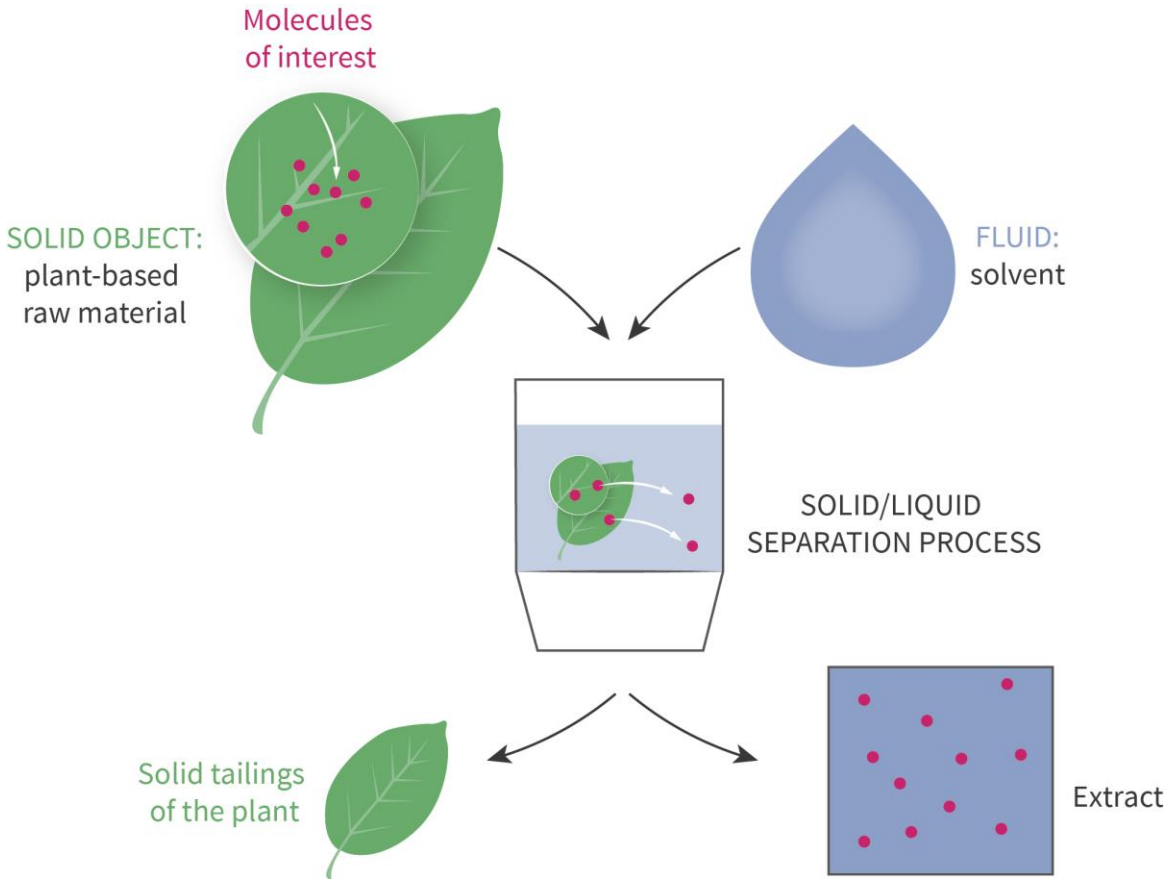
http://www.js

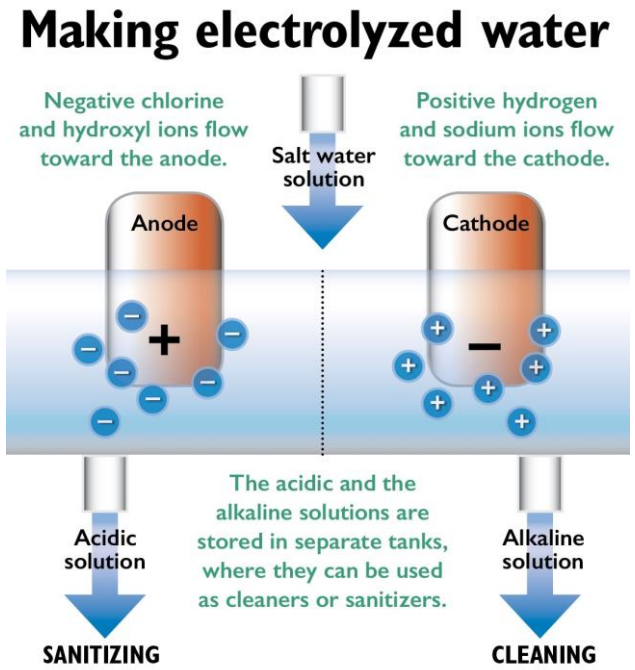
Original paper

Stability of Polyphenols under Alkaline Conditions and the Formation of a Xanthine Oxidase Inhibitor from Gallic Acid in a Solution at pH 7.4

Sari HONDA*, Rika ISHIDA, Kayo HIDAKA and Toshiya MASUDA

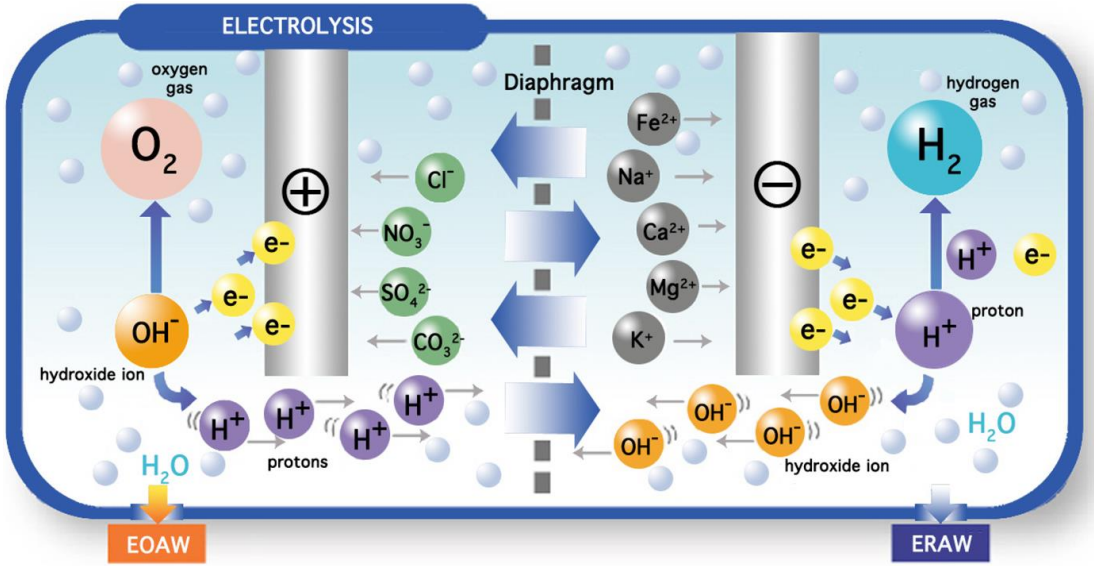
Polyphenols exhibit strong antioxidant activity that is closely linked to their high reactivity towards reactive oxygen species. Interestingly, their reactivity is enhanced under alkaline conditions.





The alkaline electrolyzed water is recognized for its remarkable solvent properties, providing a very good extraction yield in particular on vegetal matrices.

How is AEW obtained?

