Universitatea Națională de Știință și Tehnologie POLITEHNICA București

FIȘA DE VERIFICARE A ÎNDEPLINIRII STANDARDELOR DE PREZENTARE LA CONCURS

– OBTINEREA ATESTATULUI DE ABILITARE –

Candidat: Conf.dr.ing. Adina Ionuța GAVRILĂ

Departamentul de Bioresurse și Știința Polimerilor/Facultatea de Inginerie Chimică și Biotehnologii

Condiții	**Îndeplinire condiții**	
A. Doctor	Diploma de Doctor în domeniul ***INGINERIE CHIMICĂ***, nr **122** din **18.09.2006**, emisă de **Universitatea POLITEHNICA din București**	
B. Îndeplinirea standardelor minime naționale conform OMECTS nr. 6129/2016; Profesor universitar, Comisia CNATDCU nr. 8	Standarde indeplinite, conform Comisiei CNATDCU **Nr. 8, Comisia Inginerie Chimică, Inginerie Medicală, Știința Materialelor și Nanomateriale** Anexată: Fișa de calcul și de susținere a îndeplinirii standardelor minimale specifice domeniului, în acord cu realizările menționate:	
Condiții minimale și obligatorii	**Minim prevăzut**	**Realizat** la data depunerii dosarului 08.02.2024
NTOP ≥ 4; **NTOP** = număr total de articole în reviste ISI situate în top 25% (zona roșie) în calitate de autor principal. Situația revistelor în top 25% se judecă în cazul cel mai convenabil pentru candidat, fie la momentul publicării fie la data înscrierii la concurs	**≥ 4**	**4**
NP ≥ 20; **NP** = număr articole în reviste ISI la care candidatul este autor principal (prim autor sau autor de corespondență)	**≥ 20**	**22**
FIC ≥ 30; **FIC** = factor de impact cumulat (suma factorilor de impact ai revistelor)	**≥ 30**	**44.4808**
NC ≥ 120 **NC** = număr total de citări (din baza SCOPUS)	**≥ 120**	**231**
NCO ≥ 1 (în calitate de Director proiect)	**≥ 1**	**1**
C. Atestarea studiilor (diploma + Foi Matricole) și a altor realizari profesionale **Diploma de Licență**, în domeniul ***Inginerie Chimică***, Nr. **1807** din **21.07.1994** emisă de Universitatea POLITEHNICA București **Diplomă de Studii Aprofundate**, în domeniul ***Inginerie Chimică***, Nr. **1410** din **20.07.2000** emisă de Universitatea POLITEHNICA București **Certificat de absolvire a cursului de pedagogie** nr. **980** din **15.03.1995** emis de Universitatea ***POLITEHNICA București*** **Certificat de de absolvire a cursului de FORMATOR,** nr. **51** din **11.05.2010** emis de SC RISING STAR SRL		

Subsemnata, **Adina Ionuța GAVRILĂ**, Departamentul **BIORESURSE ȘI ȘTIINȚA POLIMERILOR**, Facultatea de **INGINERIE CHIMICĂ ȘI BIOTEHNOLOGII**, din Domeniul de Studii Univ. **INGINERIE CHIMICĂ**, arondat Comisiei de Specialitate CNATDCU [OMECTS 6129/20.12.2016] Nr. **8, Comisia Inginerie Chimică, Inginerie Medicală, Știința Materialelor și Nanomateriale**, declar pe propria răspundere, cunoscând prevederile art. 292 privind falsul în declarații, din Legea 286/2009 - Codul Penal, că sunt îndeplinite toate Standardele minimale prevăzute de Metodologia UPB 2013 actualizată în conformitate cu schimbarile de legislatie in domeniu in 2017 si 2018 pentru inscrierea la concurs și susțin veridicitatea informațiilor prezentate în dosar și în materialul de mai sus. Lucrările considerate a fi incluse în Baza ISI Thomson Reuters sau în alte Baze de Date Internaționale [BDI] sunt vizibile în aceste baze, în dreptul numelui candidatului, la aceasta dată.

Candidat,
Conf.dr.ing. Adina Ionuța GAVRILĂ

Data
05.06.2024

ANEXA LA FIȘA DE VERIFICARE A ÎNDEPLINIRII STANDARDELOR DE PREZENTARE LA CONCURS

– OBȚINEREA ATESTATULUI DE ABILITARE –

1. NTOP – număr total de articole în reviste ISI situtate în top 25% (zona roșie) în calitate de autor principal.

Standarde minimale (cumulative): NTOP ≥ 4 cf. OMECTS nr. 6129/2016; Anexa nr. 8

Condiţii minimale și obligatorii	Minim prevăzut	Realizat
NTOP ≥ 4; **NTOP** = număr total de articole în reviste ISI situate in top 25% (zona roșie) în calitate de autor principal. Situația revistelor în top 25% se judecă în cazul cel mai convenabil pentru candidat, fie la momentul publicării fie la data înscrierii la concurs	**≥ 4**	**4**

Nr.crt	ARTICOLE ISI (publicate in jurnale ISI situate in top 25%)
1	**Gavrila, A.I.,** Vartolomei, A., Calinescu, I., Vinatoru, M., Parvulescu, O.C., Psenovschi, G., Chipurici, P., Trifan, A. Ultrasound-Assisted Alkaline Pretreatment of Biomass to Enhance the Extraction Yield of Valuable Chemicals. Agronomy 2024, 14(5), 903. https://doi.org/10.3390/agronomy14050903, eISSN 2073-4395 (ISI, IF = 3.7) WOS:001233105800001 **Q1/2023 – AGRONOMY**
2	**Gavrila A. I.,** Zalaru C.M., Tatia R., Seciu-Grama A.M., Negrea C.L., Calinescu I., Chipurici P., Trifan A., Popa I., Green Extraction Techniques of Phytochemicals from *Hedera helix* L. and *In Vitro* Characterization of the Extracts, *Plants*, 12(22), 3908, **2023**, DOI: 10.3390/plants12223908; ISSN: 2223-7747, (ISI, IF = 4.5), WOS:001114597100001 **Q1/2023 – PLANT SCIENCES**
3	**Gavrila, A.I.,** Chisega Negrila C.G., Maholea, L., Gavrila, M.L., Parvulescu, O.C., Popa, I. Enhancing the Extraction Process Efficiency of Thyme Essential Oil by Combined Ultrasound and Microwave Techniques. *Agronomy*, 13(9), 2331, **2023**, DOI: 10.3390/agronomy13092331, eISSN 2073-4395 (ISI, IF = 3.7) WOS: 001093126200001 **Q1/2023 – AGRONOMY**
4	Asofiei I., Calinescu I., Trifan A., **Gavrila A.I.*,** A Semi-continuous process for polyphenols extraction from Sea Buckthorn Leaves, *Scientific reports*, 9(1), 1-7, **2019**, DOI: 10.1038/s41598-019-48610-6ISSN 2045-2322, (ISI, IF = 4.6), WOS:000481590200085 **Q1/2019 – MULTIDISCIPLINARY SCIENCES**

ANEXA LA FIȘA DE VERIFICARE A ÎNDEPLINIRII STANDARDELOR DE PREZENTARE LA CONCURS

– OBȚINEREA ATESTATULUI DE ABILITARE –

2. NP – număr articole în reviste ISI la care candidatul este autor principal (prim autor sau autor de corespondență),

Standarde minimale (cumulative) NP ≥ 20 conform OMECTS nr. 6129/2016; Anexa nr. 8

Condiţii minimale și obligatorii	**Minim prevăzut**	**Realizat** la data depunerii dosarului 08.02.2024
NP ≥ 20; **NP** = număr articole în reviste ISI la care candidatul este autor principal (prim autor sau autor de corespondență)	**≥ 20**	**22**

Nr. crt.	**Articole în care candidatul este autor principal (prim autor sau autor de corespondență)**	**Observații**
1	**Gavrila, A.I.,** Vartolomei, A., Calinescu, I., Vinatoru, M., Parvulescu, O.C., Psenovschi, G., Chipurici, P., Trifan, A. Ultrasound-Assisted Alkaline Pretreatment of Biomass to Enhance the Extraction Yield of Valuable Chemicals. Agronomy 2024, 14(5), 903, eISSN 2073-4395 (ISI, IF = 3.7) WOS:001233105800001	**Prim autor**
2	**Gavrila A. I.,** Zalaru C.M., Tatia R., Seciu-Grama A.M., Negrea C.L., Calinescu I., Chipurici P., Trifan A., Popa I., Green Extraction Techniques of Phytochemicals from *Hedera helix* L. and *In Vitro* Characterization of the Extracts, *Plants*, 12(22), 3908, **2023**, ISSN: 2223-7747, (ISI, IF = 4.5), WOS:001114597100001	**Prim autor**
3	**Gavrila, A.I.,** Chisega Negrila C.G., Maholea, L., Gavrila, M.L., Parvulescu, O.C., Popa, I. Enhancing the Extraction Process Efficiency of Thyme Essential Oil by Combined Ultrasound and Microwave Techniques. *Agronomy*, 13(9), 2331, **2023**, eISSN 2073-4395 (ISI, IF = 3.7) WOS: 001093126200001	**Prim autor**
4	**Gavrila**, **A.I.,** Tatia, R., Seciu-Grama, A.M., Tarcomnicu, I., Negrea, C.L., Calinescu I., Zalaru C.M., Moldovan, L., Raiciu, A.D., Popa, I. Ultrasound Assisted Extraction of Saponins from *Hedera helix* L. and an *In Vitro* Biocompatibility Evaluation of the Extracts, *Pharmaceuticals*, 15(10), 1197, **2022**, eISSN 1424-8247, (ISI, IF = 4.6) WOS:000873732500001	**Prim autor**
5	Vartolomei A., Calinescu I., Vinatoru M., **Gavrila A.I.*,** A parameter study of ultrasound assisted enzymatic esterification, *Scientific reports*, 12(1), 1421, **2022**, ISSN 2045-2322, (ISI, IF = 4.6) WOS:000749232200025	**Autor de corespondență**
6	Asofiei I., Calinescu I., Staicu V., Buliga D.I., **Gavrila A. I.*,** A strategy for enhancing the extraction yield of polyphenols from sea buckthorn leaves, *UPB Sci. Bull., Series B*, 83(2), 37- 44, **2021**, ISSN 1454 – 2331, (ISI, IF = 0.5), WOS:000661663200004	**Autor de corespondență**

