



The SulphCo® Process for Sulfur Reduction in Natural Gasoline

Overview

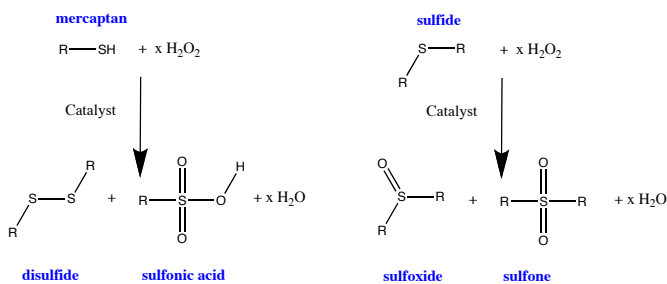
The SulphCo® process for sulfur reduction in natural gasoline, is designed to convert sulfur compounds in light petroleum to disulfides, sulfonic acids, sulfoxides and sulfones through the use of high-power ultrasound. Natural gasoline is an ideal candidate for the SulphCo® process.

The SulphCo® process consists of two steps, sonication and separation. In the sonication step, the SulphCo® process uses an aqueous additive package of hydrogen peroxide and a non-metallic catalyst. High-power ultrasound creates an intimate dispersion of these aqueous additives in the target petroleum stream. No persistent emulsions are formed. In the separation step, the aqueous reaction phase is separated from the petroleum stream by gravity.

Typical customer objectives are to reduce the sulfur concentration in the natural gasoline to a level consistent with requirements for blending into motor gasoline.

Chemistry

The chemistry of the conversion step is shown below:



Reaction conditions are typically mild, with temperatures < 200 °F and pressures < 60 psig. The aqueous additive package typically comprises < 2% of the total petroleum stream volume. The amounts of additives needed are directly proportional to the sulfur content of the natural gasoline.

The use of high-power ultrasound breaks down the aqueous / petroleum phase barrier by creating an intense cavitation field. This dramatically increases the interfacial surface between the additive bearing aqueous phase and the sulfur bearing petroleum phase, accelerating sulfur oxidation.

Apart from the conversion of sulfur compounds to disulfides, sulfonic acids and sulfones, no significant change in the properties of the natural gasoline occurs.

Process Description

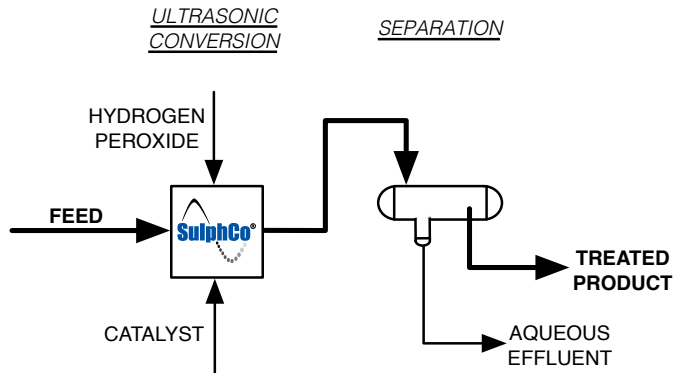
Untreated natural gasoline is sent to the SulphCo® ultrasonic processing module, which consists of a skid-mounted ultrasound reactor assembly and a feed system for the aqueous additive solutions. Hydrogen peroxide and the catalyst are injected into the natural gasoline and subjected to intense ultrasound in the reactor. Reactor residence times are typically less than 500 milliseconds. The effluent from the ultrasound reactor is an essentially homogenous phase, consisting of an extremely fine dispersion of aqueous droplets in natural gasoline.

The reactor effluent is sent to a continuous flow gravity separator, in which the aqueous droplets coalesce and drop out of the natural gasoline. An average residence time in the gravity separator is 30 minutes.



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Process



The natural gasoline is withdrawn from the top of the gravity separator. The aqueous effluent consists of water and low concentrations of the catalyst. The aqueous effluent is typically treated in existing wastewater treatment facilities or disposal wells. If desired, the catalyst can be reclaimed.

Process Advantages

Scalability

The SulphCo® process is easily scalable in response to increases in feed flow rate. The ultrasound assembly is a modular, skid-mounted unit with a processing capacity of 1,000 - 3,500 BPD. Skids are designed to work in parallel. Additional capacity is available merely by installing additional skids.

Feed Quality Flexibility

Swings in sulfur level, both gradual and abrupt, are handled easily by the SulphCo® process. Additive flow rates are automatically adjusted, in real-time, based on feed sulfur concentration; resulting in consistent, on-spec product.

Operations are Cost Effective

Operating expenses depend upon the natural gasoline's sulfur concentration.

Simple to Operate

The ultrasound assembly is completely automated, with minimal operator attention needed. Ultrasonic

probes degrade over time and must be replaced every 2+ months, requiring approximately 60 minutes of operator attention.

About SulphCo®

SulphCo® is an energy technology company engaged in the business of developing and commercializing its patented and proprietary Sonocracking™ technology that is designed to desulfurize liquid petroleum streams. SulphCo is based in Houston, Texas, and trades on the NYSE-Amex under the ticker symbol "SUF."

Contacts

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