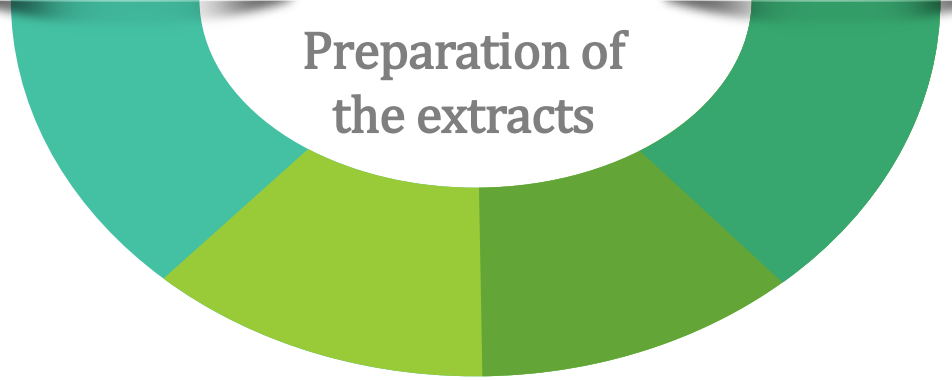


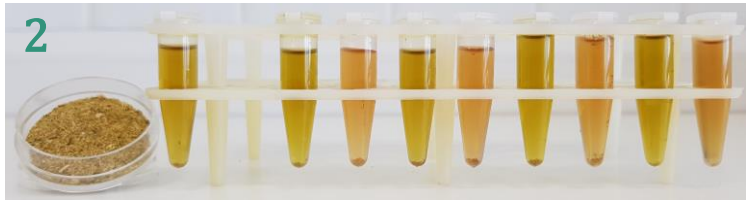
AIM OF THE STUDY

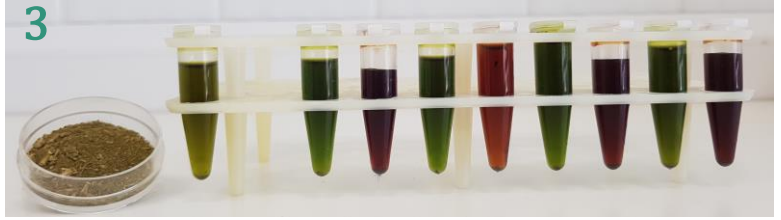
Preparation of alkaline electrolyzed water plant extracts (different pH)

Determination of total polyphenols and flavonoids from the extracts

Interpretation of the obtained values regading the influence of AEW







the plants were harvested from the local area and dried (ISO 1573:1980)

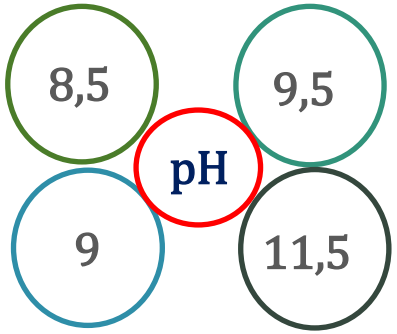
each plant volume was reduced and a total amount of 15 g was used for the sample preparation

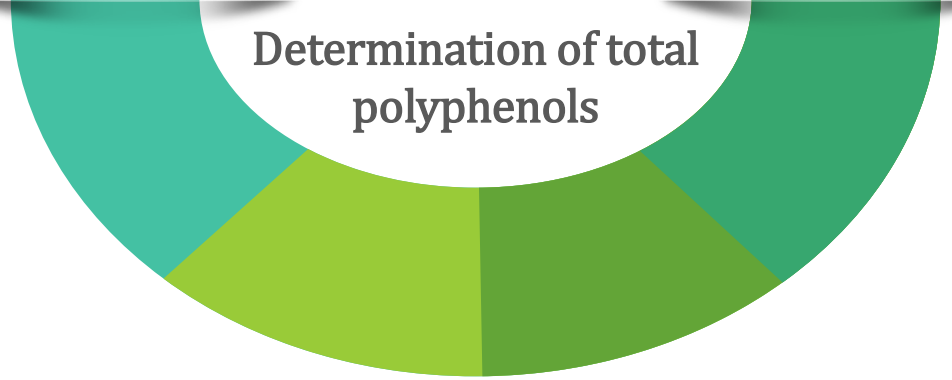
the chosen solvent was **alkaline electrolyzed water** (1:10), at different pH values and EtOH 70% (1:10)

the solvent-plant complex was fully mixed via stirring and ultrasonication

extracts were filtered (90 mm FP) and freeze dried

1. *Hyssopus officinalis (Lamiaceae)*
2. *Allium ursinum (Amaryllidaceae)*
3. *Chelidonium majus (Papaveraceae)*
4. *Thymus serpyllum (Lamiaceae)*





Performance characteristic evaluation of Folin-Ciocalteu micro-method for total polyphenols determination from plant extracts.

