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Comparative study of production of bio-indigo by *Pandoraea* sp. in a two phase fed batch and continuous bioreactor

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Indigo, is blue of blue jeans, a synthetic dye used on large scale all over the world. Chemical production of the dye is taking a new route towards bacterial production to overcome the environmental effects that are posed by the synthetic blue powder (Indigo). In the present work a strain *Pandoraea* sp. isolated from the oil contaminated soil is found to produce blue pigment which is analyzed qualitatively as indigo using Fourier Transform Infra Red (FTIR). The strain is used for indigo production at lab scale in two different bioreactor configurations first the fed batch mode and second continuous mode using two phase. The two phases consisting of medium carrying biomass and the second phase of silicone oil carrying substrate indole. The use of second phase allows higher concentration of substrate injection reducing the inhibition effects of the substrate as well as act as a partitioning agent for removal of the product. In two phase study, the maximum indigo produced was seen to be 0.068 g/L after 22 hours of substrate injection into the Fermentor in a fed batch mode. The maximum yield obtained in this configuration was 19%. For commercial production of bio-indigo a continuous operation is required, which was studied in a bioreactor with 1.5 liter capacity under the optimized conditions. The maximum indigo produced was found to be 0.052 g/L after about 72 hours of operation. The results showed decrease in the production of indigo in continuous mode as compared to fed batch operation, which may be due to the insufficient time available for the bacteria to bio-transform indole into indigo.

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A review of ethanol-diesel blend as a fuel in compression-ignition engine

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The use of ethanol blended with diesel is receiving more attention by many researchers in the recent time. It was shown that ethanol–diesel blends were technically acceptable for existing diesel engines. Ethanol as an attractive alternative fuel is a renewable bio-based resource and it is oxygenated, thereby providing the potential to reduce particulate emissions in compression–ignition engines. In this review, the properties and specifications of ethanol blended with diesel fuel are discussed. Special emphasis is placed on the factors critical to the potential commercial use of these blends. These factors include blend properties such as stability, viscosity and lubricity, safety and materials compatibility. The effect of the fuel on engine performance, durability and emissions is also considered. The formulation of additives to correct certain key properties and maintain blend stability is suggested as a critical factor in ensuring fuel compatibility with engines. However, maintaining vehicle safety with these blends may require special materials and modification of the fuel tank design. Further work is required in specifying acceptable fuel characteristics, confirming the long-term effects on engine durability, and ensuring safety in handling and storing ethanol–diesel blends.

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