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Marine waste bio-refinery

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The world is 70% covered by sea. The amount of fish oil obtained as a waste from fishing industry or from the discarded parts of fish can be used for making biodiesel and extracting high added value components like omega 3. Producing biodiesel from the discarded parts of fish could lower the production cost of biodiesel. In addition, fish oil has other high added value components such as omega-3 polyunsaturated fatty acids (PUFA) in the form of eicosapentaenoic (EPA) and docosahexaenoic (DHA) that can be produced commercially. The main objective of the project is to utilize the marine waste by investigating a cost effective technique to extract omega-3 polyunsaturated fatty acids (PUFA) from the fish oil as well as producing biodiesel. There are several methods used for the separation of omega-3 concentrate from fish oil. The most common methods which are practiced commercially are: molecular distillation (short path distillation) and supercritical fluid technology. The short path distillation is process where the volatile components are vaporized at a wide range of temperature in a very short time because of high vacuum used. The vacuum can range from 10^{-5} to 10^{-6} bar at which volatility of most compounds becomes high which will allow operating at lower temperatures. The basic principle of the short path distillation is the difference of compound volatility under vacuum which will allow operating at lower temperatures. The difference in volatility of the shorter chain (16- and 18-carbon fatty acids esters) and the longer chain (20- and 22-carbon EPA/DHA ethyl ester) enable the short path distillation process to concentrate EPA and DHA ethyl esters to levels of over 50%. Further concentration of omega-3 over 50% using the same method has some limitations. Firstly, substantial drop in the yield occurs. Secondly, the necessity to repeatedly run the oil through the same process which will cost more energy and expose the product to a very high temperature which will shorten the product stability and shelf life compared to other technologies.

Biography

Ahmed Al Hatrooshi is a PhD researcher at Newcastle University, School of Chemical Engineering and Advanced Materials. His research interest is biofuel production from biomass. He is currently working in marine waste biorefinery for production of biodiesel and high added value products from marine waste. He finished his degree from Sultan Qaboos University in Oman, College of Chemical Engineering in 2010. He has a good industrial experience where he worked in 6 countries around the world. He has been nominated to represent Newcastle University in Biopro World Talent Campus in Denamrk for the best 20 universities in biotechnology. He won the first place in the poster competition among PhD students in Newcastle University.

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