7	Vartolomei A., Calinescu I., **Gavrilă A. I.*,** Vinatoru M., Ultrasound assisted synthesis of isoamyl acetate catalysed by acidic ion exchange resin, *UPB Sci.Bull., Series B*, 83(1), 113 - 124, **2021**, ISSN 1454 – 2331, (ISI, IF = 0.5), WOS:000627764100010	**Autor de corespondență**
8	Asofiei I., Calinescu I., Trifan A., **Gavrila A.I.*,** A Semi-continuous process for polyphenols extraction from Sea Buckthorn Leaves, *Scientific reports*, 9(1), 1-7, **2019**, ISSN 2045-2322, (ISI, IF = 4.6), WOS:000481590200085	**Autor de corespondență**
9	Vartolomei A., Calinescu I., Vinatoru M., **Gavrila A. I.*,** Intensification of the Enzymatic Esterification Process by Ultrasounds, *Rev de Chim*, 70(1), 41-44, **2019**, ISSN 2537-5733, (ISI, IF = 0),WOS:000400732400002	**Autor de corespondență**
10	Asofiei I., Călinescu I., Chipurici P., **Gavrilă A. I.*,** Enzymatic Pretreatment of Vegetable Materials to Increase the Extraction Yield of Bioactive Compounds, *Rev de Chim*, 69(11), 3271-3273, **2018**, ISSN: 0034-7752, (ISI, IF = 0), WOS:000451931500067	**Autor de corespondență**
11	Raducanu C.E., **Gavrila A. I.*,** Dobre T., Chipurici P., Study on alumina supported heterogeneous catalysts for biodiesel production, *Rev de Chim*, 69(8), 2138 -2143, **2018**, ISSN 2537-5733, (ISI, IF = 0), WOS:000444602300042	**Autor de corespondență**
12	Asofiei I., Calinescu I., **Gavrila A. I.*,** Ighigeanu D., Martin D., Microwave pretreatment of vegetable materials to increase the extraction yield of natural products, *Rev de chim*, 69(8), 1976 -1179, **2018**, ISSN 2537-5733, (ISI, IF = 0), WOS:000444602300011	**Autor de corespondență**
13	Chipurici P., Vlaicu A., Raducanu C. E., Bran S. D., **Gavrila A. I.*,** Biodiesel Production from Waste Oil and Its Blends with Glycerol Ketals, *Rev de chim*, 69(7), 1881-1885, **2018**, ISSN 2537-5733, (ISI, IF = 0), WOS:000444595700057	**Autor de corespondență**
14	Calinescu I., Lavric V., Asofiei I., **Gavrila A. I.*,** Trifan A., Ighigeanu D., Martin D., Matei C. Microwave assisted extraction of polyphenols using a coaxial antenna and a cooling system, *Chemical Engineering and Processing: Process Intensification*,122, 373-379, **2017,** ISSN: 0255-2701, (ISI, IF = 4.3), WOS:00041821180003	**Autor de corespondență**
15	**Gavrila A. I.,** Asofiei I., Chipurici P., Factorial design for optimization of microwave assisted synthesis of 5-hydroxymethyl-furfural, *Rev de chim*, 68(4), 639-641, **2017**, ISSN: 0034-7752, (ISI, IF = 0), WOS:000400732400002	**Prim autor**
16	**Gavrila A. I.,** Asofiei I., Trifan A., Chipurici P., Rusen E. - Microwave assisted synthesis of 5-hydroxymethylfurfural using mild reaction conditions, *Rev de chim*, 68(3),p.435-438, **2017**, ISSN 2537-5733, (ISI, IF = 0), WOS:000400731900003	**Prim autor**
17	Calinescu I., Asofiei I., **Gavrila A. I.*,** Trifan A., Ighigeanu D., Martin D., Matei C., Buleandra M., Integrating Microwave-Assisted Extraction of Essential Oils and Polyphenols from Rosemary and Thyme Leaves, *Chem. Eng. Commun.*, 204(8) p. 965-973, **2017**, (ISI, IF = 2.5), ISSN 0098-6445, WOS:000409168800016	**Autor de corespondență**
18	Pârvulescu O. C., **Gavrilă A. I.*,** Dobre T., Ceatră L., Effects of process factors on slow pyrolysis of sorghum waste, *Rev de chim*, 67(11), 2254-2257, **2016**, ISSN: 0034-7752, (ISI, IF = 0), WOS:000388361900027	**Autor de corespondență**
19	Rusen E., Diacon A., Mocanu A., **Gavrila A.*,** Dumitrescu A.M., Dinescu A. Photonic crystals band gap modulation using the pattern of	**Autor de corespondență**

	a written DVD, *Materiale plastice*, 53 (2), 185-188, **2016**, ISSN: 0025-5289, (ISI, IF = 0.8), WOS:000380629300001	
20	Asofiei I., Calinescu I., Trifan A., David I.G., **Gavrila A.I.*,** Microwave Assisted Batch Extraction of Polyphenols From Sea Buckthorn Leaves, *Chem. Eng. Commun.*, 203(12), 1547-1553, **2016**, ISSN: 0098-6445, (ISI, IF = 2.5), WOS:000387245100003	**Autor de corespondență**
21	Calinescu I., **Gavrila A. I.*,** Ivopol M., Ivopol G. C., Popescu M., Mircioaga N. Microwave assisted extraction of essential oils from enzymatically pretreated lavender (Lavandula angustifolia Miller), *Cent. Eur. J. Chem.*, (*Open Chemstry)*, 12(8), 829-836, **2014**, ISSN: 1895-1066 (ISI, IF = 2.3), WOS:000335552400003	**Autor de corespondență**
22	**Gavrilă A.,** Andersen L. Skrydstrup T., A convenient and simple procedure for the preparation of nitrate esters from alcohols employing $LiNO_3/(CF_3CO)_2O$, *Tetrahedron Lett.*, 46, 6205–6207, **2005**, ISSN: 0040-4039 (ISI, IF = 1.8), WOS:000231406400006	**Prim autor**

ANEXA LA FIȘA DE VERIFICARE A ÎNDEPLINIRII STANDARDELOR DE PREZENTARE LA CONCURS

– OBȚINEREA ATESTATULUI DE ABILITARE –

3. FIC – factor de impact cumulat (suma factorilor de impact ai revistelor la momentul înscrierii la concursul de abilitare).

Standarde minimale (cumulative): FIC ≥ 30 conform OMECTS nr. 6129/2016; Anexa nr. 8

Condiții minimale și obligatorii	**Minim prevăzut**	**Realizat** la data depunerii dosarului 08.02.2024
FIC ≥ 30; **FIC** = factor de impact cumulat (suma factorilor de impact ai revistelor la momentul înscrierii la concursul de abilitare)	**≥ 30**	**44.4808**

In acest caz in calculul FIC se ține seama de factorul de impact al revistei la care candidatul a publicat un articol ca autor principal și respectiv de factorul de impact împărțit la numărul de autori pentru revistele în care candidatul a publicat un articol în care nu este autor principal la data depunerii dosarului 08.02.2024.

Nr. Crt.	**Referința bibliografică**	**FI**	**Na**	**Autor princ.**	**FI/Na**
1	**Gavrila, A.I.,** Vartolomei, A., Calinescu, I., Vinatoru, M., Parvulescu, O.C., Psenovschi, G., Chipurici, P., Trifan, A. Ultrasound-Assisted Alkaline Pretreatment of Biomass to Enhance the Extraction Yield of Valuable Chemicals. Agronomy **2024**, 14, 903, WOS:001233105800001	3.7	8	da	3.7
2	**Gavrila A. I.,** Zalaru C.M., Tatia R., Seciu-Grama A.M., Negrea C.L., Calinescu I., Chipurici P., Trifan A., Popa I., Green Extraction Techniques of Phytochemicals from *Hedera helix* L. and *In Vitro* Characterization of the Extracts, *Plants*, 12(22), 3908, **2023**, WOS:001114597100001	4.5	9	da	4.5
3	**Gavrila, A.I.,** Chisega Negrila C.G., Maholea, L., Gavrila, M.L., Parvulescu, O.C., Popa, I. Enhancing the Extraction Process Efficiency of Thyme Essential Oil by Combined Ultrasound and Microwave Techniques. *Agronomy*, 13(9), 2331, **2023**, WOS:001093126200001	3.7	6	da	3.7
4	Vintila A.C.N., Vinatoru M., Galan A.M., Vlaicu A., Ciltea-Udrescu M., Paulenco A., **Gavrila A.I.,** Calinescu I., The Influence of Ultrasound on the Growth of *Nannochloris* sp. in Modified Growth Medium, *Life*, 13(2), 413; **2023,** WOS:000941285400001	3.2	8	nu	0.4
5	**Gavrila**, **A.I.,** Tatia, R., Seciu-Grama, A.M., Tarcomnicu, I., Negrea, C.L., Calinescu I., Zalaru C.M., Moldovan, L., Raiciu, A.D., Popa, I. Ultrasound Assisted Extraction of Saponins from *Hedera helix* L. and an *In Vitro* Biocompatibility Evaluation of the Extracts, *Pharmaceuticals*, 15(10), 1197, **2022**, WOS:000873732500001	4.6	10	da	4.6

6	Vartolomei A., Calinescu I., Vinatoru M., **Gavrila A.I.*,** 2022, A parameter study of ultrasound assisted enzymatic esterification, *Scientific reports*, 12(1), 1421, **2022**, WOS:000749232200025	4.6	4	da	4.6
7	Asofiei I., Calinescu I., Staicu V., Buliga D.I., **Gavrila A. I.*,** A strategy for enhancing the extraction yield of polyphenols from sea buckthorn leaves, *UPB Sci. Bull., Series B*, 83(2), 37- 44, **2021**, WOS:000661663200004	0.5	5	da	0.5
8	Vartolomei A., Calinescu I., **Gavrilă A. I.*,** Vinatoru M., Ultrasound assisted synthesis of isoamyl acetate catalysed by acidic ion exchange resin, *UPB Sci.Bull., Series B*, 83(1), 113 - 124, **2021**, WOS:000627764100010	0.5	4	da	0.5
9	Staicu V., Luntraru C., Calinescu I, Chisega-Negrila C.G., Vinatoru M., Neagu M., **Gavrila A. I.,** Popa I., Ultrasonic or Microwave Cascade Treatment of Medicinal Plant Waste, *Sustainability*, 13(22), **2021,** 12849, WOS:000806947700001	3.9	8	nu	0.4875
10	Asofiei I., Calinescu I., Trifan A., **Gavrila A.I.*,** A Semi-continuous process for polyphenols extraction from Sea Buckthorn Leaves, *Scientific reports*, 9(1), 1-7, **2019**, WOS:000481590200085	4.6	4	da	4.6
11	Calinescu I., Vartolomei A., **Gavrila A.I.,** Vinatoru M., Mason T.J., A reactor designed for the ultrasonic stimulation of enzymatic esterification, *Ultrasonics Sonochemistry*, (54), 32-38, **2019,** WOS:000466997500004	8.4	5	nu	1.68
12	Calinescu I., Lavric V., Asofiei I., **Gavrila A. I.*,** Trifan A., Ighigeanu D., Martin D., Matei C. Microwave assisted extraction of polyphenols using a coaxial antenna and a cooling system, *Chemical Engineering and Processing: Process Intensification*,122, 373-379, **2017,** WOS:00041821180003	4.3	8	da	4.3
13	Calinescu I., Asofiei I., **Gavrila A. I.*,** Trifan A., Ighigeanu D., Martin D., Matei C., Buleandra M., Integrating Microwave-Assisted Extraction of Essential Oils and Polyphenols from Rosemary and Thyme Leaves, *Chemical Engineering Communications*, 204(8), 965-973, **2017**, (ISI, IF = 2.5), ISSN 0098-6445, WOS:000409168800016	2.5	8	da	2.5
14	Asofiei I., Calinescu I., **Gavrila A. I ***, Ighigeanu D., Martin D., Matei C., Microwave hydrodiffusion and gravity, a green method for the essential oil extraction from ginger - energy considerations, *UPB, Sci. Bull Series B*, 79(4), 81-92. **2017,** WOS:000424134600009	0.5	6	nu	0.0833
15	Rusen E., Diacon A., Mocanu A., **Gavrila A.*,** Dumitrescu A.M., Dinescu A. Photonic crystals band gap modulation using the pattern of a written DVD, *Materiale plastice*, 53 (2), 185-188, **2016**, WOS:000380629300001	0.8	6	da	0.8
16	Asofiei I., Calinescu I., Trifan A., David I.G., **Gavrila A.I.*,** Microwave Assisted Batch Extraction of Polyphenols From Sea Buckthorn Leaves, *Chem. Eng. Commun.*, 203(12), 1547-1553, **2016**, WOS:000387245100003	2.5	5	da	2.5
17	Calinescu I., **Gavrila A. I.*,** Ivopol M., Ivopol G. C., Popescu M., Mircioaga N. Microwave assisted extraction of essential oils from enzymatically pretreated lavender (*Lavandula angustifolia Miller*), *Cent. Eur. J. Chem.*, (*Open Chemstry)*, 12(8), 829-836, **2014**, WOS:000335552400003	2.3	6	da	2.3