Author(s) : Tripon, R. ; Repone, C. ; Urai, M. ; Chis, C. ; Oiegas, S. ; Boldura, O. M. ; Tulcan, C.
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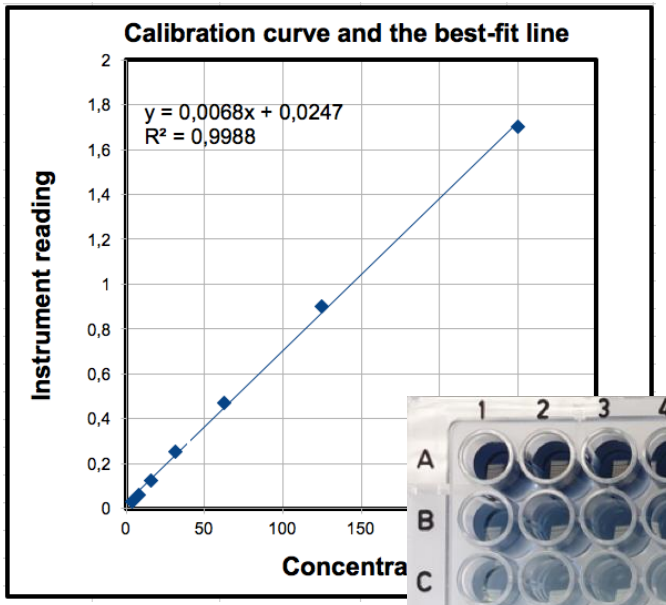
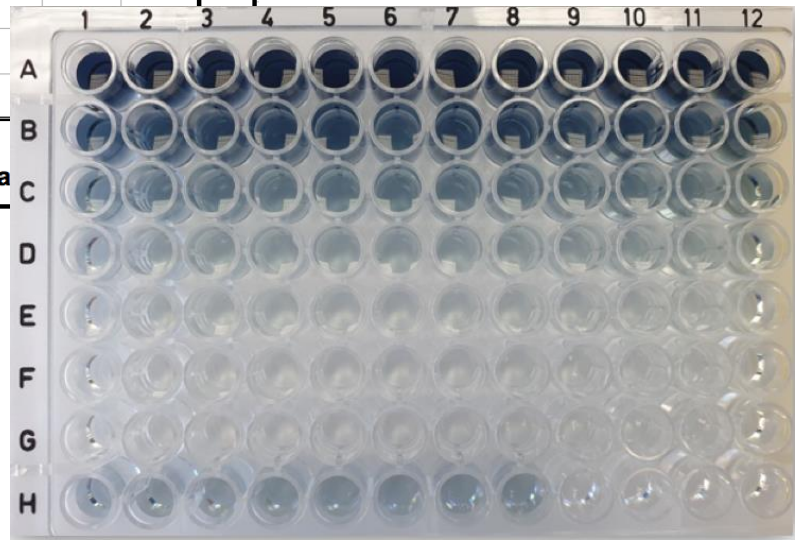
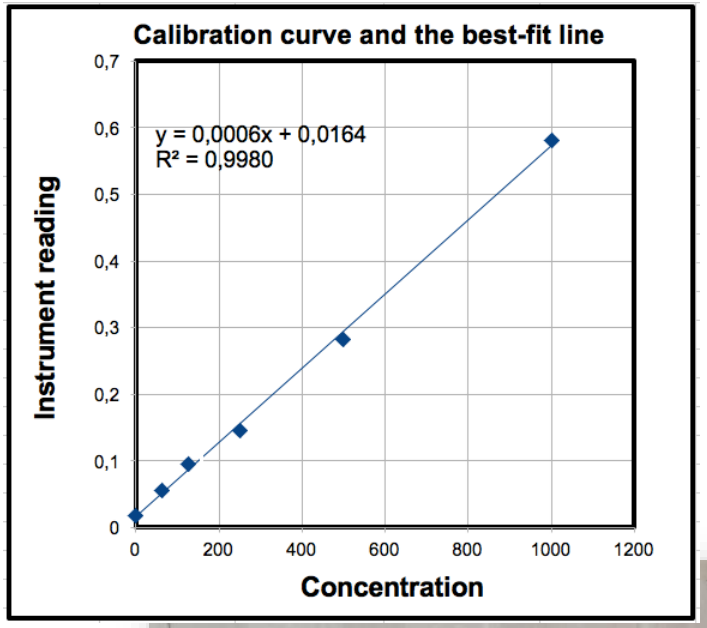
Author Email : tulcancamelia@gmail.com
Journal article : Lucrari Stiintifice - Universitatea de Stiinte Agricole a Banatului Timisoara, Medicina Veterinara 2020 Vol.53 No.1 pp.94-100 ref.11

