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Recent advances in biodiesel industry

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Despite of tremendous effort to develop second generation biofuels, most of the expected new technologies has failed from a technical point of view due to small yields, extensive maintenance or because economic drawbacks like high capital expenses (CAPEX) or significant amount of co-products to be developed in the market. Meanwhile, first generation biofuel programs like ethanol and biodiesel keep growing in several countries, mainly outside Europe. Brazil, for instance, is the second largest biodiesel producer in the world and its production will probably to double in 3 or 4 years with a strong mandatory program officially achieving B10 in 2018 with a B20 projection in the next decade. Part of this success is ascribed to a similar final price as compared to fossil diesel even without subsidies. Learning curve of biodiesel production is a clear fact when you evaluate the last 10 years when the first biodiesel plants started to produce in Brazil. Nowadays, not few ones have more than one million liters/day capacity but scale up has not been the only one factor to explain how this biofuel became feasible in some countries. In addition to available raw materials, engineering has played a very important role in this field. Sodium methylate transesterification catalyst consumption now is smaller than in the first plants, even with the higher yields (more than 99%) which are regularly obtained in the current factories. Antioxidant concentration has also decreased despite higher oxidative stability values have been required in the new biodiesel standards. Probably, one of the most important advances has been the development of esterification reactors in order to use lower prices raw materials with higher acid numbers. From the original batch reactors with very corrosive catalysts like sulfuric acid, new plants are using continuous esterification reactors working with solid catalysts or even with higher pressure and no catalyst. Figure-1 describes the concept of reactive distillation system which has been already applied in current biodiesel industries.

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