18	Călinescu I., Martin D., Ighigeanu D., **Gavrila A. I.,** Trifan A., Patrascu M., Munteanu C., Diacon A., Manaila E., Craciun G., Nanoparticles synthesis by electron beam radiolysis, *Cent. Eur. J. Chem*., (*Open Chemstry*) 12(7), **2014,** 774-781, WOS:000335552200006.	2.3	10	nu	0.23
19	**Gavrilă A.,** Andersen L. Skrydstrup T., A convenient and simple procedure for the preparation of nitrate esters from alcohols employing $LiNO_3/(CF_3CO)_2O$, *Tetrahedron Letters*, 46, 6205–6207, **2005**, WOS:000231406400006	1.8	14	da	1.8
20	Blakskjær P., **Gavrilă A.,** Andersen L. Skrydstrup T., An improved protocol for the SmI_2-promoted C-alkylation of peptides: degradation and functionalization of serine residues in linear and cyclic peptides, *Tetrahedron Lett.*, 45(49), 9091–9094, **2004,** WOS:000225147400031.	1.8	4	nu	0.45
21	Chipurici P., Papahagi L., Avram R., **Gavrilă A.I.,** Liquid phase oxidation of the alkylaromatic hydrocarbons, *Rev. Roum. Chim*, 47(7), **2002,** 641-645, WOS:000183386900006.	0.5	4	nu	0.125
22	Chipurici P., Papahagi L., Avram R., **Gavrilă A.I.,** Liquid phase oxidation of the alkylaromatic hydrocarbons, *Rev. Roum. Chim*, 47(7), **2002**, p.641-645, WOS:000183386900006.	0.5	4	nu	0.125
FACTORUL DE IMPACT CUMULAT (FIC)					**44.4808**

ANEXA LA FIȘA DE VERIFICARE A ÎNDEPLINIRII STANDARDELOR DE PREZENTARE LA CONCURS

– OBȚINEREA ATESTATULUI DE ABILITARE –

4. NC - Număr total de citări din baza SCOPUS.

Standarde minimale (cumulative): NC ≥ 120 conform OMECTS nr. 6129/2016; Anexa nr. 8

Lista de citări din baza de date SCOPUS

Condiții minimale și obligatorii	**Minim prevăzut**	**Realizat** la data depunerii dosarului 08.02.2024
NC ≥ 120 **NC** = număr total de citări (din baza SCOPUS)	**≥ 120**	**231**

1. **Gavrila, A.I.,** Chisega Negrila C.G., Maholea, L., Gavrila, M.L., Parvulescu, O.C., Popa, I. Enhancing the Extraction Process Efficiency of Thyme Essential Oil by Combined Ultrasound and Microwave Techniques. *Agronomy*, 13(9), 2331, **2023**, WOS:001093126200001 (1 citare fără autocitările candidatei)

1/1. Kowalski, R.; Kowalska, G.; Mitura, P.; Rowi´ nski, R.; Pankiewicz, U.; Hawlena, J. The Effect of Peppermint and Thyme Oils on Stabilizing the Fatty Acid Profile of Sunflower Oil, *Molecules* 29(2),292, (**2024)**, DOI: 10.3390/molecules29020292.

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ANEXA LA FIȘA DE VERIFICARE A ÎNDEPLINIRII STANDARDELOR DE PREZENTARE LA CONCURS

– OBȚINEREA ATESTATULUI DE ABILITARE –

5. NCO – număr contracte de cercetare-dezvoltare-inovare obținute prin competiție la nivel național sau internațional ori contracte de cercetare-dezvoltare-inovare cu terții în valoarea minimă echivalentă cu 10.000 euro (în calitate de director).

Standarde minimale (cumulative) NCO ≥ 1 conform OMECTS nr. 6129/2016; Anexa nr. 8

Condiţii minimale și obligatorii	**Minim prevăzut**	**Realizat** la data depunerii dosarului 08.02.2024
NCO > = 1 (în calitate de Director proiect)	**1**	**1**

Lista a fost realizată în conformitate cu prevederile OMECTS nr. 6129/2016; Anexa nr. 8 – Comisia de Inginerie Chimică, Inginerie Medicală, Știința Materialelor și Nanomateriale, Comisia CNATDCU Nr. 8.

PROIECT	**Suma**	**Director/responsabil proiect**
179ARUT/2023 **Fitoextracte încapsulate din plante autohtone cu proprietăţi neuroprotectoare** FitoNeuroPro **(2023-2024),** https://crescdi.pub.ro/#/profile/553	**49 752 lei /10000 euro**	director proiect
381PED/2020 **Tehnologii de obținere a unor produse naturale cu proprietăți imunostimulatoare** IMUNOSTIM **(2020-2022)** https://crescdi.pub.ro/#/profile/553	**100000 lei /11000 euro**	responsabil proiect UPB

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A Semi-Continuous Process For Polyphenols Extraction From Sea Buckthorn Leaves

Ioana Asofiei, Ioan Calinescu, Adrian Trifan & Adina Ionuta Gavrila

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Abstract

Sea buckthorn (*Hippophae Rhamnoides L.*) is an important source of bioactive compounds such as: antioxidants, vitamins, fatty acids, amino acids, and minerals. Sea buckthorn leaves extracts have been proved to have anti-microbial, antioxidant, anti-inflammatory, and anti-viral properties. In this paper, the extraction of polyphenols from sea buckthorn leaves using a semi-continuous small-scale reactor is described. The extraction conditions must not affect the composition and structure of polyphenols. For this reason, the influence of different parameters (residence time, solvent flow rate, stirring rate, reactor type, and solvent pre-heating) on the extraction process were studied. The polyphenolic extracts were analyzed in order to determine the total phenolic content (TPC), the antioxidant capacity and the

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Authors and Affiliations

Department of Bioresources and Polymer Science, Faculty of Applied Chemistry and Material Science, University Politehnica of Bucharest, 1-7 Gh. Polizu Str., 011061, Bucharest, Romania

Anamaria Vartolomei, Ioan Calinescu, Mircea Vinatoru & Adina Ionuta Gavrila

Contributions

A.V. and A.I.G. performed the enzymatic esterifications, investigation, writing original draft; I.C. methodology, writing—review and editing; M.V. provided supervision for experimental work and manuscript preparation.

Corresponding author

Correspondence to Adina Ionuta Gavrila.

A parameter study of ultrasound assisted enzymatic esterification

By Vartolomei, A (Vartolomei, Anamaria) [1] ; Calinescu, I (Calinescu, Ioan) [1] ; Vinatoru, M (Vinatoru, Mircea) [1] ; Gavrila, AI (Gavrila, Adina Ionuta) [1]

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Abstract This work is focused on the study of the esterification parameters for the ultrasound assisted synthesis of isoamyl acetate catalyzed by lipase Lipozyme 435 in a continuous loop reactor. Investigating the influence of different parameters shows that a higher concentration of ester (462 mg/g mixture) can be obtained at a temperature of 50 degrees C, flow rate 0.16 mL/min. The best ultrasonication conditions are: sonication applied continuously for a short time (20 min), ultrasound power 32 mW and amplitude 20%. The enzyme can be successfully reused tree times without loss of enzyme activity. Reaction kinetics for isoamyl acetate ultrasound assisted production showed that satisfactory reaction concentration (close to the equilibrium concentrations) could be reached in short reaction times (2 h). Ultrasound assisted enzymatic esterification is consequently a cleaner and a faster process.

Keywords **Keywords Plus:** ACETIC-ACID; STABILITY; ENZYMES; IMMOBILIZATION; ENHANCEMENT; ALCOHOL

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Univ Politehn Bucuresti, Fac Appl Chem & Mat Sci, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu Str, Bucharest 011061, Romania

Addresses :

[1] Univ Politehn Bucuresti, Fac Appl Chem & Mat Sci, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu Str, Bucharest 011061, Romania

E-mail Addresses : adina.gavrila@upb.ro

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A Semi-Continuous Process For Polyphenols Extraction From Sea Buckthorn Leaves

Ioana Asofiei, Ioan Calinescu, Adrian Trifan & Adina Ionuta Gavrila

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Abstract

Sea buckthorn (*Hippophae Rhamnoides L.*) is an important source of bioactive compounds such as: antioxidants, vitamins, fatty acids, amino acids, and minerals. Sea buckthorn leaves extracts have been proved to have anti-microbial, antioxidant, anti-inflammatory, and anti-viral properties. In this paper, the extraction of polyphenols from sea buckthorn leaves using a semi-continuous small-scale reactor is described. The extraction conditions must not affect the composition and structure of polyphenols. For this reason, the influence of different parameters (residence time, solvent flow rate, stirring rate, reactor type, and solvent pre-heating) on the extraction process were studied. The polyphenolic extracts were analyzed in order to determine the total phenolic content (TPC), the antioxidant capacity and the

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Authors and Affiliations

Faculty of Applied Chemistry and Materials Science, Department of Bioresources and Polymer Science, 1-7 Gh. Polizu, Bucharest, Romania

Ioana Asofiei, Ioan Calinescu, Adrian Trifan & Adina Ionuta Gavrila

Contributions

I.C. and A.T. designed the experiments, while I.A. and A.I.G. wrote the main manuscript text and prepared the figures. All authors reviewed the manuscript.

