Nufarm Crude C4 Inhibitors for Butadiene Units

Crude C4 cuts are produced by crackers and contain varying amounts of the valuable monomer 1,3-butadiene. These can be processed on site but can also be transported and traded for processing at sites remote from the crackers.

Butadiene can form polymers during storage and transportation, both poly-butadiene rubber and, via reaction with oxygen, polyperoxides that are highly unstable and hazardous.

Crude C4s are therefore stabilized during transport and the ideal product is one which combines a phenolic anti-oxidant to remove poly-peroxides and a stable free radical product that can prevent any polybutadiene formed from carbon radical reactions.

Nufarm's crude C4 stabilizer, Inhibitor AHM E870, is designed to perform these functions and has been successfully used for several years by a major butadiene producer.

Nufarm Polymerization Inhibitors for Butadiene Production

Butadiene is extracted and purified from a crude C4 stream using several different technologies. The basic principle of them all is to use a solvent to extract 1,3-butadiene from the other stream components, the solvent and butadiene are then separated by distillation and finally polymer grade butadiene is purified in a final distillation step.

There are two types of polymer that can form in a butadiene distillation unit

- Polybutadiene rubber
  - This is formed by carbon-carbon radical reaction and is characterised by soft polymer. The process can be inhibited with stable free radical inhibitors and Nufarm have been providing these compounds to butadiene producers for over 15 years. It is normal to achieve 5 year run-lengths between mandatory shutdowns using these products. Nufarm can provide a custom product for your plant and advice is available from our Technical Service Team.
  - Products Available
    - Inhibitor AHM B238 (>16 years of commercial use)
    - Inhibitor AHM B247 (>13 years of commercial use)
    - Inhibitor AHM B239 (>10 years of commercial use)
- Popcorn polymer
  - This is formed when oxygen ingress occurs and is characterised by white or yellow globular polymer that grows from the inside out and can damage equipment through uncontrolled growth. Excellent engineering and operator controls are required to prevent oxygen ingress because there are no polymerization inhibitors capable of preventing popcorn polymer growth once it has seeded. The characteristic of the popcorn polymer of growing in the vapour phase and containing internal radical sites means that conventional inhibitors are ineffective and adding volatile inhibitors runs a serious risk of product contamination. The Nufarm Technical Service Team can advise on industry best practice to prevent popcorn polymer.

Nufarm Polymerization Inhibitors for Butadiene in SBR Plants

Styrene butadiene rubber is used primarily in the production of car and truck tyres and is produced using either solution or emulsion polymerisation.

There are a number of applications for inhibitors and anti-oxidants in the production of the SBR rubber to keep the process running smoothly

- Butadiene is re-distilled before use to remove stabilisers
  - **Inhibitors are used for this**
- The polymerisation reaction can be stopped by the addition of short stopping agents
  - ***Inhibitors are used for this***
- Unreacted monomers are then stripped off for recovery
  - Butadiene is stripped by flash distillation followed by vacuum distillation
  - Unreacted Styrene is removed by steam stripping in a vacuum column
  - ***Inhibitors are used to prevent polymerisation here***

Nufarm is the supplier of inhibitors, anti-oxidants and technical service to a major producer of SBR in Europe