

Technology of Biodiesel Production in China

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Currently, energy consumption in China accounts for 13.6% of the total worldwide energy consumption. However, in terms of average resources consumed per person, the consumption in China is still in low level. China has abundant biomass resources. With the issuance of renewable energy regulations in China, the percentage of renewable energy consumption is expected to increase from 7% at present to 15% in 2020. Up to now, one of the most feasible bio-fuels for vehicles is biodiesel. Biodiesel, as an alternative diesel fuel, is made from renewable fats and oils, such as rice bran oil, rape oil, cottonseed oil and animal fat. In 2004, 46.26 million tons of main food oil plants (including soybean, rapeseed, peanut, and sesame) were produced in China, while the consumption was only 24 million tons. The consumption per person is close to 19 kg/person/year, higher than the world average of 2 kg/person/year. Because the edible oil market has become saturated, many companies are focusing on the production of biodiesel from vegetable oils. In addition, a large amount of wasted food oil can be collected from restaurants. Production of biodiesel from the wasted food oil has become a major issue to reduce environmental pollution and also to secure the fuel production. In recent years, the biodiesel industry has been mainly founded by private enterprises. Some production lines with 10,000-20,000 tons/year production, have been built by companies in many provinces. Although the raw materials are available from a wide variety of resources, only inexpensive raw feedstock is applicable to the production of biodiesel in China. In 2006, the price of crude oil raised, resulting in vegetable oil prices were competitive to that of diesel, pushing commercialization of bio-fuels. In recent studies, biodiesel fuels were produced from various resources at relatively raw cost with different technologies. Biodiesel can be produced either with or without catalyst. In the catalyst-assisted biodiesel production system, base, acid or enzymes can be used. Alkali-catalyzed transesterification is currently used in the commercial production of biodiesel. With base as catalyst, waste liquids containing free fatty acids, glycerol and water are difficult to be reutilized. Therefore, great efforts have been directed toward the development of environmental friendly catalysts. Acid transesterification is an efficient method to produce biodiesel if the raw material oil has relative high free fatty acids content. The main disadvantage of enzyme system is that the cost is still prohibitively

high due to generally poor reusability as a result of poor stability of the enzyme. Supercritical technology is a suitable alternative for biodiesel production from a technical and environmental point of view. Supercritical fluid can react with refined oils efficiently without the help of catalyst to produce biodiesel at a high yield (95% to 98%) in a short time. In addition, the effects of biomass fuels on the engine performance, economy, combustion characteristics, and emission characteristics have been extensively investigated.