Corresponding author

Correspondence to Adina Ionuta Gavrila.

Ethics declarations

Competing Interests

The authors declare no competing interests.

A Semi-Continuous Process For Polyphenols Extraction From Sea Buckthorn Leaves

By Asofiei, I (Asofiei, Ioana) [1] ; Calinescu, I (Calinescu, Ioan) [1] ; Trifan, A (Trifan, Adina) [1] ; Gavrila, AI (Gavrila, Adina Ionuta) [1]

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Abstract Sea buckthorn (Hippophae Rhamnoides L.) is an important source of bioactive compounds such as: antioxidants, vitamins, fatty acids, amino acids, and minerals. Sea buckthorn leaves extracts have been proved to have anti-microbial, antioxidant, anti-inflammatory, and anti-viral properties. In this paper, the extraction of polyphenols from sea buckthorn leaves using a semi-continuous small-scale reactor is described. The extraction conditions must not affect the composition and structure of polyphenols. For this reason, the influence of different parameters (residence time, solvent flow rate, stirring rate, reactor type, and solvent pre-heating) on the extraction process were studied. The polyphenolic extracts were analyzed in order to determine the total phenolic content (TPC), the antioxidant capacity and the concentration of the main phenolic compounds. The TPC increases with the stirring rate. Pre-heating the solvent leads to a better yield and reduced residence time. The antioxidant capacity is in concordance with the TPC results. HPLC analysis confirms that the semi-continuous microwave assisted extraction (MAE) does not affect the composition of the extracts. The energy consumption was significantly lower for MAE compared with conventional extraction (CE).

Keywords **Keywords Plus:** MICROWAVE-ASSISTED EXTRACTION; SUPERCRITICAL-FLUID EXTRACTION; ELECTRIC-FIELD TREATMENT; BETA-CAROTENE; ANTIOXIDANT; BATCH

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Fac Appl Chem & Mat Sci, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu, Bucharest, Romania

Addresses :

[1] Fac Appl Chem & Mat Sci, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu, Bucharest, Romania

E-mail Addresses : adinagav@yahoo.com

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5)

A STRATEGY FOR ENHANCING THE EXTRACTION YIELD OF POLYPHENOLS FROM SEA BUCKTHORN LEAVES

By Asofiei, I (Asofiei, Ioana) [1] ; Calinescu, J (Calinescu, Joan) [1] ; Staicu, V (Staicu, Vasile) [2] ; Buliga, DI (Buliga, Diana-Ioana) [1] ; Gavrila, AI (Gavrila, Adina Ionuta) [1]

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Abstract In this paper, the influence of enzymatic pretreatment on the microwave assisted extraction (MAE) of polyphenols from sea buckthorn leaves is described. Different parameters, such as enzyme concentration, extraction time, and type of enzyme were studied. Comparative extractions without enzymatic pretreatment were carried out. The best results were achieved for an enzyme concentration of 1% and an extraction time of 300 s. The Glucanex enzyme led to a higher total phenolic content (TPC) compared with Ultrazyme and Carezyme.

Keywords **Author Keywords:** enzymatic pretreatment; microwave; polyphenols; sea buckthorn

Keywords Plus: MICROWAVE-ASSISTED EXTRACTION; ELECTRIC-FIELD TREATMENT; ANTIOXIDANT; PHENOLICS; OPTIMIZATION; FRUITS; JUICE; ACID

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, Bucharest, Romania

Addresses :

1 Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, Bucharest, Romania

2 SC Hofigal Export Import SA, Bucharest, Romania

E-mail Addresses : asofiei.ioana@yahoo.com; ioan.calinescu@upb.ro; vasile.staicu@yahoo.ro; dianaioana.buliga@yahoo.com; adinagav@yahoo.com....

A STRATEGY FOR ENHANCING THE EXTRACTION YIELD OF POLYPHENOLS FROM SEA BUCKTHORN LEAVES

Ioana ASOFIEI[1], Ioan CALINESCU[2], Vasile STAICU[3], Diana-Ioana BULIGA[4], Adina Ionuta GAVRILA[5]*

In this paper, the influence of enzymatic pretreatment on the microwave assisted extraction (MAE) of polyphenols from sea buckthorn leaves is described. Different parameters, such as enzyme concentration, extraction time, and type of enzyme were studied. Comparative extractions without enzymatic pretreatment were carried out. The best results were achieved for an enzyme concentration of 1% and an extraction time of 300 s. The Glucanex enzyme led to a higher total phenolic content (TPC) compared with Ultrazyme and Carezyme.

Keywords: enzymatic pretreatment, microwave, polyphenols, sea buckthorn

1. Introduction

Sea buckthorn (*Hippophae Rhamnoides* L.), which belongs to *Elaeagnaceae* family, is a nitrogen-fixing bush widely found in temperate and subtropical areas. All its parts are rich in a wide range of bioactive compounds, such as tocopherols, carotenoids, polyphenols, sterols, vitamins, lipids, and minerals [1, 2]. These components are useful in medicinal and pharmaceutical applications due to the antioxidant, anti-inflammatory, antibacterial, antiviral, and antitumor properties [3].

Polyphenols are valuable metabolites synthesized by plants which can act as antioxidants, protective agents against UV light, phytoalexins and attractants for pollinators [4-6]. Conventional extraction methods of non-volatile bioactive compounds are Soxhlet extraction and maceration. These methods present low efficiency due to high temperatures or long extraction times that could lead to degradation of valuable constituents and require high consumption of organic

[1] Lecturer., Dept. of Bioresources and Polymer Science, University POLITEHNICA of Bucharest, Romania, e-mail: asofiei.ioana@yahoo.com
[2] Prof., Dept. of Bioresources and Polymer Science, University POLITEHNICA of Bucharest, Romania, e-mail: ioan.calinescu@upb.ro
[3] Eng., S.C. Hofigal Export Import SA, Romania, e-mail: vasile.staicu@yahoo.ro
[4] PhD student, Dept. of Bioresources and Polymer Science, University POLITEHNICA of Bucharest, Romania, e-mail: dianaioana.buliga@yahoo.com
[5] Assoc. Prof., Dept. of Bioresources and Polymer Science, University POLITEHNICA of Bucharest, Romania, e-mail: adinagav@yahoo.com
* Corresponding author, e-mail: adinagav@yahoo.com

6)

ULTRASOUND ASSISTED SYNTHESIS OF *ISOAMYL* ACETATE CATALYSED BY ACIDIC ION EXCHANGE RESIN

By Vartolomei, A (Vartolomei, Anamaria) [1] ; Calinescu, J (Calinescu, Joan) [1] ; Gavrila, Al (Gavrila, Adina Ionuta) [1] ; Vinatoru, M (Vinatoru, Mircea) [1]

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Abstract Esterification of acetic acidic with isoamyl alcohol in heterogeneous phase was performed in the presence of acidic ion exchange resin. A method of enhancing the performance of resin is the use of ultrasounds. In the present paper a study on ultrasound-assisted esterification catalyzed by cation exchange resin for flavor esters preparation using a continuously micro-reactor is presented. The method is efficient and friendly for the environment, and it has shown significant improvements compared to conventional method.

Keywords **Author Keywords:** isoamyl acetate; ultrasound; ion exchange resin; heterogeneous esterification

Keywords Plus: CANDIDA-ANTARCTICA LIPASE; PACKED-BED; ENZYMATIC-SYNTHESIS; ESTERIFICATION; OPTIMIZATION; CAVITATION; STABILITY

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Univ Politehn Bucuresti, Fac Appl Chem & Mat Sci, Bioresources & Polymer Sci Dept, Bucharest, Romania

Addresses :

[1] Univ Politehn Bucuresti, Fac Appl Chem & Mat Sci, Bioresources & Polymer Sci Dept, Bucharest, Romania

E-mail Addresses : anamaria111@gmail.com; ioan.calinescu@upb.ro; adinagav@yahoo.com; mircea.vinatoru@gmail.com

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ULTRASOUND ASSISTED SYNTHESIS OF *ISO*AMYL ACETATE CATALYSED BY ACIDIC ION EXCHANGE RESIN

Anamaria VARTOLOMEI[1], Ioan CALINESCU[2], Adina Ionuta GAVRILA[3]*, Mircea VINATORU[4]

Esterification of acetic acidic with isoamyl alcohol in heterogeneous phase was performed in the presence of acidic ion exchange resin. A method of enhancing the performance of resin is the use of ultrasounds. In the present paper a study on ultrasound-assisted esterification catalyzed by cation exchange resin for flavor esters preparation using a continuously micro-reactor is presented. The method is efficient and friendly for the environment, and it has shown significant improvements compared to conventional method.

Keywords: isoamyl acetate, ultrasound, ion exchange resin, heterogeneous esterification

1. Introduction

Isoamyl acetate is a strong flavor used in the food industry, the banana flavor, chemically obtained from an alcohol and an organic acid in the presence of an acid catalyst or by extraction from natural sources. The isoamyl alcohol ester, especially isoamyl acetate, has numerous industrial applications [1]. As an artificial flavor, it has uses in foods with an artificial flavor of banana and pear, for the preservation of carbonated juices, as an additive added to cigarettes, is used also as solvent for tannins, nitrocelluloses, lacquer, celluloses and camphor. The isoamyl acetate also finds applications in the production of celluloid cements, waterproof lacquer, silk, leather or artificial pearls, for photographic films, metallic paints and bronzing liquids [2-4].

[1] PhD Student, Bioresources and Polymer Science Department, Faculty of Applied Chemistry and Materials Science, University POLITEHNICA of Bucharest, Romania, e-mail: anamaria111@gmail.com

[2] Prof., Bioresources and Polymer Science Department, Faculty of Applied Chemistry and Materials Science, University POLITEHNICA of Bucharest, Romania, Romania, e-mail: ioan[illegible]@upb.ro

[3]* Assoc. Prof., Bioresources and Polymer Science Department, Faculty of Applied Chemistry and Materials Science, University POLITEHNICA of Bucharest, Romania, *Corresponding author, e-mail: adinagav@yahoo.com

[4] Bioresources and Polymer Science Department, Faculty of Applied Chemistry and Materials Science, University POLITEHNICA of Bucharest, Romania, e-mail: mircea.vinatoru@gmail.com

8)

Intensification of the Enzymatic Esterification Process by Ultrasounds

ANAMARIA VARTOLOMEI, IOAN CALINESCU, MIRCEA VINATORU, ADINA IONUTA GAVRILA*
University Politehnica of Bucharest, Faculty of Applied Chemistry and Materials Science, Pi[illegible]ources and Polymer Science Department, 1-7 Gh. Polizu Str., 011061, Bucharest, Romania

Ultrasound application is a method of enhancing the performance of biocatalysts. Enzymes performance is strongly influenced by the nature of the reaction medium. Ultrasounds have the potential to significantly influence the activity of the enzymatic processes, provided that the energy input is not too high to inactivate the enzyme. In the present paper a systematic study on ultrasound-assisted enzymatic esterification for aroma esters preparation is described. Thus, by ultrasound assisted enzymatic esterification i-amyl acetate was obtained. The method is efficient, mild, and environmentally benign. Significant improvements were obtained in comparison to conventional method. The results show a favourable perspective of the ultrasound technique to improve the process efficiency and reduce the reaction time. The commercial aroma esters synthesis will be potentially realized due to this ultrasound-promoted esters synthesis method.

