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JSC «SISTEMU INOVACIJAS»

Kristaps Erglis

Sea buckthorn seed extraction using supercritical CO_2 for nutraceutical product application

UNIVERSITAS LATVIENSIS 19 19 SCIENTIAE ET PATRIAE

UNIVERSITY OF LATVIA

Company background

FOUNDED IN 2007;

MAIN FIELD OF THE BUSINESS - CLINICAL RESEARCH ORGANIZATION AND DEVELOPMENT OF NOVEL MEDICAL TECHNOLOGIES;

IN 2010 INVOLVED IN EU CO-FINANCED PROJECT TO EVALUATE NUTRACEUTICAL APPLICATION FOR USE AS A SUPPLEMENT FOR PATIENTS WITH CVD;

PARTICIPATION IN SEVERAL PROJECTS TO DEVELOP EXTRACTION TECHNOLOGIES OF SEA BUCKTHORN BERRY RESIDUES;

IN 2019 OPENED PILOT PLANT FOR SUPERCRITICAL CO_2 EXTRACTION.

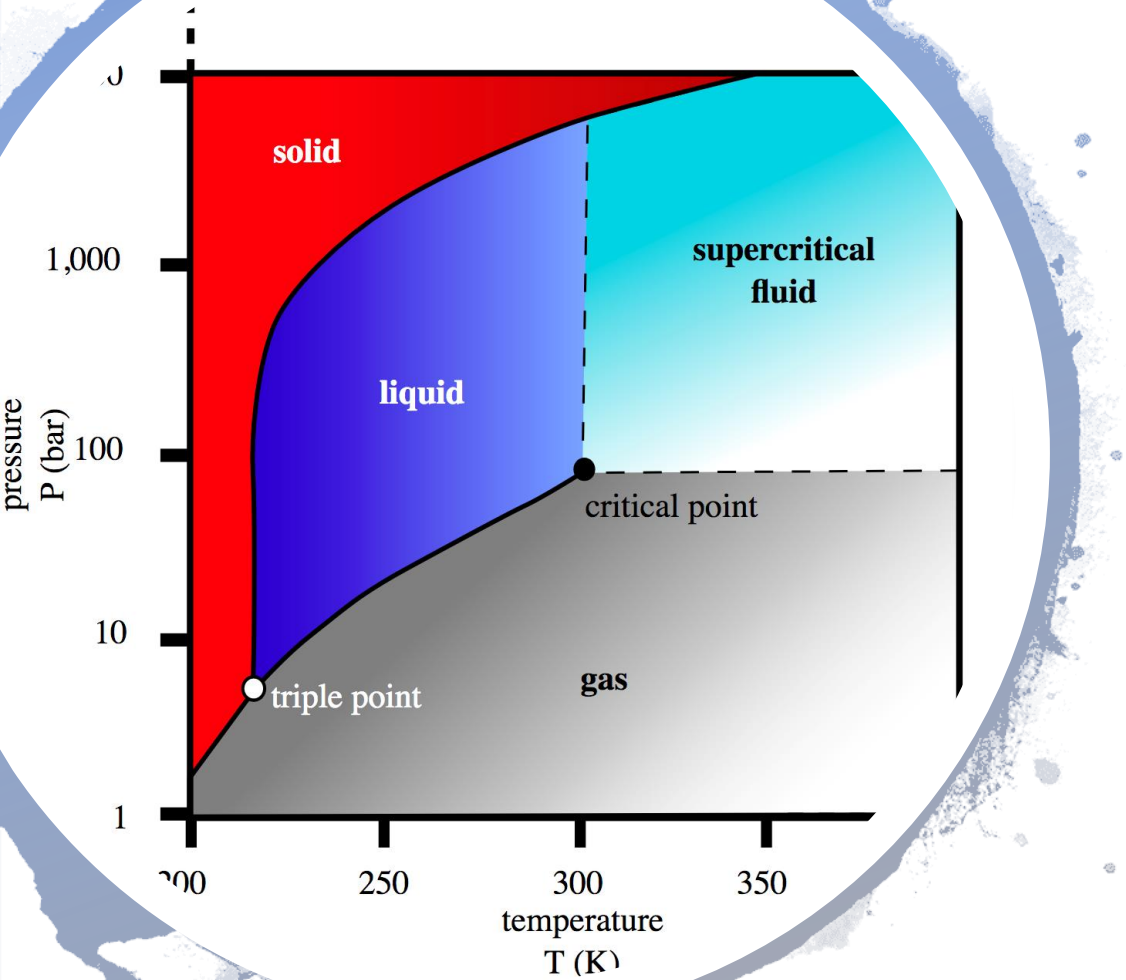
Sea buckthorn seed oil

- Sea buckthorn seeds contains up to 90% of unsaturated fatty acids;
- Main fatty acids Omega-3 (alpha-linolenic acid), Omega-6 (linoleic acid), Omega-9 (Oleic acid);
- Advantage Omega-3 and Omega-6 ratio is close to 1:1
- Contains Phytosterols, beta-sitosterol;
- Compared to pulp oil contains higher amount of Tocopherols (Vitamin E);
- Product should be administered internally;
- Planning to produce it in soft gel capsules (1000 mg).

