Theoretical Studies on the Ethylene Purification Using Substituted Nickel Dithiolenes

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The world is running out of energy, thus energy preservation is of paramount importance. Using current technology, ethylene is purified from petroleum feedstocks using the very energy intensive cryogenic distillation method. However, a purification procedure based on the redox properties of nickel bis-dithiolene complexes has been theoretically studied, in order to design a more convenient route to ethylene purification. Several possible addition routes of ethylene to neutral and anionic Ni(S₂C₂(CN)₂)₂ complexes have been modeled using density functional theory. An intraligand addition and subsequent decomposition is preferred for the neutral complex, while the interligand adduct is formed in the presence of the anion, in line with previous experimental results. The effect of the anion, whose role is as a mediator in the initial step of the reaction, is discussed, and the ability of this compound to avoid poisoning by acetylene is investigated. The results from the CN substituted complex are then compared with that of ethylene addition to CF₃, H, and OH substituted nickel dithioline complexes.

Biofuel from Used Vegetable (Cooking) Oil

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Everyday people use cooking oil at home and various commercial establishments in the hospitality industry. Particularly hotels and restaurants are generating 0.1 million tons/year of waste cooking oil in India and other countries such as US (0.3-0.4 million tons), EU (0.7-1 million tons), United Kingdom (0.2 million tons), and Canada (0.135 million tons). However, most of the used vegetable oils are still regarded as waste materials and disposed of without any such adequate use, which leads to not only environmental pollution but also an enormous wastage. These used vegetable oils have capabilities to be a potential feedstock for production of bio fuel by transesterification reaction and consequently leads to low cost bio fuel production.

The objective of this study is to find an immediate alternative and sustainable energy solution from using waste vegetable oil for replacement of fossil fuel. The present article mainly deals with description of the continuous transesterification process along with optimization of the process parameters. Also it covers the advanced technology that is utilized for the generation of biofuel with design of portable biofuel generation plant with higher efficiency. This process would exhibit several advantages such as, (i) low temperature reaction (50-60°C), (ii) fast reaction with complete process taken less than an hour and (iii) high quality bio fuel and it meets EU standard.