Nufarm Inhibitors for the Ethylene Train

Naphtha or light gasses are “cracked” to give the range of unsaturated monomers that are used to produce many of our polymers used in everyday life. In various amounts, ethylene, propylene and butadiene are produced and separated by distillation. C4s including butadiene can be purified remotely and are often traded. C5+ materials are also produced.

Stable free radicals are well established in the purification of ethylene and propylene. Nufarm staff have many years of experience in the industry and can advice on dosing locations and quantities to prevent fouling.

We currently supply products to both depropanisers and debutanisers.

Case History: In 2010 we were approached by a company with severe fouling problems in their debutanizer unit. Typical run-lengths before shutting down to clean the column were 150 days only. Nufarm treatment was started in September 2010 and the plant ran for 4 years until turnaround with no indication of fouling, no pressure drops and no change in steam valve settings. The benefits of this increased run-length on production efficiency and costs are huge.

Nufarm Inhibitors for Compressors

The compressor is one of the most important components of the cracker unit and it can easily suffer from fouling due to the presence of unsaturated species such as styrene and butadiene in the process stream. Many treatments are available, such as wash oil or wash water, dispersants, or polymerisation inhibitors. In many cases a combination of these are used to keep the compressor free of fouling. The best combination of products and the best place for the addition of the treatment is something that Nufarm can help you to select.

Nufarm Inhibitors for Caustic Towers

Acidic gases are created during the thermal cracking of steam-cracker feedstocks. The preferred choice for removing these acid gases from the cracked gas is by absorption using dilute caustic soda. The Caustic Tower is designed to remove these acid gases.

In addition to acid gases, oxygenated compounds, including carbonyl compounds such as aldehydes, are formed in the furnaces.

Most of these carbonyl compounds are absorbed into the caustic solution and in the conditions found in the column will undergo aldol condensation. The aldol condensation reaction products have a characteristically orange to red colour.

As the reactions progress, the colour will intensify and an oily, viscous hydrocarbon liquid phase is produced. If left unchecked, an aldehyde resin material is formed. This is fouling material that forms sticky deposits found in many caustic systems.

Nufarm have an industry approved treatment, Inhibitor AHM E830, for the prevention of aldol polymer in the caustic tower. We can also supply free radical inhibitors to prevent monomers polymerizing in this tower.

The effect of Nufarm's inhibitor E830 for red oil is shown below. Increasing amounts of inhibitor from left to right show the prevention of aldol polymer.

Nufarm Inhibitors for Pygas and Pygas Hydrotreating

Pyrolysis gasoline (pygas) is the cut of heavier molecules (C5+) that is generated by the cracking of naphtha. It is used as a feedstock for BTX units and is transported and traded in bulk.

Nufarm supplies Pygas stabilisers that can be added to the pygas during transport to prevent the formations of gums or polymer whilst in transit. These are particularly useful if the pygas is to be stored for any significant time or transported through hot climates.

Pygas can be hydrotreated (hydrogenated) to remove unsaturated compounds from the stream. This process is hot, and fouling caused principally by styrene and cyclopentadiene can occur in the reboiler and heat exchangers.

Case History : The catalytic reformer in a BTX unit has been treated with our stable free radical inhibitor AHM B239 for 10 years. Before treatment the catalyst required regeneration 2-4 times per year, after treatment a record run-length of 590 days was achieved.

Nufarm Inhibitors for Chlor-Vinyls

Vinyl Chloride monomer (VCM) is a very large volume monomer whose polymers have a wide range of application in both flexible and rigid forms. The most common method of production is via ethylene dichloride (EDC).

EDC is prepared by reacting ethylene and chlorine. This process is very selective, resulting in high purity EDC and high yields. When the EDC is heated to 500 °C at 15–30 atm (1.5 to 3 MPa) pressure, EDC vapour decomposes to produce vinyl chloride and anhydrous hydrochloric acid.

Even though residence time and temperature are carefully controlled, it produces significant quantities of chlorinated hydrocarbon side products. In practice, EDC conversion is relatively low (50 to 60 percent). The furnace effluent is immediately quenched with cold EDC to stop undesirable side reactions. The resulting vapor-liquid mixture then goes to a purification system.

VCM itself does not cause significant fouling problems during purification but some of the by-products of the cracking process do so. Chloroprene can foul the Lights column and Nufarm can supply inhibitors to keep this column free of polymer and reduce the amount of valuable product lost to waste.

Vinylidene Chloride is produced by the alkaline de-chlorination of 1,1,2-trichloroethane and has a tendency to polymerize during purification. Nufarm Technical Services can offer advice on the best inhibitors to use to prevent this based on our past experiences in commercial units.