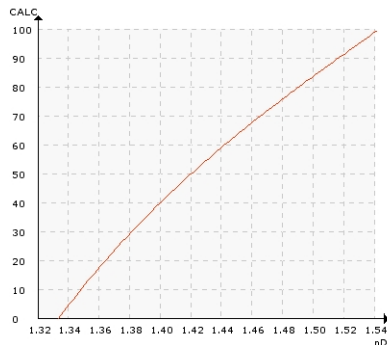


GLYCEROL (GLYCERINE), C₃H₅(OH)₃

Typical end products

High purity glycerol for food, drugs and cosmetics

Chemical curve: R.I. per BRIX at Ref. Temp. of 20°C



Introduction

Glycerol is a by-product of the petrochemical, animal fat and vegetable oil based biodiesel industries. However, crude glycerol derived from biodiesel production is of low value because of impurities. Further refining of crude glycerol is dependent on the economics and the availability of facilities. Larger scale biodiesel producers refine their crude glycerol and market it to other industries.

For every 9 kg (19.8 lbs) of biodiesel produced, about 1 kg (2.2 lbs) of a crude glycerol by-product is formed. Effective usage, or conversion, of crude

glycerol with specific products will offset biodiesel production costs.

Glycerol is generally treated and refined through filtration, chemical additions and fractional vacuum distillation, yielding a variety of commercial grades. When destined to be used in food, cosmetics, and drugs, further purification such as bleaching, deodorizing, and ion-exchange will be required to remove trace properties.

Application

Physical Refining: The first step in physical refining is to remove fatty, insoluble or precipitated solids by filtration and/or centrifugation. This removal may require pH adjustment.

Then, the water is removed by evaporation. All physical processing is typically conducted at 65-90°C (149-194°F) as glycerol, at these temperatures, is less viscous but remains stable.

Glycerol Purification: The final glycerol purification is completed by using vacuum distillation with steam injection, followed by an activated carbon bleaching. This has the advantage of being well-established technology but has the disadvantage of being capital and energy intensive. Vacuum distillation of glycerol is best suited to operations > 25 kilotons per day.

BIOREFINING	
APPLICATION NOTE	9.02.01
BIODIESEL GLYCEROL REFINING	


Ion-exchange purification of glycerol is an attractive alternative to vacuum distillation for smaller capacity plants. The ion-exchange system uses cation, anion and mixed bed exchangers to remove catalyst and other impurities. The glycerol is first diluted with soft water to a 15 to 35 percent glycerol-to-water solution. The ion-exchange is followed by vacuum distillation or flash drying. As a result, water removal often results in a partially refined glycerol of 85 percent.

Installation

The K-Patents Process Refractometers PR-23-GP are installed at the inlet and the outlet of the evaporator.

The K-Patents refractometer is also used to detect the interface in the ion-exchange regeneration process and to monitor concentration levels before and after evaporation.

The concentration and quality of the purified glycerin is also monitored.

Instrumentation	Description
	<p>K-Patents Process Refractometer PR-23-GP is an industrial refractometer for large pipe sizes and tanks, cookers, crystallizers and kettles. Installation through a flange or clamp connection.</p>
<p>Measurement range:</p>	<p>Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 % by weight.</p>