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Study of biodiesel and PUFA potential of oleaginous microalgae biomasses by NMR and IR spectroscopic techniques

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Microalgae biomasses are potential sources of biodiesel and food supplements as their lipids are comprised of both saturated and unsaturated fatty acids in the range of C14 to 22 including PUFA (ω -3). Algae biomasses are comprised of neutral lipids (Triacylglycerides, TAG; free fatty acids, FFA), polar lipids (glyceroglyco+phospho lipids), proteins, sugars, vitamins etc. Microalgae are unicellular photosynthetic organisms with 1-50 μ m in size, that require primarily three components to produce biomass, i.e., water, CO₂ and sunlight with relatively higher photosynthetic efficiency of 3–8% against 0.5% for terrestrial plants. The microalgae grow in aquatic environment of diverse sources of water such as sea, brackish, ponds and industrial waste water. The neutral lipids of microalgae biomasses are important components of interest to energy sector because of their high ability to produce biodiesel with high oil productivity and growth rate of more than 30 times the traditional food crops. The content of important health ingredients such as ω -3 fatty acids containing TGA (C18:3, C20:5 (EPA) and C22:6 (DHA) of algal oil is much higher than vegetable oils. In the present study multipulse 1D and 2D NMR techniques have been used to characterise algal oils obtained by ultrasonic extraction of solid biomasses for fatty acid composition, particularly ω -3PUFA. The effect of cultivation parameters such as nutrients (N, P) on the quality and neutral lipid productivity in order to enhance the biodiesel and nutritional properties have been specifically demonstrated to highlight the potential of NMR and IR techniques

Biography

Amarjit S Sarpal completed his PhD degree in Analytical Chemistry in 1980 from GNDU, Amritsar, India and worked in the Indian Oil Corporation Ltd. (R&D), India, from 1977 to 2011. He has 40 years of rich experience in characterization of petroleum and related products, bio-fuels, polymers and catalyst by the applications of analytical techniques such as FT NMR, FTIR, MS, GC-MS etc. He has published 135 research papers and presented 180 research papers at national and international conferences, seminars and tutorials. He has also worked at University of Illinois in 2011 on a project on biofuels from algae biomasses. He has completed his project on "Biodiesel potential of microalgae biomasses and national sources of Brazil" in the capacity of Team Leader at INMETRO, Rio de Janeiro, Brazil from April 2012 to October 2015. He is recipient of many awards including recent Wolff Kishner Research Award in Analytical Chemistry for the year 2015, Award of Excellence, by International Agency for Standards and Rating, USA.

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