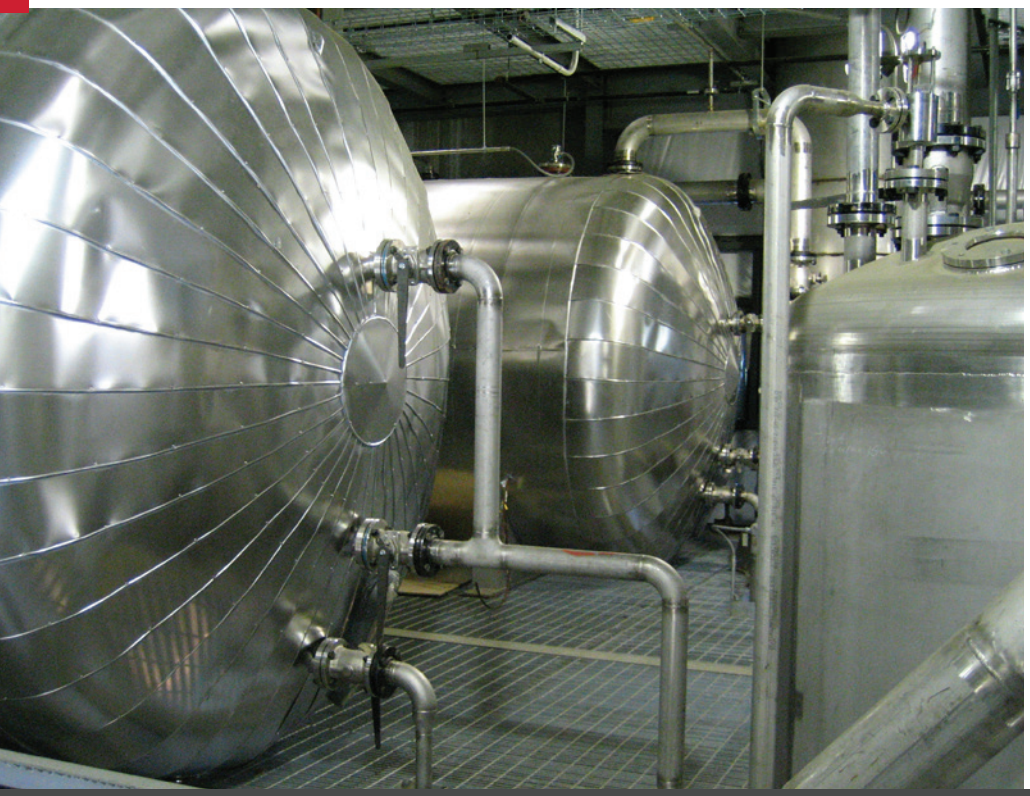
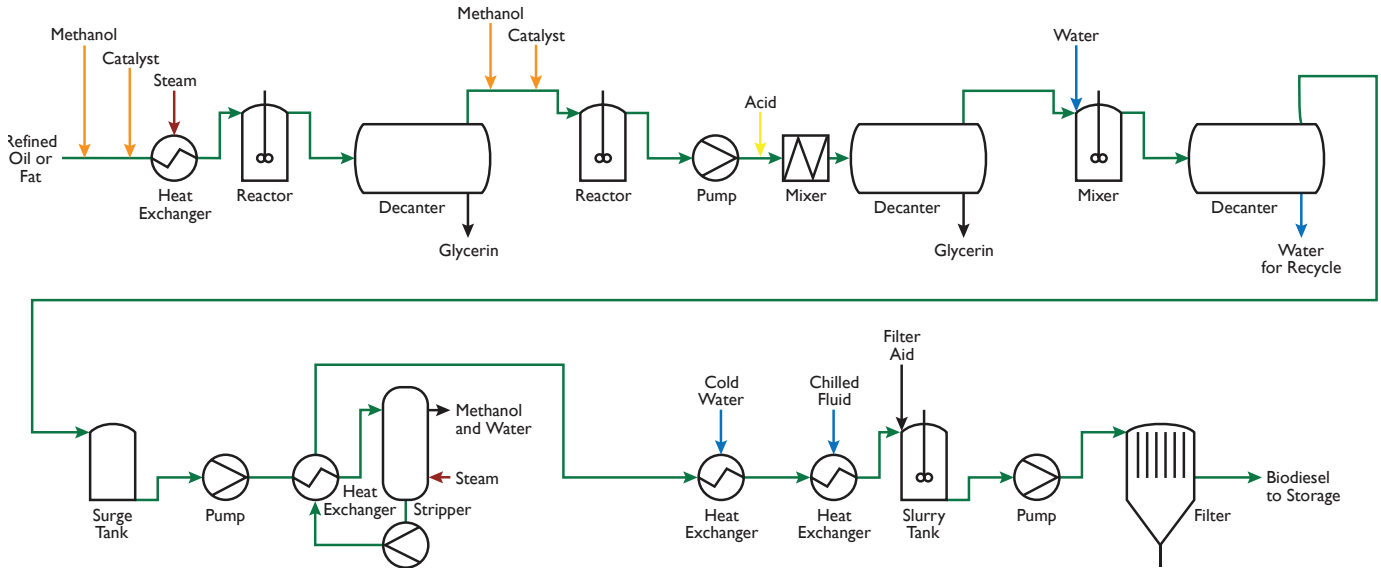
CPM Crown's Biodiesel Process