Keywords: ultrasounds, enzyme, esterification, i-amyl acetate

Organic esters are important compounds with special properties used as solvents, perfumes, and flavours. Specialty esters are synthesized by esterification of the short chain carboxylic acids (such as acetic, propionoic, and butyric acids) with alcohols (such as ethanol, butanol, *i*-amylic alcohol, geraniol, menthol, citronelol, etc) and they are widely used as flavors and fragrances in the food, pharmaceutical and cosmetic products [1]. Flavours are used in soaps, deodorants, shampoos, creams, and shower gels, and fragrances are used in lipsticks, toothpaste, lip gloss and lip balms [2]. Among these specialty esters, *i*-amyl esters (especially *i*-amyl acetate) are of commercial importance due to the strong banana flavour. They can be used in a variety of foods, such as honey, artificial coffee and beverages (especially fermented alcoholic beverages, such as beer, sake, and wines) [3].

Flavour esters can be extracted directly from natural sources, but this method is relatively expensive by comparison with classical chemical esterification that is cheaper and faster. The classical method for the synthesis of *i*-amyl acetate is the Fischer esterification reaction. The reaction is carried out at high temperature using concentrated acids as catalyst. This ester can be prepared by the reaction of a carboxylic acid with *i*-amyl alcohol in the presence of a catalyst such as concentrated sulfuric acid, hydrochloric acid, p-toluene sulfonic acid, or the acid ion exchange resin. The equilibrium of this Fischer esterification is reached after a few hours of refluxing. The position of the equilibrium can be shifted by adding more acid or alcohol, depending on cost or availability [4].

These conventional chemical methods present some disadvantages like low purity of products, using acids as catalysts, necessity of high temperatures leading to unsafe and sometimes inefficient methods, unwanted in food and cosmetics preparations. The biotechnological methods using enzymes as catalysts offer an opportunity to perform enzymatic esterification under milder conditions with a better quality of the esters [5-9].

Enzymatic esterifications for aroma and perfumes synthesis are carried out using lipases as biocatalysts. Thus, various lipases are used for preparation these specialty esters such as *Rhizopus oryzae*, *C. antarctica*, *T. lanuginosus*, *P. fluorescens*, *R. japonicus*, *Candida rugosa*, and *Staphylococcus simulans* [2]. *i*-Amyl acetate (banana aroma) was prepared using *Rhizopus miehei* as the esterification biocatalyst, and conversions were higher than 95% (reaction time: 72 hours, reaction temperature: 40°C in the presence of *n*-heptane as solvent) [10,11]. Another aroma ester *n*-amyl butyrate was synthetized using immobilized *Candida rugosa* lipase and the yield was over 90% with (reaction time 48 h and *n*-hexane solvent) [3,12].

Ultrasounds (US) with frequencies ranging from 20 kHz up to 5 MHz are a type of mechanical energy which do not exhibit ionizing radiation properties. The propagation of ultrasound in the fluids generates waves and produces successive compression and rarefaction cycles. When the ultrasonic power exceeds a certain value in the rarefaction phase the molecules of fluids are pulled apart and as consequence cavitation bubbles are formed. Bubbles thus generated are not stable and suffer a sudden collapse releasing tremendous amount of energy in a very localized space volume when the amplitude of acoustic pressure exceeds a thresholds e.g. 0.06-0.1 MPa for distilled water [13,14]. During cavitation bubbles collapse, the temperature and pressure inside the bubbles reach more than 5000 K and 1000 atm [14,15]. In the presence of the small solid surfaces (heterogeneous reactions), the collapse of bubbles near the solid surface leads to formation of microjets which improve the mass transfer and speed up the transport processes [16]. At low acoustic pressure, microbubbles of various sizes present in a liquid could be forced to oscillate in response to alternating pressure waves of ultrasound, without cavitation. Such oscillations generate shear forces and enhance fluid flow and mass transfer that could be used in various chemical processes [17,18].

The ultrasounds frequency and power have an influence on the cavitation bubbles collapse and consequently affect the enzyme activity by three main mechanisms. First effect is pure thermal, due to the rising of the temperature during cavitation. Free radicals generated by water or other polar liquids sonolysis represent the second effect, and the third effect is produced by mechanical shear forces formed by microstreaming and shock [19]. Therefore, ultrasounds can influence the activity of enzymes in the esterification processes if the input energy is not too high to produce the deactivation of enzyme, mostly via the third effect. Applying a high ultrasonic power can lead to cell destruction being considered as microbicide, while low power increases the

* email: email: adinagav@yahoo.com

9)

Enzymatic Pretreatment of Vegetable Materials to Increase the Extraction Yield of Bioactive Compounds

IOANA ASOFIEI, IOAN CALINESCU, PETRE CHI[illegible]RICI, ADINA IONUTA GAVRILA*
University Politehnica of Bucharest, Faculty of Appli[illegible]ce,1-7 Gh. Polizu Str., Bucharest, 011061, Romania

In this paper, the influence of enzymatic pretreatment on the microwave assisted extraction (MAE) of polyphenols from artichoke leaves is described. Prior to enzymatic pretreatment, the influence of different parameters (extraction time, stirring rate, and extraction temperature) on the extraction process was studied. The total phenolic content (TPC) increases with the stirring rate. To avoid degradation of polyphenols, the extraction time and temperature should not be too high. The antioxidant capacity is in concordance with the TPC results. The enzymatic pretreatment, for the best extraction conditions, enhances the concentration of polyphenols compared with the extracts obtained without pretreatment.

Keywords: enzymatic pretreatment, polyphenols, artichoke, microwave assisted extraction

Artichoke (*Cynara scolymus* L.) is originated from the southern Mediterranean parts of North Africa and is widely grown in Europe or America [1].

Globe artichoke is grown for its immature inflorescence which is consumed as vegetable, due to its healthpromoting compounds and sensory properties. The residues, namely leaf and stem, represent 80-85% of the above ground biomass [2, 3]. The bioactive compounds of artichoke are mainly polyphenols, as well as inulin [4], fibres and minerals that provide pharmaceutical and nutritional properties. Caffeic acid derivatives are the main phenolic compounds in artichoke heads and leaves. Besides them artichoke contains other phenolic acids (ferulic and coumaric acids), apigenin, luteolin, etc. [5].

Classical extraction methods of active principles are Soxhlet extraction [6], maceration [7] and heat reflux extraction [8]. These methods require expensive organic solvents with relatively high consumption, long extraction times, and high temperatures that could lead to degradation of valuable constituents. More convenient techniques such as pressurized fluid extraction (PFE), ultrasound assisted extraction (UAE), pulsed electric field (PEF), supercritical fluid extraction (SFE) and microwave assisted extraction (MAE) were recent presented [9-11].

Due to the combination of extraction technique with microwave heating, MAE is a promising technology for the extraction of bioactive compounds from vegetal material. The advantages of MAE are a shorter extraction time, high extraction efficiency and selectivity, good control of heating process, better extraction yield and low energyconsumption [11-14].

The efficiency of the extraction process is influenced by the interactions between bioactive molecules and sample matrix and by the diffusion of solvent through the plant matrix. Thus, the structure of the material is an important factor influencing the extraction efficiency and any means to modify the structure to enhance the extraction is attractive. Considering the latter, a quite new strategy to enhance the extraction of bioactive compounds from plant is the enzymatic pretreatment [15]. The purpose of the enzyme is to break or soften the cell walls. Thus, the bioactive compounds have an easier access to the solvent [16,17]. Enzymes such as glucuronidases, cellulases, hemicellulases, pectinases, glucanases, amylases, and tannases have already been used to break the carbohydrate linkages and to decompose the cell wall structure [18].

The purpose of this work was to study the influence of enzymatic pretreatment and different parameters (extraction time, stirring rate, and extraction temperature) on the microwave assisted extraction of polyphenols from artichoke leaves.

Experimental part

Materials

Artichoke leaves (*Cynara cardunculus* L.) were harvested in the summer of 2014 at Hofigal S.A. in Furculesti. The fresh leaves were dried in an air flow-heating oven at 60°C to a constant weight and stored at 4-5°C until they were used for the extraction of phenolic compounds. Folin Ciocalteu reagent (Merck), ethanol and sodium carbonate were analytical purity grade. Reagents for antioxidant capacity, Trolox (6-hydroxy-2,5,7,8-tetramethychroman-2-carboxylic acid), ABTS (2,2-azinobis(3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt), and potassium persulfate were purchased from Sigma-Aldrich. The enzymes (Celluclean 400 L, Flavourzyme 1000 L, Glucanex, and Ultrazyme 100T) were kindly donated by Novozymes A/S (Denmark).

Extraction procedure

The microwave assisted extraction (MAE) of polyphenolic compounds was carried out in a microwave applicator (Biotage Initiator). The extractions were carried out in triplicate using a 20:1 ratio of solvent to plant. The extraction solvent was a mixture of 50% ethanol in water. The experiments were performed at different temperatures (40, 60 and 80°C) and stirring rates (300, 600 and 900 rpm). Individual experiments were performed considering the following extraction times: 5, 7.5, 10, 15 min. After the extraction, the mixture was centrifuged at 3000 rpm for 10 min at room temperature and the supernatant was collected and fresh analysed every time.

Enzymatic pretreatment procedure

Artichoke leaves were mixed with the pretreatment solution (a buffer solution containing 0.1 M citric acid and

*email: adinagav@yahoo.com

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Study on Alumina Supported Heterogeneous Catalysts for Biodiesel Production

CRISTIAN EUGEN RADUCANU, ADINA IONUTA GAVRILA*, TANASE DOBRE, PETRE CHIPURICI
[1] University Politehnica of Bucharest, Faculty of Applied Chemistry and Materials Science, Chemical and Biochemical Engineering Department, 1-7 Gh. Polizu Str., 011061, Bucharest, Romania
[2] University Politehnica of Bucharest, Faculty of Applied Chemistry and Materials Science, Bioresources and Polymer Science Department, 1-7 Gh. Polizu Str., 011061, Bucharest, Romania

In this work four heterogeneous catalysts were studied first by preparing a γ-alumina catalytic support then by impregnating with acidic and base compounds to gain certain properties needed to catalyze vegetable oils conversion to biodiesel. The resulted new catalytic properties allowed us to simultaneously conduct esterification and transesterification reaction in a single step when waste cooking oils with a high free fatty acid content were converted to biodiesel. The prepared catalysts were thermally and chemically stable and exhibited good catalytic activity when tested in (trans)esterification reactions to yield biodiesel. The effects of catalyst loading, methanol/oil molar ratio and reaction time on biodiesel yield along with catalyst reusability were investigated. The highest biodiesel yield reached was 88.10% at 65°C reaction temperature, 15:1 methanol/oil molar ratio, 5% catalyst loading and 4 h reaction time.

