BIOMIN TECHNICAL ALERT

The Use of Oilsorb EC-100 Organoclay in a Gas Sweetening System

It is common industry practice to utilize various amines to remove acid gases such as $H^{2}S$ or $C0^{2}$ from hydrocarbons with low molecular weight. The amines most commonly used include Methyl Ethanol Amine (MEA), Diethanol Amine (DEA), and Methyl Diethanol Amine (MDEA). Aqueous solutions of these amines form complexes with acid gases which, with the application of heat, can be broken reversibly.

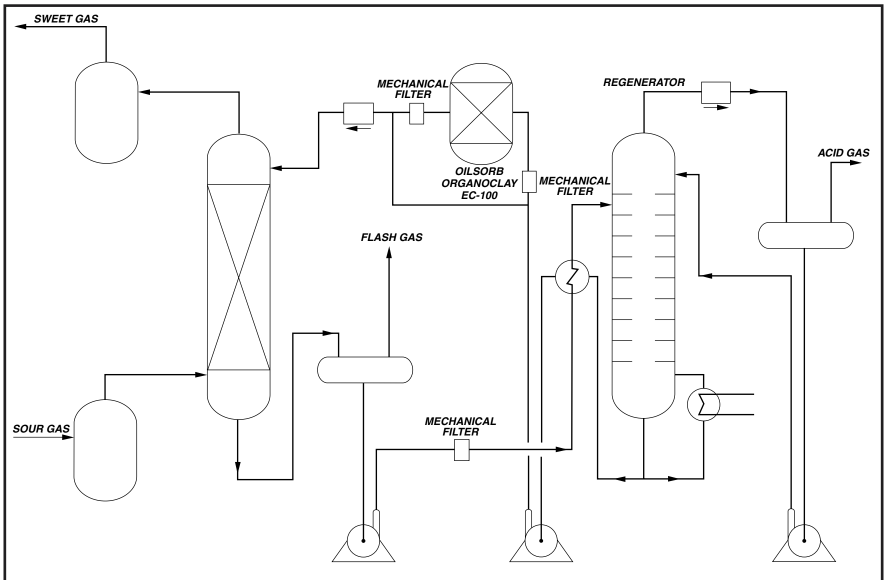

Figure 1. Use of Organoclay in clean-up of refinery's Amine System.

A typical amine system consists of an absorber, steam stripper, and condenser (See Figure 1). In the operation of these systems, certain higher molecular weight hydrocarbons are also absorbed into the amine solution, causing foaming problems with the steam strippers. To date, the only filter media used to continually remove these trace hydrocarbons has been activated carbon. This approach of treating the amine has yielded limited success.

A side-by-side test was completed which compared EC-100 Organoclay with activated carbon. Following is a discussion comparing the performance of EC-100 Organoclay and carbon under normal refinery operating conditions.

In this test, a slip stream of 6 to 10 gpm was used with average flow of 8 gpm. The total system flow of amine was 40 gpm; therefore, the slip stream was approximately 20% of the total flow. The carbon column used was 5 feet in diameter and had a bed depth of 36 inches. This yielded an aerial flow velocity of 0.4 gpm/ft^2. The EC-100 Organoclay column was 54 inches in diameter with a 36 inch bed depth, resulting in an aerial flow velocity of 0.5 gpm/ft^2.

The data collected concerning activated carbon filtration covered approximately 3 weeks while the data collected concerning EC-100 Organoclay covered slightly less than 3 months. The short duration of monitoring carbon was used to determine a base line for internally deciding whether or not to continue the EC-100 Organoclay test. The influent and effluent samples were tested by an outside laboratory for oil and grease contents.