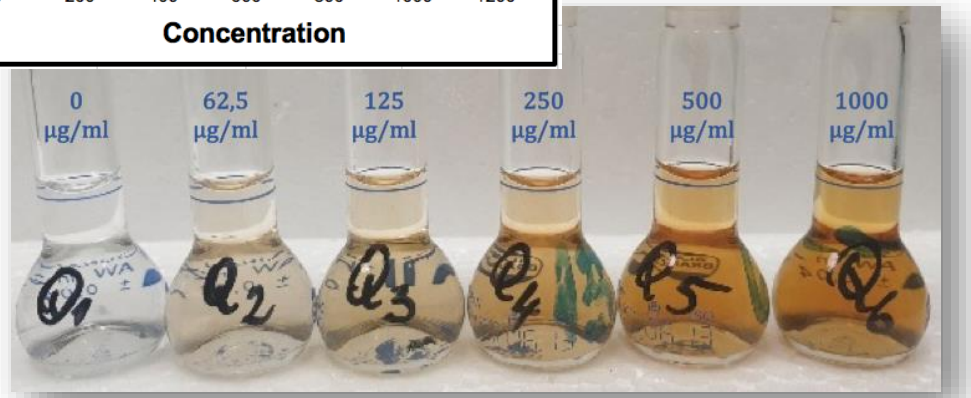
25 µL sample
125 µL Folin-Cicalteu Reagent
100 µL Na2CO3
The mixture was kept at room temperature for 30' and the OD was read at 760 nm with a *Tecan Infinite M1000 Pro* spectrofotometer.

The calibration curve was made with gallic acid at the following concentrations: 3,9, 7,8, 15,62, 31,25, 62,5, 125 and 250 ug/ml.

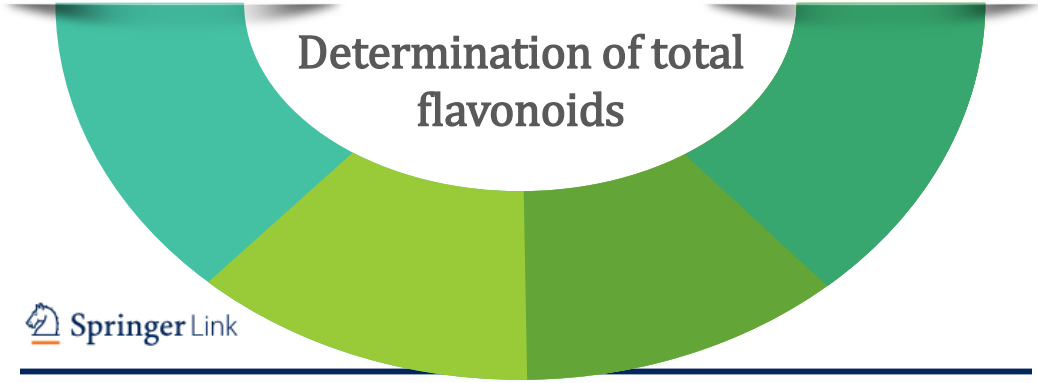








For the calibration curve rutin (1mg/ml) was used and 5 standards were prepared
(62,5, 125, 250, 500 and 1000 ug/ml)