Keywords: heterogeneous catalyst; γ-alumina, biodiesel; oil conversion, green process

Biofuels along with hydro, wind or solar energy should be considered by now important pieces in any national energy mechanism that develops economic and security strategies. Among biofuels biodiesel is the second most used and produced biofuel by a technology that, in more than 70% of industrial processes, uses fresh oil as feedstock and homogeneous catalyzed transesterification reaction to convert this conflictual feedstock to biodiesel [1-7]. Heterogeneous catalysts can transform this conventional technology into a more sustainable process: second generation fatty acid enriched feedstock can be converted, improved separation and non-toxic products purification can be realized and important energy costs can be reduced [2,5,8-11].

Versatility, thermal stability and chemical stability are key characteristics of an efficient catalytic support to design a heterogeneous catalyst for transesterification reaction to convert vegetable oils to biodiesel. Activated carbon was extensively studied lately, because of its variety of sources like biomass residues, *e.g.*, agricultural and forestry wastes, algal biomass, and because of its numerous functional groups that help binding different key chemical species. Easy to prepare, usually by slow pyrolysis, activated carbon ensures a relatively high specific surface area and a well developed porosity in applications that require an enhanced selectivity [12-17]. Alumina, commonly in form of γ-Al_2O_3, is also an extremely versatile catalytic support due to its Al-O network that easily allows chemical binding of specific chemical compounds to catalyze specific chemical reactions. These catalytic supports are then used to build catalysts by different methods like impregnation method or precipitation [12]. Various metallic oxides (ZnO, CaO or MgO) were successfully used to catalyze alkali transesterification and various acidic catalysts were studied in vegetable oils conversion to biodiesel, using fresh or waste oils as feedstock [18-24].

In this work heterogeneous catalysts were prepared and tested in a laboratory scale biodiesel production. Catalyst preparing involved the use of a catalytic support, also synthesized in this work, and adding onto it base and acidic compounds for the particularly properties needed to convert oils to biodiesel in a single step reaction [6].

Experimental part

Materials

The following materials have been used in experimental research: $Al_2(SO_4)_3$ and NH_3 solution for γ-alumina catalytic support preparation; KOH, $Mg(NO_3)_2 \cdot 6H_2O$, $Ca(CH_3COO)_2 \cdot H_2O$, $(NH_4)_6Mo_7O_{24} \cdot 4H_2O$, $Mn(NO_3)_2 \cdot 6H_2O$ for catalysts preparation; phenophtalein, Hannus Reagent, $Na_2S_2O_3$, KI, HCl, NaOH, ethyl ether, ethanol, starch indicator solution for feedstock analysis; methanol (99%), fresh sun flower, palm waste cooking oil (PWCO), rapeseed waste cooking oil (RWCO), fresh palm oil (FPO) and fresh rapeseed oil (FRO) for biodiesel production. Prior to catalyst testing in methanolysis reaction, the vegetable oils used as feedstock were analyzed (table 1).

Equipment and procedure

Catalytic support preparation

Catalyst preparation started with catalytic support synthesis according to a pre-established protocol

Vegetable oil	Acid value (mgKOH/g)	Iodine value (gIodine/cg)	Saponification value (mgKOH/g)	FFA (%)
Fresh sun flower oil	0.05	128.00	193.00	-
PWCO	7.13	65.30	201.85	5.45
RWCO	9.09	98.00	199.59	4.31
FRO	0.91	63.19	187.14	0.45

Table 1
CHARACTERISTIC PARAMETERS OF VEGETABLE OILS

* email: adinagav@yahoo.com

11)

Microwave Pretreatment of Vegetable Materials to Increase the Extraction Yield of Natural Products

IOANA ASOFIEI[1], IOAN CALINESCU[1], ADINA IONUTA GAVRILA[1]*, DANIEL IGHIGEANU[2], DIANA MARTIN[3]
[1]University Politehnica of Bucharest, Faculty of Applied Chemistry and Material Science, 1-7 Gh. Polizu Str., 011061, Bucharest, Romania
[2]National Institute for Lasers, Plasma and Radiation Physics, 409 Atomistilor Str., 077125, Magurele, Romania
[3] SC HOFIGAL SA, 2 Intrarea Serelor Str., 042124, Bucharest, Romania

It was designed and built a laboratory experimental installation (LEI) for the microwave pretreatment of vegetable materials. To study the influence of microwave pretreatment on the total phenolic content (TPC), a conventional extraction of polyphenols from treated and untreated fresh sea buckthorn leaves was performed. For short extraction times, the amount of phenolic compounds was higher for the extracts obtained from treated leaves, but a long pretreatment time (28 s) led to a decrease in TPC. The qualitative analysis showed that the chemical composition is not affected by the microwave pretreatment.

Keywords: microwave pretreatment, polyphenols, sea buckthorn

A general definition of green chemistry is developing strategies to reduce or to eliminate the use and generation of hazardous substances. An example of this concept is represented by the sustainable transformation of biomass into building blocks (such as ethanol, lactic acid, levulinic and succinic acids, 5-hydroxymethilfurfural, etc.) [1-3]. Considering the latter, the concept of green extraction can be defined as follow: developing extraction techniques which will allow the use of alternative solvents and renewable natural products and ensure a safe and high quality of extract [4].

Bioactive compounds from different parts of medicinal plants (flowers, leaves, fruits, peels, seeds) are beneficial for human health. Due to their biological activity, polyphenolic compounds are among the most important bioactive molecules [5].

Sea buckthorn (genus *Hippophae*) is a small tree of *Elaeagnaceae* family which grows in different regions of Europe and Asia [6,7]. All parts of sea buckthorn shrub are valuable because they contain a variety of bioactive compounds with medicinal and nutritional potential [8-12].

Sea buckthorn leaves are rich in polyphenolic compounds such as: catechins, p-coumaric acid, caffeic acid, gallic acid, quercetin, kaempferol, isorhamnetin, myricetin, and their glycosides [13,14]. Distribution of phenolic compounds in plants is not uniform. Insoluble compounds are found in the cell walls and soluble components are within the plant cell vacuoles. The external layers of plants contain higher amounts of polyphenols than those located inside the plant parts [15,16].

Extraction of polyphenols from plant tissues is accomplished by conventional methods (maceration, Soxhlet extraction) or using unconventional methods such as microwave assisted extraction, ultrasound assisted extraction [17], supercritical fluid extraction, etc. The efficiency of the extraction process is influenced by the interactions between sample matrix and bioactive molecules as well as by the diffusion of solvent through the plant matrix [18].

Since the structure of the material is a key factor influencing the extraction efficiency, any means to modify the structure to enhance the extraction is attractive [19]. It is indeed recognized that sample pretreatment significantly affects the microstructure of a plant material and the release of nutrients [20,21]. The extraction efficiency of polyphenols from plant material can be improved by applying a microwave pretreatment. During the microwave pretreatment, the water present within the cells of the vegetable material evaporates, generating a high pressure against the walls of the cell. Due to the high pressure, the cell walls are destroyed and the compounds migrate easier from the plant cells [22].

The purpose of this work was to study the effect of microwave pretreatment in order to improve the extraction yield of polyphenols from sea buckthorn leaves prior to conventional extraction.

Experimental part

Materials

Fresh sea buckthorn leaves (*HippophaeRhamnoides L.*) were harvested at the beginning of June 2015 at Hofigal S.A. in Bucharest. Folin - Ciocalteu reagent (Merck), ethanol, and sodium carbonate were analytical purity grade. For the HPLC quantification of phenolic compounds, the following standards were used: gallic acid, caffeic acid, chlorogenic acid, catechin, ferulic acid, p-coumaric acid, and rutin from Sigma-Aldrich.

Microwave pretreatment equipment

A laboratory experimental installation (LEI) was specially designed and built for microwave pretreatment of plants before the extraction of bioactive compounds. It consists mainly of the following units (fig. 1): a magnetron (MAG) of 2.45 GHz with adjustable output power (0-700 W) generated as 10 ms pulses at 50 Hz repetition rate; a microwave launcher (MWL) which contains magnetron antenna; a transition waveguide to fit MWL to WR430 standard waveguide; a transition from WR430 to WR340 (SAIREM); a ferrite rectangular circulator (FRC-ENGLAND/ F1152-12); a dual directional rectangular coupler (SAIREM/ Model BCT 236) for forward and reflected power monitoring; a three stub tuner (SAIREM/Model AI 35 609R) for impedance matching; a rectangular to cylindrical mode transducer; an elongate cylindrical cavity (ECC) of – 9 cm inner diameter and – 100 cm length, in which is installed along its axis a quartz tube (guidance tube) containing continuously circulating plant samples. The ECC is adapted

* email: adinagav@yahoo.com

12)

Biodiesel Production from Waste Oil and Its Blends with Glycerol Ketals

PETRE CHIPURICI[1], ALEXANDRU VLAICU[1], CRISTIAN EUGEN RADUCANU[2], STEFANIA DANIELA BRAN[3], ADINA IONUTA GAVRILA[1]*

[1]University Politehnica of Bucharest, Faculty of Applied Chemistry and Materials Science, Bioresources and Polymer Science Department, 1-7 Gh. Polizu Str., 011061, Bucharest, Romania

[2] University Politehnica of Bucharest, Faculty of Applied Chemistry and Materials Science, Chemical and Biochemical Engineering Department, 1-7 Gh. Polizu Str., 011061, Bucharest, Romania

[3]Bucharest University of Economic Studies, Doctoral Programs in Economics and Law, 11 Tache Ionescu Str., 010352, Bucharest, Romania

In the last years, researchers, governments, and industries spent significant resources towards biofuels production. Biodiesel has attracted attention as a renewable, non-toxic, and biodegradable fuel. In this work, biodiesel production using waste oil from the margarine industry is described. Another objective of this paper is additivation of biodiesel with glycerol ketals in order to improve the physicochemical properties. Biodiesel blends with additives were further analyzed and compared with the EN biodiesel specifications. The characterization of biodiesel blends revealed the improvement of their density, viscosity, cold filter plugging point, flash point, and iodine index.