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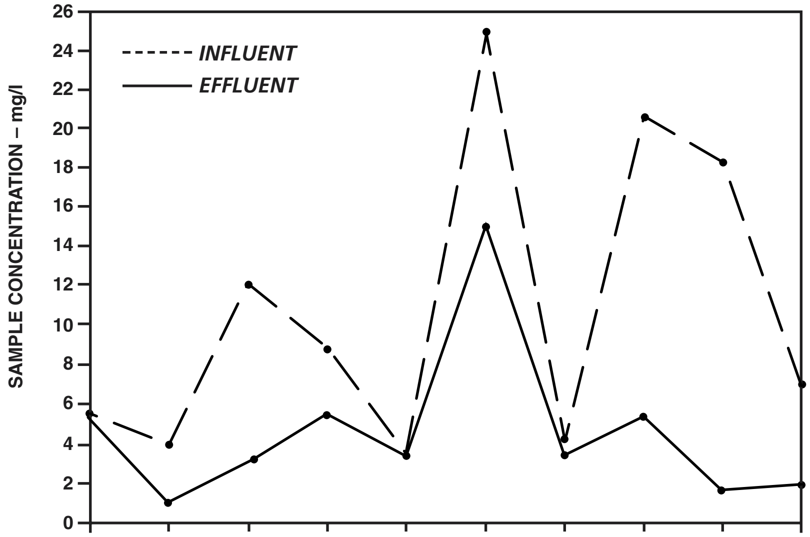

Figure 2. Carbon Filter 30-day Test

The influent and effluent concentrations of oil and grease for both carbon and EC-100 Organoclay are graphically presented here in Figures 2 and 3. In comparing the data, several observations are in order.

First, in comparing average influent and effluent concentrations over the two test periods, it is seen that the average influent concentrations for carbon of 10.9 ppm are considerably lower than those for EC-100 Organoclay of 15.5 ppm, yet the average effluent quality for EC-100 Organoclay of 3.1 ppm was far lower than for carbon of 4.7 ppm.

Secondly, the overall average removal efficiency for carbon (57.0%) was much lower than that of EC-100 Organoclay (80.0%). This higher removal efficiency means much quicker cleanup of the system after upset periods. However, removal rate changes with influent concentration level show these average removal rates to be somewhat misleading. At high influent concentrations (>20 ppm) the EC-100 Organoclay has an average removal rate of 94% as compared to carbon with 57%. Again, this would strongly affect the impact of upsets on the system. At lower concentrations (<15 ppm) that occur more than 70% of the time, the removal rate for EC-100 Organoclay and carbon are 56% and 38% respectively. It is clear that at both high and low influent concentrations, EC-100 Organoclay provides superior removal capabilities.

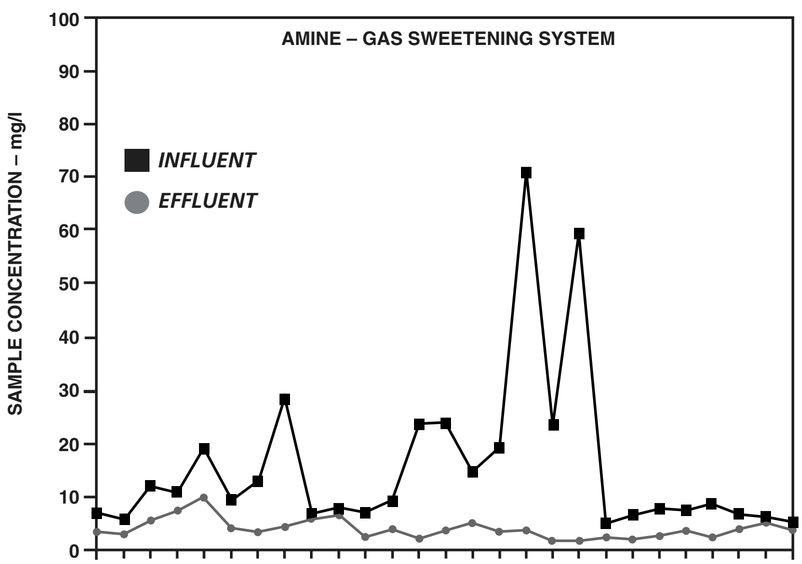

Figure 3. 3-month Organoclay Amine Sweetening System Lab Test

Another interesting factor to note is a stabilization of the EC-100 Organoclay column after the first two weeks of operation, averaging 2.1 ppm effluent concentration. Thirty-five percent of the time, oil and grease effluent was at or below detection limits. This stabilization phenomena has been observed in other operations and appears to be related to a conditioning of the EC-100 Organoclay bed. In addition, the EC-100 Organoclay will sorb 4 to 5 times more oil and grease than carbon.

All of the above factors resulted in the refinery adopting Oilsorb EC-100 Organoclay in place of carbon for cleaning their amine system.