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Evaluation of Aluminium Complexation Reaction for Flavonoid Content Assay

Anna Pękal & Krystyna Pyrzynska

Food Analytical Methods **7**, 1776–1782 (2014) | Cite this article

36k Accesses | **233** Citations | **3** Altmetric | Metrics

The preparation of the samples was made in 5 ml volumetric flasks
500 µL of each sample and 150 µL NaNO2 (5%) were mixed and kept at room temperature for 5';
250 µL AlCl3 (2%) were added and kept for another 6';
250 µL NaOH were added on the resulted mixture and kept at room temperature for 10';
The OD of the samples was read at 510 nm (Perkin Elmer Lambda 25 spectrofotometer).

RESULTS

Total POLYPHENOLS *stirring*

	EtOH mg GAE/g	pH 8,5 mg GAE/g	pH 9 mg GAE/g	pH 9,5 mg GAE/g	pH 11,5 mg GAE/g
H. officinalis	75,14 ±0,32	74,82 ± 0,29	**78,31 ± 0,11**	74,93 ± 0,22	73,36 ± 0,14
A. ursinum	36,9 ± 0,18	34,11 ± 0,20	**38,03 ± 0,25**	35,01 ± 0,27	31,12 ± 0,32
Ch. majus	20,11 ±0,07	19,98 ± 0,13	**22,71 ± 0,25**	21,03 ± 0,29	19,34 ± 0,14
T. serpyllum	97,71 ± 0,93	97,03 ± 0,57	**99,97 ± 0,95**	98,71 ± 0,74	97,98 ± 0,42

Total POLYPHENOLS *ultrasonication*

	EtOH mg GAE/g	pH 8,5 mg GAE/g	pH 9 mg GAE/g	pH 9,5 mg GAE/g	pH 11,5 mg GAE/g
H. officinalis	83,81 ± 0,11	85,13 ± 0,21	**90,03 ± 0,34**	85,41 ± 0,63	84,32 ± 0,56
A. ursinum	43,14 ±0,12	45,21 ± 0,22	**48,74 ± 0,14**	45,91 ± 0,33	43,91 ±0,44
Ch. majus	29,45 ± 0,23	31,51 ± 0,53	**34,31 ± 0,25**	32,13 ± 0,11	39,97 ±0,34
T. serpyllum	117,03 ±0,98	119,14 ±0,82	**123,11 ±0,74**	121,91 ±0.92	120,06 ±0,88

RESULTS

Total FLAVONOIDS *stirring*

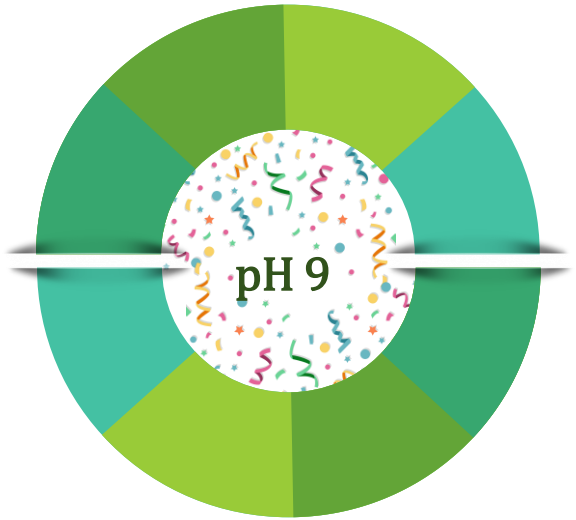
	EtOH mg RE/g	pH 8,5 mg RE/g	pH 9 mg RE/g	pH 9,5 mg RE/g	pH 11,5 mg RE/g
H. officinalis	1,34 ± 0,02	1,42 ± 0,09	1,98 ± 0,04	1,47 ± 0,03	1,36 ± 0,08
A. ursinum	2,11 ± 0,03	2,97 ± 0,01	3,87 ± 0,06	3,07 ± 0,02	3,19 ± 0,05
Ch. majus	9,71 ± 0,02	10,12 ±0,05	13,01 ±0,02	12,03 ± 0,04	11,07 ±0,06
T. serpyllum	18,03 ± 0,04	20,91 ±0,05	23,03 ±0,03	21,97 ± 0,08	21,01 ±0,05