Keywords: biodiesel, waste oil, glycerol ketals, additives

In the last decades, the research regarding alternative fuels has received a lot of attention due to global warming and depleting fossil fuel resources. Biofuels are considered a sustainable alternative to fossil fuels because they are prepared from renewable materials and are friendlier to the environment [1-6]. Among biofuels, biodiesel is accepted as the *future fuel* because its low toxicity, very low sulfur content, and biodegradability [7-9]. This biofuel presents such advantages as high cetane number, high flash point, high combustion efficiency, and good lubrication [9-12]. The obstacles for biodiesel commercialization is the high production cost related to costs of the raw materials and the competition between the food and fuel industries over agricultural land and plants with high oil content. In this context, using cheaper feedstock, such as waste cooking oil (WCO), is a promising alternative, and would add to the positive environmental impact of using alternative fuels. Waste oil is a significant feedstock due to an increasing quantity being available as a result of economic development specifically in the food industry [13-16]. Due to the interest in biodiesel production, design, modeling, and simulation of production facilities were the subject of recent studies [17-21].

A problem derived from biodiesel production is the large excess of glycerol, the main byproduct generated in this process, which must be dealt with identifying new valuable products and pathways for glycerol valorization. Glycerol produced through this process contains methanol and cannot be used as an ingredient in food and pharmaceutical products. An alternative is the usage as fuel additive, but its high boiling point is undesirable in fuels. Thus, in recent years, transformation of glycerol into valuable derivatives by different catalytic process such as: esterification, etherification, dehydration, hydrogenation, and oxidation were studied by many research groups [22-25]. Glycerol derivatives present important uses such as surfactants and solvents, but in last decade a new strategy has been developed, consisting of utilizing these compounds as biofuel additives. Thus, the influence of oxygenated compounds obtained from glycerol on biodiesel quality parameters was studied and adding of these glycerol derivatives was found to improve cold flow, ignition properties, and cetane number of fuels [26-28].

Ketalization of glycerol with different ketones can be an attractive alternative for glycerol valorization, providing oxygenated compounds that can be used as biodiesel additives. These compounds possess antioxidant and good combustion properties and by additivation of biofuels they improve viscosity, cold filter plugging point (CFPP), pour point (PP), and particles emission [29-31].

The aim of this paper is to present an alternative feedstock for biodiesel synthesis and its subsequent additivation with glycerol ketals. In this study biodiesel obtained through transesterification of waste oil from the margarine industry, which has no known uses and requires being stored, was blended with glycerol ketals and the influence of these compounds on the density, viscosity, CFPP, flash point and iodine index was studied.

Experimental part

Materials and methods

Biodiesel was obtained by transesterification of waste oils from the margarine industry with methanol (J.T. Backer) in alkaline catalysis (KOH, Merck). In order to obtain glycerol ketals, acetone (Lab-Scan Analytical Sciences), 2-butanone (Reactivul) and glycerol (Reactivul) were used. Sulfuric acid (Merck) solution (5%) was used as catalyst, and ethyl alcohol (Chimreactiv SRL) and ethyl acetate (Chimactiv SRL) were used as solvents. 1,2-Isopropylideneglycerol (Solketal) used as standard for Gas Chromatography (GC) analysis was purchased from Sigma Aldrich.

Synthesis of biodiesel

Biodiesel was obtained by the transesterification of waste oils from the margarine industry with methanol, in batch homogeneous alkaline catalysis. The flow diagram of the operation for obtaining biodiesel is shown in figure 1. Initially, the raw oil was characterized by determining the acidity index, the iodine index, and the saponification index.

* email: adinagav@yahoo.com

13)

Microwave assisted extraction of polyphenols using a coaxial antenna and a cooling system

By Calinescu, I (Calinescu, Ioan) [1] ; Lavric, V (Lavric, Vasile) [1] ; Asofiei, I (Asofiei, Ioana) [1] ; Gavrila, AI (Gavrila, Adina Ionuta) [1] ; Trifan, A (Trifan, Adrian) [1] ; Ighigeanu, D (Ighigeanu, Daniel) [2] ; Martin, D (Martin, Diana) [3] ; Matei, C (Matei, Constantin) [2]

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Abstract Microwave assisted extraction is a powerful tool for natural compounds extraction from plants. The main goal of our research is to obtain a maximum extraction yield without affecting the chemical structure of the valuable natural compounds. In order to avoid the degradation of the latter, a special equipment has been developed. This equipment allows microwave heating using a slot end coaxial antenna into a microwave applicator provided with an efficient cooling system. Consequently, a high specific absorption rate (SAR) is achieved at low temperatures. A slightly non-uniform heating was observed at lower stirring rates that represents an advantage for the extraction process, keeping the extracted product without any degradation. Using this equipment, polyphenols were extracted from sea buckthorn leaves. For these extracts, total polyphenol content, chemical composition, and antioxidant capacity were determined. The extracts obtained by this procedure present higher polyphenol content with a higher antioxidant capacity than those obtained by conventional methods performed at the same temperature profile and in the same extraction cell. (C) 2017 Elsevier B.V. All rights reserved.

Keywords **Author Keywords:** Extraction; Microwave; Coaxial antenna; Polyphenols

Keywords Plus: PHENOLIC-COMPOUNDS

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Univ Politehn Bucuresti, Fac Appl Chem & Mat Sci, 1-7 Gh Polizu St, Bucharest 011061, Romania

Addresses :

1 Univ Politehn Bucuresti, Fac Appl Chem & Mat Sci, 1-7 Gh Polizu St, Bucharest 011061, Romania

2 Natl Inst Lasers Plasma & Radiat Phys, 409 Atomistilor St, Magurele 077125, Romania

3 SC HOFIGAL SA, 2 Intrarea Serelor St, Bucharest 042124, Romania

16)

Integrating Microwave-Assisted Extraction of Essential Oils and Polyphenols from Rosemary and Thyme Leaves

By Calinescu, I (Calinescu, Ioan) [1] ; Asofiei, I (Asofiei, Ioana) [1] ; Gavrila, AI (Gavrila, Adina Ionuta) [1] ; Trifan, A (Trifan, Adrian) [1] ; Ighigeanu, D (Ighigeanu, Daniel) [2] ; Martin, D (Martin, Diana) [3] ; Matei, C (Matei, Constantin) [2] ; Buleandra, M (Buleandra, Mihaela) [4]

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Abstract The extraction of essential oils (EOs) and polyphenols from rosemary and thyme has been done using an integrated process: microwave hydro-diffusion and gravity (MHG) for EOs and microwave-assisted extraction (MAE) for polyphenols. The innovative installation based on the MHG principle allows uniform microwave irradiation field due to a mechanical stirring and experiments done at low pressure. The results of quantitative analysis of the EOs extracted by MHG after 10 min were similar with those obtained by traditional methods (conventional hydro-distillation (CHD) and microwave-assisted hydro-distillation (MHD)) after 150 and 105 min, respectively. The specific energy for MHG was 5-15 times lower compared with these classical methods. The MHG extraction of EOs is also an effective method for plant material pretreatment before polyphenol extraction. Total phenolic content increased from 35 to 55 mg GAE/g DM for rosemary and from 23 to 38 mg GAE/g DM for thyme.

Keywords **Author Keywords:** Essential oil; Microwave-assisted extraction; Microwave hydro-diffusion and gravity; Polyphenols; Rosemary; Thyme

Keywords Plus: ROSMARINUS-OFFICINALIS L.; CHEMICAL-COMPOSITION; ANTIMICROBIAL ACTIVITY; BIO-REFINERY; VULGARIS L.; HYDRODIFFUSION; ULTRASOUND; GREEN; HYDRODISTILLATION; ANTIOXIDANTS

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu, Bucharest 011061, Romania

Addresses :

1 Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu, Bucharest 011061, Romania

2 Natl Inst Lasers Plasma & Radiat Phys, Magurele, Ilfov, Romania

3 SC HOFIGAL SA, 2 Intrarea Serelor, Bucharest, Romania

4 Univ Bucharest, Dept Analyt Chem, Bucharest, Romania

E-mail Addresses : adinagav@yahoo.com

17)

Effects of Process Factors on Slow Pyrolysis of Sorghum Waste

By Parvulescu, OC (Parvulescu, Oana Cristina) [1] ; Gavrila, AI (Gavrila, Adina Ionuta) [2] ; Dobre, T (Dobre, Tanase) [1] ; Ceatra, L (Ceatra, Laurentiu) [1]

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Abstract Slow pyrolysis of sorghum stalk and leaves was conducted in a fixed bed reactor using carbon dioxide as a carrier gas. Pyrolysis products consisted of a char, a pyrolytic oil and incondensable gases. Effects of process factors, i.e., power density (0.145 and 0.248 W/cm(3)), carbon dioxide superficial velocity (1.7 and 3.4 cm/min) and sorghum particle volume (0.05 and 0.20 cm(3)), on process responses (bed temperature, char and oil specific masses) were established. Under conditions studied, the power density and particle volume had significant influence on the pyrolysis dynamics and yield of pyrolysis products. Correlations between characteristic factors and final responses of pyrolysis process were determined by 2 (3) factorial design. A one-stage global reaction kinetic model was selected to describe the process dynamics and its parameters were fitted based on experimental data. The experimental and predicted data may provide useful data for the design, scale-up and operation of fixed bed pyrolysis reactors.

Keywords **Author Keywords:** factorial experiment; kinetic model; pyrolysis; sorghum

Keywords Plus: GASEOUS PRODUCTS; BIOMASS; RESIDUES; CATALYST; REMOVAL; ENERGY

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Univ Politehn Bucuresti, Bioresources & Polymer Sci Dept, 1-3 Gheorghe Polizu Str, Bucharest 011061, Romania

Addresses :

[1] Univ Politehn Bucuresti, Chem & Biochem Engn Dept, 1-3 Gheorghe Polizu Str, Bucharest 011061, Romania

[2] Univ Politehn Bucuresti, Bioresources & Polymer Sci Dept, 1-3 Gheorghe Polizu Str, Bucharest 011061, Romania

E-mail Addresses : adinagav@yahoo.com

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Effects of Process Factors on Slow Pyrolysis of Sorghum Waste

OANA CRISTINA PARVULESCU[1], ADINA IONUTA GAVRILA[2]*, LENASE DOBRE[1], LAURENTIU CEATRA[1]
[1]University Politehnica of Bucharest, Chemical and Biochemical Engineering Dept., 1-3 Gheorghe Polizu Str., 011061, Bucharest, Romania
[2]University Politehnica of Bucharest, Bioresources and Polymer Science Dept., 1-3 Gheorghe Polizu Str., 011061, Bucharest, Romania

Slow pyrolysis of sorghum stalk and leaves was conducted in a fixed bed reactor using carbon dioxide as a carrier gas. Pyrolysis products consisted of a char, a pyrolytic oil and incondensable gases. Effects of process factors, i.e., power density (0.145 and 0.248 W/cm^2), carbon dioxide superficial velocity (1.7 and 3.4 cm/min) and sorghum particle volume (0.05 and 0.20 cm^3), on process responses (bed temperature, char and oil specific masses) were established. Under conditions studied, the power density and particle volume had significant influence on the pyrolysis dynamics and yield of pyrolysis products. Correlations between characteristic factors and final responses of pyrolysis process were determined by 2^3 factorial design. A one-stage global reaction kinetic model was selected to describe the process dynamics and its parameters were fitted based on experimental data. The experimental and predicted data may provide useful data for the design, scale-up and operation of fixed bed pyrolysis reactors.

