



## Tulsion® Ion Exchange Resins – Specialty Applications

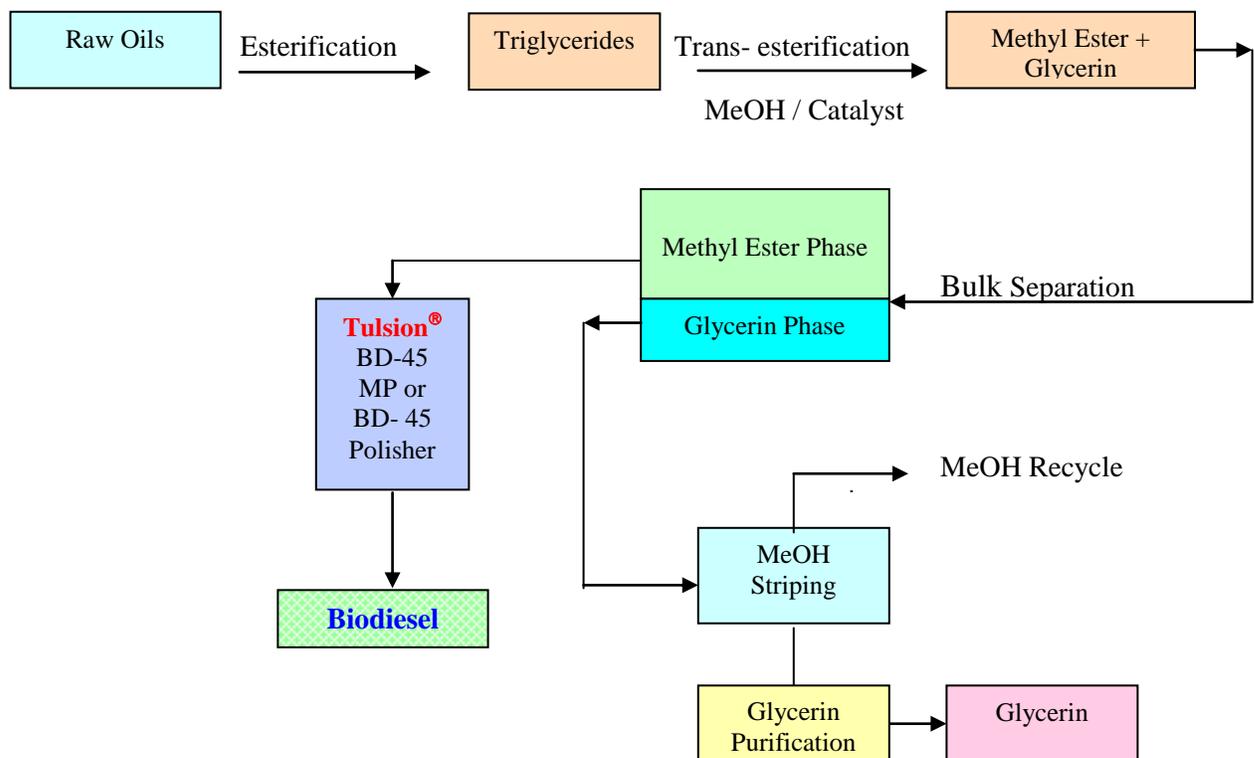
### Tulsion® Specialty Ion Exchange resins for Biodiesel Purification / Biodiesel Polishing / B 100 Purification -

Biodiesel, a clean burning fuel, is emerging as an alternate source to the fuel derived from petrochemical feedstock. It is non-toxic, biodegradable, and this renewable energy source is getting extremely popular across the globe.

#### Biodiesel manufacturing process:

Biodiesel manufacturing involves esterification of fatty acids and transesterification of triglycerides using various starting materials such as vegetable oils, waste cooking oils, animal fats etc. Trans-esterification is carried out in presence of methanol and catalysts; which yields raw biodiesel (methyl ester) and glycerin as principal products along with the soap, catalyst and methanol. This step is followed by bulk separation of the two distinct phases - Biodiesel (methyl ester) and Glycerin. The separated biodiesel (methyl ester) phase is then passed through specialized ion exchange resin column/s to remove impurities like glycerin, soaps and traces of catalyst, along with ionic salts to produce pure Biodiesel.

#### Schematic Flow Diagram:



### **Tulsion<sup>®</sup> resins for Biodiesel purification:**

- Tulsion<sup>®</sup> T-45 BD Macro – a Macroporous Strong Acid cation exchange resin with sulphonic acid functional group in hydrogen or sodium ionic form.
- Tulsion<sup>®</sup> T-45 BD – a Gel type Strong Acid cation exchange resin with sulphonic acid functional group in either the sodium or hydrogen form.
- Ion Exchange resin technology plays a crucial role in the purifying of raw biodiesel fuel (moved from preceding section)
- Both Tulsion<sup>®</sup> specialty resins are offered in dry form
- Purification with Tulsion<sup>®</sup> resins achieves highest quality biodiesel as per the norms of EN or ASTM. (European and American norms)

### **Highlights of Tulsion<sup>®</sup> speciality resins for Biodiesel purification:**

- Engineered to handle desired pressure drops and flow kinetics.
- Specifically designed pore size for effective processing of long chain hydrocarbons. (for Macroporous type)
- Highly compatible with variation in the process feed, temperature and pH.
- Treats diverse bio-diesel qualities originating from varied sources of triglycerides.
- Possibility exists to regenerate spent media thereby achieving lower process and disposal cost.
- Tulsion<sup>®</sup> resins are being used as the initial media for new systems and have also successfully replaced competitive resins in existing resins.
- Simple and continuous process compared to messy water separation or other competing processes.

### **Life of Tulsion<sup>®</sup> resins in Biodiesel purification:**

Tulsion<sup>®</sup> resins offer extremely good life, which also depends on following factors -

- Ester feed quality
- Process design

- Levels of soap and catalyst in resin feed. Higher levels of soap and catalyst in feed will exhaust the resin capacity and hamper its absorption ability for water and methanol.
- Effectiveness of the bulk separation process of methyl ester and glycerin
- Quality and maintenance of process equipment

### **Operations with Tulsion<sup>®</sup> Resins:**

Tulsion<sup>®</sup> resins are user friendly and easy to handle while charging, during process operations, regeneration and unloading after exhaustion.

Tulsion<sup>®</sup> resins are thermally stable up to 120 °C (250°F) and can be regenerated with suitable quantity of MeOH.

It is important to note that the Purification of methyl ester / B100 process stream with Tulsion<sup>®</sup> resin is a polishing step. It is not a substitute or alternate for bulk phase separation of the methyl ester and glycerin.

Tulsion<sup>®</sup> biodiesel purification resins are the highly productive, most cost-effective polishers with proven track records across globe.

Thermax offers expert advice in selection of appropriate Tulsion<sup>®</sup> resins and operational guidelines. Samples for trials will be made available on request.



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**CHEMICAL DIVISION**  
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TI/T-45 BD & T45 BD Macro/ 01/20/09

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