Total FLAVONOIDS *ultrasonication*

	EtOH mg RE/g	pH 8,5 mg RE/g	pH 9 mg RE/g	pH 9,5 mg RE/g	pH 11,5 mg RE/g
H. officinalis	1245 ± 0,01	2,51 ± 0,04	3,11 ± 0,08	2,56 ± 0,07	2,48 ± 0,02
A. ursinum	3,91 ± 0,03	4,34 ± 0,05	5,04 ± 0,09	4,45 ± 0,05	4,03 ± 0,08
Ch. majus	11,44 ±0,05	12,03 ±0,07	14,43 ±0,11	13,97 ± 0,09	12,43 ±0,11
T. serpyllum	20,98 ±0,12	32,71 ±0,22	33,55 ±0,16	32,56 ± 0,18	31,14 ±0,23

Conclusion

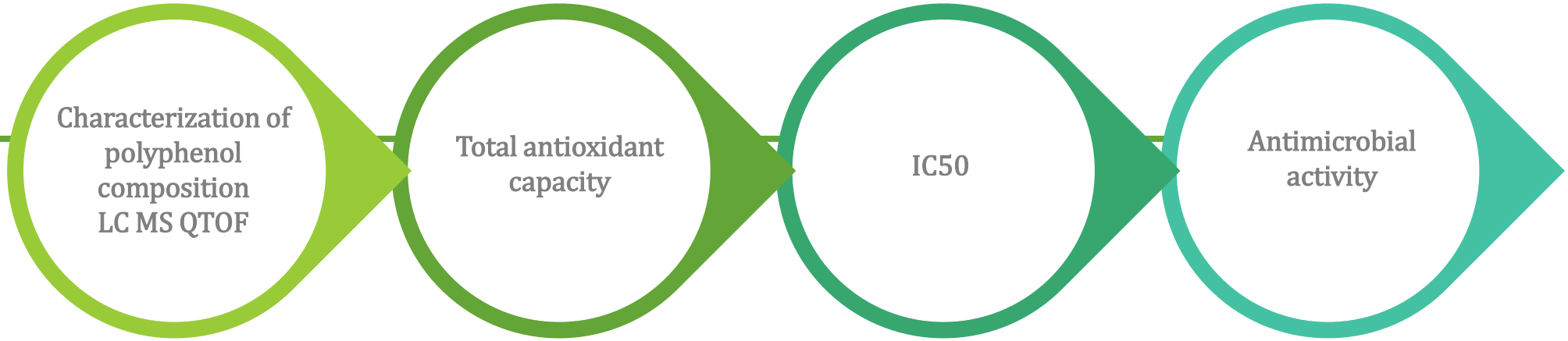
Alkaline electrolyzed water facilitates the extraction process of phytoconstituents, preventing their degradation.



The basic pH increases the reactivity of the compounds, being a particularly important aspect in the case of polyphenols, due to their strong antioxidant activity that is closely linked to the high reactivity towards reactive oxygen species;

The highest values of total polyphenols and flavonoids were obtained in the case of plants extracted with alkaline electrolyzed water at pH 9, by using the ultrasonication technique.

Future plans



SPECIAL THANKS FOR YOUR ATTENTION!

Activities under this work were carried out in the *Antioxidant Systems Laboratory (A1c)*, Research Laboratory Complex "Horia Cernescu" from Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania", Timisoara, Romania and it was supported by the project *"A bio-economical approach of the antimicrobial agents - use and resistance"*, in the frame of contract PCCDI 7/19.03.2018, code: PN-III-P1-1.2-FPRD- 2017, with the acronym BIOAMR, a project funded by UEFISCDI.