H2S Pro-3 in Refining

Introduction:
Additive Direct Services has brought to market the Pro-3 series; an innovative non-amine/non-aldehyde H2S scavenger for crude oil applications. A need was identified to reduce fouling created by amine based scavengers in refineries, production streams and crude oil terminals, while keeping the treat costs similar as traditional MEA Triazine.

Reaction Overview:
\[ R(Pro3) + H_2S \rightarrow R'SO_4^- + H_2O \]
- **Pro-3** will chelate the H2S molecules and turn them into an aqueous, non-toxic sulphate salt
- The heavier sulphate salt molecule will drop into produced water stream
- Reaction is fast and irreversible.
- Active component of the **Pro-3** is stable up to 300°C.
- **Pro-3** will react instantaneously with H2S once contact is made.
- **Pro-3** will also react with lower chain mercaptans.
  - Mercaptan reaction time may take up to 24 hours depending on mercaptan types.
- **Pro-3** will react with carbon dioxide
- **Pro-3** will not react with double bonded mercaptans

Separation
- The density of the active **Pro-3** components is 9.18 lbs/gallons.
- Promotes efficient separation from crude oil within 12-24 hours.
- Washes out in the desalter.

The high specific gravity of this product is designed to promote efficient separation from the crude oil when transferred into separators or storage tanks. Complete separation is usually achieved within 12-24 hours depending on the viscosity of the hydrocarbon being treated.

Any **Pro-3** left within the crude oil, should wash out in the desalter. The water soluble sulphate salts of the reacted product are typically separated from the crude oil at this stage of the refining process.
Waste Water Treatment Plant

Background

Pro-3 will react into a stable non-hazardous sulphate salt (SO$_4^{2-}$). Lab testing has shown that Oxygen Uptake Rates (OUR) in a waste water treatment plant (WWTP) will increase as a function of Reacted Pro-3.

Water samples from a refinery’s WWTP were obtained and dosed to mimic a scenario where Pro-3 would enter the WWTP at 10, 20 and 30 gallons per minute.

Results

Data from the testing can be seen in Figure 1 below.

![Figure 1: WWTP OUR with Pro-3 Effluent](image)

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