

Screening of long chain imidazolium base ionic liquids for EPA and DHA extraction from microalgae using COSMO-RS model

ABSTRACT

Omega-3 Poly Unsaturated Fatty Acids (Omega-3 PUFA) in various types including alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) have many benefits for human health. The EPA and DHA from microalgae are favorable as the algal is farmed in a controlled environment that avoids harmful contamination such as methyl mercury and copper from the sea. Microalgae has the advantage of presenting neither an unpleasant odour nor a high amount of cholesterol. The presence of squalene and phytosterols in microalgae offer additional benefits to human health. The existing conventional methods of lipid extraction like soxhlet consume large amount of solvent and hence consider high toxic and energy intensive. Ionic liquids (ILs) are new classes of solvents that have the potential in extracting the microalgae lipid. ILs provide low vapor pressure, high thermal stability, non-toxicity and they can dissolve polar, non-polar and polymeric components. Very limited research has been conducted on extracting microalgae lipid especially PUFA using ILs therefore, this study aims to screen the potential ILs that can be used in the lipid extraction process. The screening was carried out using Continuum Solvation Models for Real Solvents (COSMO-RS) method to investigate the effect of different types of anions base ILs by calculate the activity coefficient value. It was found that the lowest activity coefficient has the best interaction between the solute and solvent. According to the results the lowest activity coefficient for EPA and DHA extraction belongs to [benzoate] as anion for the octyl-methyl imidazolium base ILs.

Keyword: Lipid extraction; EPA; DHA; Ionic liquid; COSMO-RS