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A Study on the Emulsification of Algal Oil using Quillaja Saponin

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INTRODUCTION & AIM

- Algal oil (AO) - vegan-friendly source of DHA (Docosahexaenoic acid) - a primary omega-3 fatty acid essential for brain, eye, and heart health.
- Its lipophilicity, oxidative sensitivity, and poor oral bioavailability adversely affect its functional efficacy.
- Emulsions facilitate the delivery of lipophilic compounds - enhances their aqueous dispersibility and physicochemical stability.
- This work outlines the formulation of algal oil emulsion using *Quillaja saponin (QS)* as a natural surfactant.

METHOD

1g *QS* + 90 mL of the water phase
(glycerol - 1 mL + ascorbic acid (AA) - 200 mg)

↓ stirred for 10 min

10 g of oil phase (AO) was added dropwise

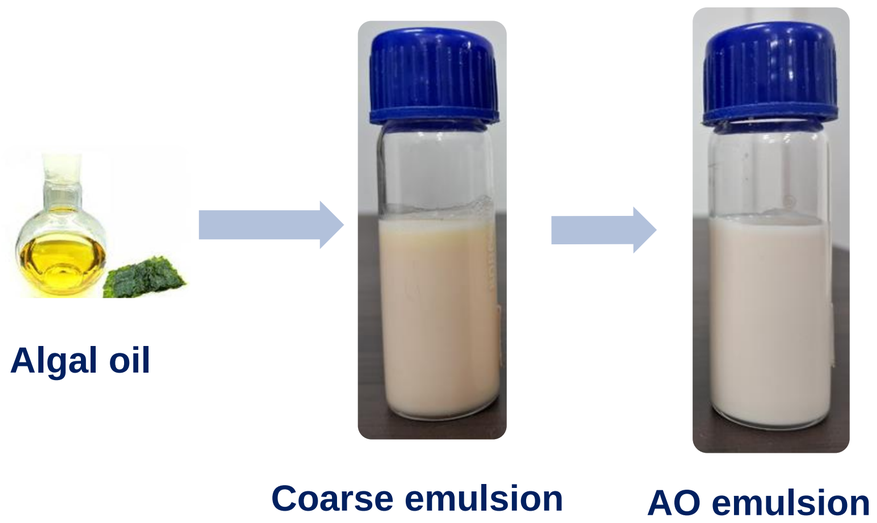
↓ homogenized (12,000 rpm) for 10 min

Coarse emulsion

↓ Ultrasonicated (75% amplitude)

Algal oil Emulsion
Particle size Polydispersity index (PDI), Zeta potential

RESULTS & DISCUSSION



Sample code		1	2	3	4
Input Parameters	Oil %	10	10	10	10
	Water phase	PB	DW	DW	DW
	Surfactant	QS	QS	QS	QS
	Surfactant %	1	1	1	1
	Additives	No	GLY, AA	No	GLY, AA
	Homogenisation time	10	10	10	10
	Ultrasonication time	10	10	10	15
	Ultrasonication power	75	75	75	75
Output parameters	Particle size (nm)	287	270	240	330
	PDI	0.38	0.38	0.36	0.36
	Zeta potential	-34	-36	-43	-40

** DW – Distilled Water, PB – Phosphate Buffer, QS – Quillaja Saponins, GLY – Glycerol, AA – Ascorbic Acid*

- No significant influence of water phase, (phosphate buffer or distilled water), and additives (glycerol and ascorbic acid) on the particle size.
- Varying ultrasonication time (10 and 15 min) showed a notable impact.
- Higher ultrasonication time increased particle size (intensified cavitation, creating strong shear forces that break oil droplets into smaller sizes)
- PDI less than 0.5 and zeta potential greater than -30 was obtained (All trials) – good colloidal stability.

CONCLUSION

The developed Algal oil emulsion is a prospective carrier for the preparation of fortified formulations of lipophilic nutrients with improved bioavailability.

REFERENCES

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