Sea buckthorn seed oil fatty acid profile

Samples	No.1		No.2		No.3		No.4		No.5	
	Sea buckthorn seed oil		Sea buckthorn seed oil		Sea buckthorn seed oil		Sea buckthorn seed oil		Sea buckthorn seed oil	
	Quantity %	SD	Quantity %	SD	Quantity %	SD	Quantity %	SD	Quantity %	SD
Saturated fatty acids	11,9		11,2		12,2		11,9		12,6	
Unsaturated fatty acids	88,1	± 2,9	88,7	± 2,9	87,7	± 2,9	88,0	± 2,9	87,3	± 2,9
Trans fats	0,1	± 0,0	0,1	± 0,0	0,1	± 0,0	0,1	± 0,0	0,2	± 0,0
C18:2 trans	0,1	± 0,0	0,1	± 0,0	0,1	± 0,0	0,1	± 0,0	0,1	± 0,0
omega 3	32,9	± 1,6	33,6	± 1,7	32,8	± 1,6	33,2	± 1,7	32,4	± 1,6
omega 6	36,4	± 1,8	36,3	± 1,8	35,8	± 1,8	36,0	± 1,8	35,4	± 1,8
omega 9	16,6	± 1,5	16,5	± 1,5	16,8	± 1,5	16,6	± 1,5	17,2	± 1,6
monounsaturated	18,7	± 1,6	18,7	± 1,6	19,1	± 1,6	18,8	± 1,6	19,5	± 1,7
polyunsaturated	69,3	± 2,4	70,0	± 2,5	68,6	± 2,4	69,2	± 2,4	67,8	± 2,4
Palmitic C16:0	8,4	0,8	7,7	0,8	8,6	0,9	8,7	0,9	8,9	0,9
Palmitoleic C16:1 n9	2,2	0,6	1,9	0,5	2,5	0,6	2,6	0,6	3,0	0,7
Heptadecanoic C17:0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0
cis-10-Heptadecanoic C17:1	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0
Stearic C18:0	2,5	0,6	2,6	0,7	2,4	0,6	2,3	0,6	2,4	0,6
C18:1 trans	<0,1		<0,1		<0,1		<0,1		<0,1	
Oleic C18:1 n9	14,2	1,4	14,3	1,4	14,0	1,4	13,7	1,4	13,9	1,4
cis-Vaccenic acid C18:1 11c	2,0	0,5	2,1	0,5	2,1	0,5	2,1	0,5	2,2	0,5
Linolelaidic C18:2 9t12t	<0,1		0,1	0,0	0,1	0,0	<0,1		0,1	0,0
9c12t-Linoleic acid C18:2 9c12	0,1	0,0	<0,1		0,1	0,0	0,1	0,0	0,1	0,0
9t12c-Linoleic acid C18:2 9t12	<0,1		<0,1		<0,1		<0,1		<0,1	
Linoleic C18:2 n6	36,2	1,8	36,1	1,8	35,6	1,8	35,8	1,8	35,2	1,8
Arachidic C20:0	0,4	0,1	0,4	0,1	0,3	0,1	0,3	0,1	0,3	0,1
gamma-Linolenic C18:3 n6	0,1	0,0	0,1	0,0	0,2	0,0	0,1	0,0	0,1	0,0
cis-11-Eicosenoeic C20:1 n9	0,2	0,0	0,2	0,0	0,2	0,0	0,1	0,0	0,2	0,0
alpha-Linolenic C18:3 n3	32,8	1,6	33,5	1,7	32,7	1,6	33,1	1,7	32,3	1,6
Heneicosanic C21:0	<0,1		<0,1		0,1	0,0	0,1	0,0	0,2	0,1
cis-11,14-Eicosadienoic C20:2	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0
Behenic C22:0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0
cis-8,11,14-Eicosatrienoic C20:	<0,1		<0,1		<0,1		<0,1		<0,1	
Erucic C22:1n9	<0,1		0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0
cis-11,14,17-Eicosatrienoic C20	<0,1		<0,1		<0,1		<0,1		<0,1	
Arachidronic C20:4 n6	<0,1		<0,1		<0,1		<0,1		<0,1	
Tricosanic C23:0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0
cis-13,16-Deocosadienoic C22:	<0,1		<0,1		<0,1		<0,1		<0,1	
Lignoceric C24:0	<0,1		<0,1		<0,1		<0,1		<0,1	
EPA C20:5n3	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0
Nervonic C24:1 n9	<0,1		<0,1		<0,1		<0,1		<0,1	
DHA C22:6 n3	<0,1		<0,1		<0,1		<0,1		<0,1	

Supercritical fluid extraction



Supercritical fluid extraction using carbon dioxide.

- Effective and selective extraction of biologically active substances;
- Extraction of substances in their natural form;
- Extraction without damaging sensitive products;
- Production of different fractions in a single step;
- High extraction yields;
- Exclusion of oxygen – no oxidation;
- Recycling of CO_2 - eco friendly technology;
- High concentration of extracts already at low dosage levels;
- CO_2 Extract are stable and have long shelf life;
- CO_2 extracts do not contain any proteins and inorganic salts (free from food allergens);
- No solvent residues in extracted product.

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Development of sea buckthorn seed oil production technology using supercritical CO2 extraction

EU co-financed project to develop sea buckthorn seed oil extraction technology using supercritical carbon dioxide.

Project team – SISTEMU INOVACIJAS (leading partner), University of Latvia, Ramkalni Nordeco, One Baltic.

The aim of the project is to develop efficient extraction technology of sea buckthorn seeds using supercritical carbon dioxide extraction.

It is planned to evaluate efficiency of extracted sea buckhorn seed oil in clinics study including patients with elevated CVD residual risk.

Supercritical fluid extraction technology application

- Wide potential of application for different fruit and vegetable matrices to extract lipid fractions;
- Company has medium range system for pilot scale production;
- For material pre-treatment lyophilisation technology have been used to preserve biological active ingredients;
- Further options to use co-solvent in supercritical extraction in order to get polar fraction (e.g. polyphenols)
- We offer contract manufacturing (extraction and lyophilisation);
- We are open to new projects and ideas.

Thank you for your attention!

- Well spent life is long
/Leonardo Da Vinci/