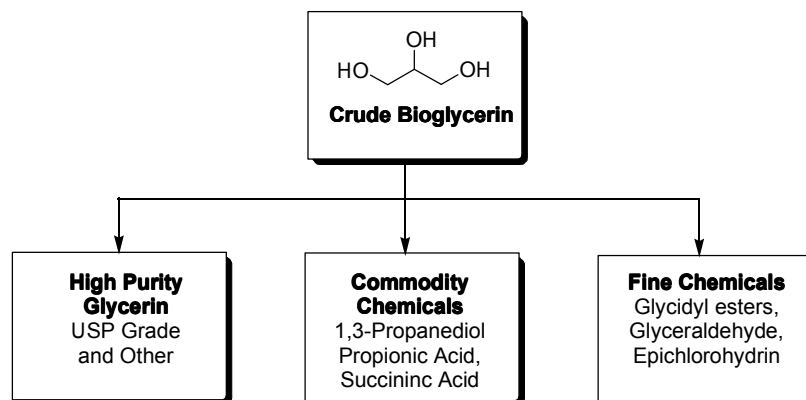


Purification of Crude Bioglycerin for Production of High Value Products

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Biodiesel is commercially produced by the hydrolysis and/or transesterification of vegetable oils and animal fats. During this conversion, a large quantity of crude bioglycerin is generated (~10% w/w of biodiesel). Unfortunately, the swift rise of the biodiesel industry has led to a market surplus of glycerin, and with it a precipitous drop in the price of crude bioglycerin (*Current Opinion in Biotechnology*, **2007**, *18*, 213-219). What was originally considered to be a valuable co-product of biodiesel production that could favorably drive refinery economics has turned into an unwanted waste stream with associated disposal costs. The pursuit of downstream technologies that transform bioglycerin into commodity chemicals for polymers and bioplastics is a subject which has generated intense interest by many parties. If successful, these products stand to greatly improve the economics of biodiesel production. Thesis Chemistry, in particular, is pursuing the development of proprietary technologies for the production of certain high-value fine chemicals useful in manufacture of pharmaceuticals and agrichemicals.



Crude bioglycerin contains methanol, water, higher organic impurities and inorganic salts. Water and methanol are relatively inexpensive to remove by distillation, whereas the higher organic impurities can be controlled through adjustment of the biodiesel processing parameters or with downstream chemistry. However, the inorganic salts (4-10% abundance), formed during acidification of the alkaline hydrolysis/transesterification media, are much more challenging to remove, and these salts can impede chemoenzymatic transformations of bioglycerin into high value products. Distillation could be used to remove these salts, but doing so would be an energy intensive undertaking due to the high boiling point of glycerin (bp 182 °C, 20 mm Hg). Ion exchange resins, on the other hand, are broadly employed in the industrial desalination of aqueous streams. These resins are recyclable and can be regenerated using acids and bases already present in biodiesel facilities. Thesis Chemistry has investigated the use of ion exchange resins to purify crude bioglycerin and we now report a successful reduction of residual chloride ion from 4.5% to 0.02%.