re: Oil Refinery applications;

Dear Steve,

Sulfree™ is Guard Products' name of its aromatic imine line of chemical/natural products that react selectively with Hydrogen Sulfide, Mercaptans, and Selenides in water and petrochemicals tying up smelly Sulfur compounds.

Sulfree can be used to scavenge Hydrogen Sulfide compounds in petrochemicals and is being fine tuned for these purposes as testing is progressing. Sulfree OS-6000 and OS-6100—our highest concentration products have been found to be somewhat oil soluble and can be made for oil soluble purposes when treating in place certain sulfur compounds such as those in tar and asphalt.

With a high flashpoint, and fast capture of Hydrogen Sulfides, the Sulfree product safely captures Sulfur compounds without the hazard of formaldehyde based triazines or glyoxal. In independent laboratory side by side testing, the 60% Sulfree was faster than triazines at removing Hydrogen Sulfide suggesting that lower concentrations can be effective at removing Hydrogen Sulfide molecules.

Sulfree is

- Not Hazardous
- Not Flammable
- Not Corrosive
- Not an Oxidizer
- Not a Poison
- Not a Cancer causing agent

Sulfree

- Requires no special tanks or equipment
- Reduces generation of Hazardous Substances
- Biodegrades completely
- Requires no special tanks, pumps or equipment

Our recently developed comparison table compares the induction ratios of many different products in removing Hydrogen Sulfide from gases based on a lb/lb basis. This table relates information gathered from different sources and shows that Sulfree treatment is efficient and economical by comparison.

At an oil refinery, Sulfree was anaerobically sprayed into the highly contaminated gas stream—over 10000 ppm. The amount of Hydrogen Sulfide reduction was measured. Each Sulfree molecule removed 16 molecules of Hydrogen Sulfide. When we considered the weight of Sulfree and compared it with the weight of Hydrogen Sulfide removed and then compared the molar weights of the compounds, we obtained these numbers. We have not yet discovered all the likely reactions for this extreme rate of removal, only that it happened.

At a Bio-Gas generation site, a gas stream was contaminated with between 1600 and 2000 ppm of Hydrogen Sulfide. Single Pass Scrubbing with a 0.2% solution produced a gas stream of about 400 ppm Hydrogen Sulfide with a contact time of only 0.6 seconds and a scrubbing bed depth of 6 feet. Scrubbing the gas stream with a 5% solution of Sulfree reduced the concentration of Hydrogen Sulfide by 97%.

Our testing has also included fish toxicity and bacterial toxicity testing. Using a15% solution of Sulfree, the LC-50 for Rainbow Trout was 260 ppm.. We attempted to kill bacteria with this product. Information might have suggested that it would be bacteriacidal like formaldehyde. We sent samples off to a laboratory and came back with data that suggested that at medium concentration levels, the bacteria live just fine in Sulfree solutions. We had the tests done twice. **No bacteriacidal action. and no hazard also allows Sulfree to be released into sanitary sewers instead of being disposed of or treated as hazardous waste.**

Communication with us is important because we can tailor the Sulfree product to meet specific needs, whether for oil, gas, wastewater or scrubbing purposes and we have many varieties that may work better in differing applications. Comparisons are also important because differing concentrations or application methods may reduce the requirements for treatment or disposal.

We look forward to meeting your needs for odor and Hydrogen Sulfide removal.

Sincerely,

Guard Products Inc.