CONTINUOUS TRANSESTERIFICATION PROCESS

CPM Crown's biodiesel process uses a two-step transesterification reaction followed by neutralizing and washing steps. The two-step transesterification reaction converts nearly 100% of the triglycerides in the oil or fat to biodiesel (methyl ester). The excess methanol is recovered and the biodiesel is dried in the same step. Finally, the biodiesel is chilled and filtered to remove potential impurities formed below the process temperature.

CPM Crown Standard Biodiesel Flow Diagram



Glycerin Recovery

Glycerin generated in the two-step transesterification reaction is recovered and neutralized. The excess methanol is recovered and the glycerin is dried in the same step.

The glycerin is considered a crude glycerin because it contains greater than the maximum 0.01 percent salts allowed in technical grades and is less than 99% pure.

The salts are formed from the reaction of the caustic and acid used in most transesterification processes. The salts are removed when the glycerin is distilled or refined to a technical grade or higher quality.

Water Recovery

Water recovered from the water wash decanter, strippers, and methanol distillation is reused for washing the biodiesel and diluting the acid and caustic.

Methanol Recovery

The excess methanol is recovered from the biodiesel, glycerin and fatty matter, then dried and reused in the two-step transesterification reaction.

Fatty Matter Recovery

A small amount of fatty matter, typically mono- and di-glycerides, is generated in the transesterification reaction. This fatty matter does not require a separate recovery system due to the small quantity generated and can be skimmed or decanted from the glycerin storage tank.

If the transesterification process feedstock has a high amount of free fatty acid (FFA), then a separate fatty matter recovery step may be required.

Energy

The Crown design minimizes the energy required by using gravity both for separation and flow from vessel to vessel. The design incorporates heat economizers to cool one stream while heating the other.

Feedstock

The transesterification process is most efficient when the feedstock quality of the phosphorus and fatty acid is at least equivalent to refined and bleached (RB).

Removing the phosphorus and fatty acids is critical to producing the highest-quality biodiesel for the lowest cost. Phosphorus and fatty acids form a pasty substance that inhibits the reaction rate and increases the processing cost.

Other Crown Processes

Crown designs and supplies equipment for all of your Biodiesel needs:

- Preparation
- Extraction (Pressing or Solvent)
- Refining
    1. Degumming
    2. Neutralizing
    3. Silica Adsorption and Bleaching
    4. Stripping and Deodorizing
- Methyl Ester (Biodiesel) Transesterification
- Glycerin Refining

For ongoing innovation, Crown's technology and team are second to none.

CPM Crown's Global Innovation Center is a facility unlike any other. A fully functional 15,000 sq. ft. pilot plant, analytical lab and training facility, the GIC offers piloting capabilities from benchtop lab scale to multiple tons per day of continuous production, simulating real life and enabling customers to develop and test new product concepts in a confidential, controlled environment. The GIC has capabilities in preparation, extraction, desolventizing, drying, deodorizing, refining, fat splitting, renewable diesel and specialty extraction (including Hemp CBD Oil). Crown's technical expertise, R&D and full lifecycle process provide guidance and support at every step from feasibility, trials and custom processing to commercial-sized operations and aftermarket.

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