Keywords: factorial experiment, kinetic model, pyrolysis, sorghum

Currently, in the context of an increasing demand for energy as well as of environmental degradation and fossil fuel depletion, the replacement of conventional fuels with biomass-based ones is an attractive option. Vegetal materials, especially wastes and by-products, are abundant, inexpensive, renewable and carbon neutral resources, that can be converted into energy using various thermo-chemical technologies, *e.g.*, combustion, pyrolysis, gasification. Among them, pyrolysis is the only technique leading to solid, liquid and gas products which are valuable sources of energy and chemicals [1-6].

Biomass pyrolysis consists in thermal decomposition of organic matrix in an oxygen depleted atmosphere, obtaining a porous carbonaceous solid (char) and volatiles. The volatiles, consisting of non-condensable light gases, condensable gases (tar) and water vapour, are further condensed resulting in a non-condensable fraction (pyrolytic gas) and a pyrolytic liquid (oil) containing *cca.* 15-35% water. Pyrolysis tar usually contains hundreds of organic compounds, *e.g.*, alcohols, aldehydes, ketones, carboxylic acids, sugars, furans, alkenes, nitrogen compounds, phenolics, BTX (benzene, toluene, xylene), PAH (polyaromatic hydrocarbons), whereas pyrolytic gas mainly consists of CO_2, CO, H_2, CH_4, C_2H_6, C_2H_4 and small amounts of C_3H_8, NH_3, NO_x and SO_x [6]. The pyrolysis process is usually conducted in the presence of a carrier gas which can be inert (N_2, Ar) or oxidant (CO_2, steam). Pyrolysis products result from both primary reactions of solid material devolatilization and secondary reactions of primary products degradation, *e.g.*, tar thermal cracking, tar and char carbon gasification (reforming with CO_2, H_2 and H_2O) [1,5,6].

The pyrolysis rate as well as the distribution, composition and properties of the pyrolysis products mainly depend on heating rate, process temperature, residence time of volatiles, raw material properties (type, size, shape, pretreatment), type and flow rate of carrier gas. A decrease in char yield and an enlargement of volatiles yield with an increase in *heating rate* have been reported [6-8]. Higher levels of process *temperature* produce the same effect. At temperatures lower than 500 °C, non-condensable gases and oil amounts increase with temperature, whereas at temperatures higher than 500 °C, gas yield increases and oil production decreases with an increase in temperature due to an enhancement of tar thermal cracking [6-17]. The *size of vegetal material particles* may have an important effect on the yield of pyrolysis products. An increase in grain size determines larger temperature gradients in the particle leading to an increase in char yield and a decrease in oil amount [6,18]. The presence of an *oxidizing carrier gas* (*e.g.*, steam, CO_2) and increased *residence times* enhance the production of pyrolytic gas due to gasification and cracking reactions [6].

This paper has aimed at studying the fixed bed pyrolysis of sorghum waste, *i.e.*, stalk and leaves, under carbon dioxide atmosphere. The effect of process independent variables, *i.e.*, heat flow rate, carbon dioxide superficial velocity and sorghum waste size, on the process dynamics and yield of pyrolysis products was measured and predicted.

Experimental part

Materials

Crushed sorghum stalk and leaves were employed as a vegetal material. Two fractions of sorghum waste particle size, *i.e.*, about 1 x 5 x 10 mm (fine) and 1 x 10 x 20 mm (coarse), corresponding to a mean volume of 50 mm^3 and 200 mm^3, respectively, were selected for subsequent studies.

Equipment and procedure

Laboratory set-up and experimental procedure referring to the slow pyrolysis of vegetal materials were detailed in our previous studies [19-21]. Sorghum waste was packed in a 5 cm internal diameter and 50 cm height quartz column. Column external wall was heated by an electric resistance fed by an autotransformer, leading to the heating and thermal decomposition of vegetal material.

Carbon dioxide from a cylinder up-flowed through the fixed bed sorghum waste and left the column along with the volatiles obtained during the pyrolysis. The mixture of gases and vapour was cooled in a condenser, resulting in a

* email: adinagav@yahoo.com

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Photonic Crystals Band Gap Modulation Using the Pattern of a Written DVD

By Rusen, E (Rusen, Edina) [1] ; Diacon, A (Diacon, Aurel) [1] ; Mocanu, A (Mocanu, Alexandra) [1] ; Gavrila, A (Gavrila, Adina) [1] ; Dumitrescu, AM (Dumitrescu, Anca Madalina) [2] ; Dinescu, A (Dinescu, Adrian) [3]

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Abstract This study presents a novel strategy for the modulation of the stop band of a polymer photonic crystal by utilizing the pattern on the surface of a written DVD. Thus, fluorescent dye doped polymer colloids (305 nm) capable to self-assemble have been obtained through soap-free emulsion polymerization and deposited on the surface of the DVD, both the top and bottom. The resulting films were investigated by SEM, UV-Vis and fluorescence spectroscopy. Depending on the design of the surface, the modification of the band gap, as well as the emission properties of the photonic crystals were observed.

Keywords **Author Keywords:** photonic crystal; band gap; DVD; SEM; fluorescence

Keywords Plus: DERIVATIVES; FULLERENES; EMISSION; SINGLET; DYES

Author Information Corresponding Address: Gavrila, Adina (corresponding author)

Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu Str, Bucharest 011061, Romania

Addresses :

1 Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu Str, Bucharest 011061, Romania

2 Univ Politehn Bucuresti, Dept Chem & Biochem Engn, 1-7 Gh Polizu Str, Bucharest 011061, Romania

3 Natl Inst Res & Dev Microtechnol IMT Bucharest, 126 A,Erou Iancu Nicolae Str, Bucharest 023573, Romania

E-mail Addresses : adinagav@yahoo.com

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Microwave-Assisted Batch Extraction of Polyphenols from Sea Buckthorn Leaves

By Asofiei, I (Asofiei, Ioana) [1] ; Calinescu, I (Calinescu, Ioan) [1] ; Trifan, A (Trifan, Adrian) [1] ; David, IG (David, Iulia Gabriela) [2] ; Gavrila, AI (Gavrila, Adina Ionuta) [1]

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Abstract Extraction of polyphenols from sea buckthorn leaves using microwave-assisted extraction MAE) is described. The influence of different parameters on the extraction process reactor type, stirring rate, extraction time, temperature, ethanol/water ratio) was studied. The polyphenolic extracts were analyzed in order to determine the total phenolic content TPC) either by the Folin-Ciocalteu method or by differential pulse voltammetry DPV), and the concentration of the main polyphenolic compounds by high-performance liquid chromatography HPLC). The specific microwave energy was also determined. MAE resulted in a shorter extraction time 7.5 versus 30 min for the conventional method). The best results for MAE were obtained at a temperature of 90 degrees C, using a solvent/plant ratio of 20/1 and 50% ethanol in the extraction solvent. The highest values of antioxidant capacity were obtained for polyphenolic extracts resulted from microwave extraction.

Keywords **Author Keywords:** Microwave-assisted extraction; Polyphenols; Sea buckthorn

Keywords Plus: ANTIOXIDANT ACTIVITY; HPLC

Author Information Corresponding Address: Gavrila, Adina Ionuta (corresponding author)

Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu, Bucharest 011061, Romania

Addresses :

1 Univ Politehn Bucuresti, Dept Bioresources & Polymer Sci, 1-7 Gh Polizu, Bucharest 011061, Romania

2 Univ Bucharest, Dept Analyt Chem, Bucharest, Romania

E-mail Addresses : adinagav@yahoo.com

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Microwave assisted extraction of essential oils from enzymatically pretreated lavender (*Lavandula angustifolia* Miller)+

RICCCE 18

Ioan Calinescu[1], Adina I. Gavrila[1*], Maria Ivopol[1,2], Gabriel C. Ivopol[1,2], Mariana Popescu[1,2], Nectara Mircioaga[1]

[1]*Department of Bioresources and Polymer Science, Faculty of Applied Chemistry and Materials Science, University Politehnica of Bucharest, Bucharest 010072, Romania*

[2]*Hofigal Export-Import S.A., Bucharest 042124, Romania*

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Abstract: In this study, microwave assisted a hydrodistillation process (MWHD) of essential oils from lavender (*Lavandula angustifolia* Miller) was investigated. In order to examine any potential differences in essential oil extraction, the lavender flowers underwent enzymatic pretreatment.

A 2^3 factorial design of experiments, combined with statistical methods of data analysis were used to optimize enzymatic pretreatment and to evaluate the influence of major variables (enzyme concentration, temperature and pH) on the performance of the microwave assisted extraction.

Under optimal conditions, an extraction yield of 24 mg oil g^{-1} substrate was achieved (an increase by approximately 25% in comparison with the classic extraction conditions of conventional hydrodistillation).

The main compounds of the essential oils obtained were analyzed and identified by gas chromatography coupled to mass spectrometry (GC-MS). Analyzing the data obtained indicated that the content of main compounds (linalool and linalyl acetate - 73%) was greater than that obtained by conventional extraction (67%).

Keywords: *Lavender oil • Hydrodistillation • Enzymatic pretreatment*

1. Introduction

In the *Labiatae* family, the genus *Lavandula* comprises approximately 30 botanical species and subspecies, of which three are utilized for their production of essential oils: *L. angustifolia* Miller (syn. *L. officinalis* Choix) provides essential oil of the highest quality, *L. latifolia* Medicus which has the lowest yields, and various forms of *L. hybrida* (*L. angustifolia* × *L. latifolia*) which has the highest yields but not such a high quality oil [1,2].

Lavender is a perennial Mediterranean shrub that grows spontaneously in dry chalky soils at altitudes of 400 m to 1800 m [3]. Lavender has been used since ancient times, for example the Romans scented their bathwater and laundry water with lavender, from whence the Latin verb to wash 'lavare' and subsequent words in English such as laundry, lavage and lavatory. A typical yield of essential oil from fresh lavender is between 0.8 to 1.5%, or about 10 – 25 kg of essential oil per hectare [1].

Essential oil of *L. angustifolia* Miller is a colourless to pale yellow liquid, with a fresh grassy, floral fragrance, and comprises 1 – 3% of the dry floret spike [4]. Over 300 compounds have been identified from species of *Lavandula*, the two main compounds being linalool, and linalyl acetate (which is present in a greater quantity in *L. angustifolia* and *L. hybrida*).

Both linalool and linalyl acetate are detectable in the blood five minutes after topical application of *L. angustifolia* essential oil, reaching peak levels in

* *E-mail: adinagav@yahoo.com*

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