RECOVERY OF METHANOL FROM BIODIESEL PROCESS

BIO-DIESEL Process:

Biodiesel (methyl ester) is transesterification of vegetable oil by using methanol and KOH/ NaOH as catalyst. The reaction is carried out in 2 reactors. Esterification is carried out to about 80 – 90% level in the first reactor. Glycerin is separated which carries methanol. More methanol is mixed in second reactor to complete remaining Esterification. Glycerin phase is again separated. Consumption of methanol is about 10% of the weight of oil input but excess quantity of methanol is used for the reaction. The excess methanol goes with Bio-diesel phase as well as with glycerin phase. Bio diesel phase has about 10% of methanol and Glycerin phase has about 40% to 50% of methanol. Bio-diesel phase also has some quantity of soap in it and needs to be washed with water to remove soap.

FENIX METHANOL RECOVERY SYSTEM:

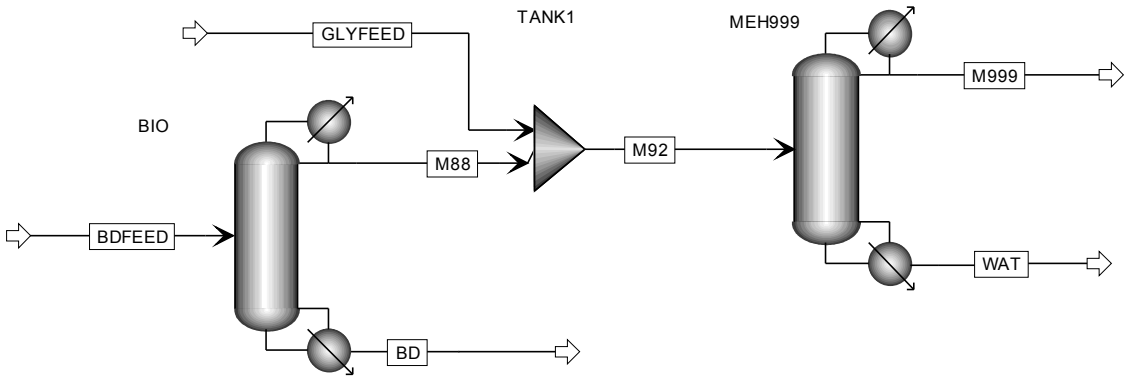
For recovering of methanol following routes are possible:

ROUTE -1: 2-Column Scheme

Feed containing Biodiesel, Glycerin, Water and Methanol is fed to a atmospheric continuous distillation column to separate out methanol of purity 97% (by wt) from the top. The column is a packed column with Fenix structured packing. This methanol of 97% (by wt) is distilled in separate column to recover methanol of 99.9 % (by wt) purity, which is recycled back to the reactor. The recovery of methanol is >95%.
The Biodiesel and Glycerin are phase separated. The glycerin still contains ~10% water and some traces of methanol. BP grade Glycerin (99.5% wt) can be achieved by using vacuum batch distillation column.

Bio-diesel phase is washed with water as it may contain soap and traces of methanol and finally can be dehydrated in vacuum evaporator. See Flowsheet 1

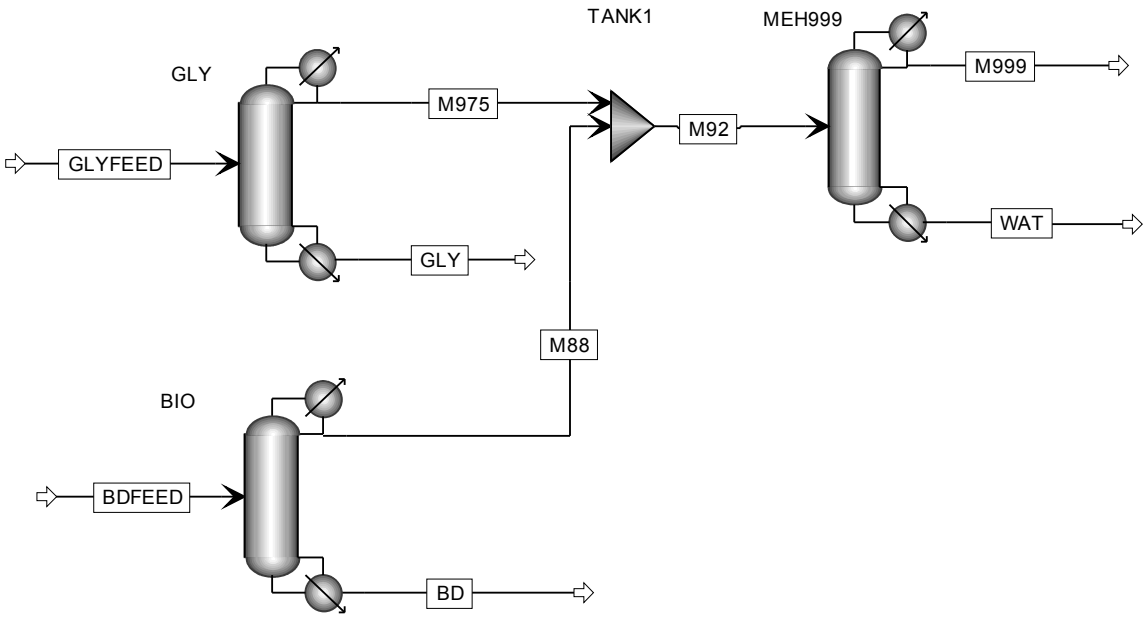
Flowsheet 1: Methanol recovery for route 1



ROUTE -2: 3-Column scheme

Biodiesel and Glycerin phase are separated first. Biodiesel contains nearly ~10% (wt) methanol whereas glycerin contains nearly ~50-60% (by wt). From these two different streams, Methanol of 97% (by wt) can be recovered by using two different atmospheric continuous distillation column. The column is packed with Fenix structured packing. This methanol of is distilled in separate column to recover methanol of 99.9 % (by wt) purity, which is recycled back to the reactor. The recovery of methanol is >95%.
See Flowsheet 2

Flowsheet 2: Methanol recovery for route 2



Sometimes separate evaporator is needed if water content in glycerin is greater 30% (by wt). BP grade Glycerin (99.5% wt) can be achieved by using vacuum batch distillation column.

Bio-diesel phase is washed with water as it may contain soap and traces of methanol and finally can be dehydrated in vacuum evaporator.