

ACTIFY™

BREAKTHROUGH POLYMERIZATION CONTROL

FOR STYRENE PRODUCERS

DORF KETAL™

*Innovation isn't just what we do.
It's who we are.™*

Breakthrough Protection: 30% to 50% Better Polymer Control at Lower Total Cost

Used together, Dorf Ketal's activated inhibitor and retarder formulations provide unprecedented polymerization control throughout the distillation section, from lights removal right through to tar recovery.

Throughput and run time increase, tar output and maintenance costs decline and product quality improves. It all adds up to lower total operating cost, a substantial improvement that you'll see on your bottom line

There is nothing else like it.

- Extended induction time
- Faster reaction kinetics
- Effective at high temperatures
- Works at lower dosages
- Reduces or eliminates DNBP
- Effective in the presence of DVB
- Stable in long-term storage
- Non-toxic, easy to handle
- Effective with or without oxygen
- Zero carry-over into tower overheads and styrene monomer

THE WORLD'S HARDEST WORKING STYRENE POLYMERIZATION CONTROL SYSTEM

The **1st** **ACTIVATED 4HT True Inhibitor**

Dorf Ketal's innovative activated true inhibitor inhibits polymerization longer than conventional 4HT "true inhibitors" and then continues to work as a retarder after the initial reaction!

The result is the best, longest-lasting polymerization protection available from any true inhibitor.

The **1st** **ACTIVATED DNBP Retarder**

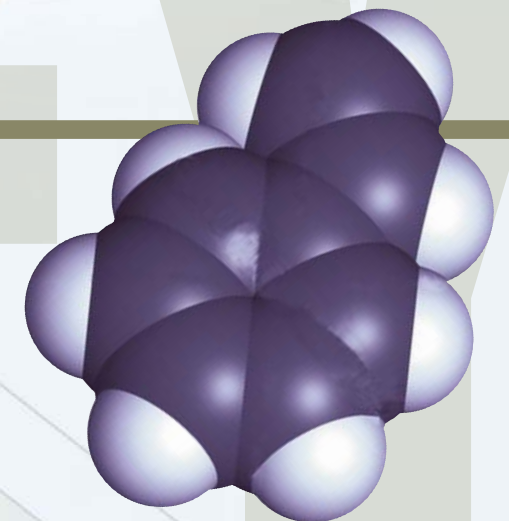
Dorf Ketal's unique activated DNBP retarder substantially outperforms DNBP alone and works at much lower dosages, even at extreme temperatures.

You get better polymer control with less DNBP, which means less toxicity and lower NOx emissions during incineration.

The **1st** **GREEN** **ACTIVATED DNBP-Free Retarder**

You don't have to use DNBP to benefit from Dorf Ketal's new activated chemistry.

The same industry-leading protection is also available in an activated **DNBP-free** retarder that is completely non-toxic and non-hazardous to aquatic organisms.



Styrene Polymerization is Costly

Styrene polymerizes rapidly in the dehydrogenation and distillation sections, especially in the presence of DVB, peroxides and other precursors.

This fouling reduces throughput, increases tar and can contaminate the monomer.

Removing significant accumulations can be difficult and may entail lengthy shutdowns.

Inhibitor or Retarder?

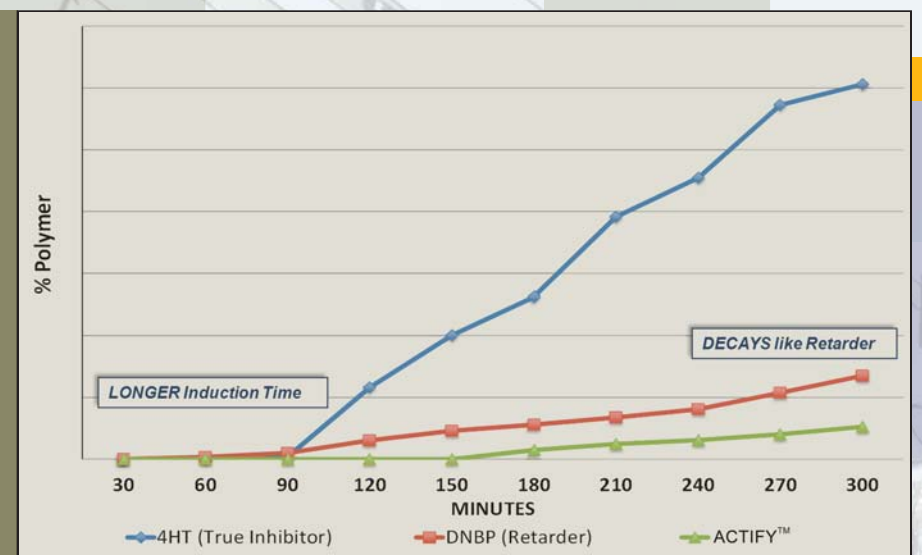
Conventional "true inhibitors" prevent polymerization so long as they are unreacted (*the induction period*), but polymerization proceeds rapidly when they are consumed.

Retarders don't actually prevent polymerization, they slow it down, and they remain effective until they leave the system. In the event of a plant upset a retarder can provide control until the problem is resolved.

Innovative Dorf Ketal technology sets a new performance standard for both types of protection. **ACTIFY™** is simply a better choice, whether you prefer an inhibitor, a retarder or both.

ACTIFY™

**Inhibitor
Performance
with the
Protection
of a
Retarder**



**INNOVATIVE
TREATMENT**

FOR STYRENE PRODUCERS

DORF KETAL

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**Specify
Dorf Ketal
Activated Protection**

**ACTIFY™ your
Styrene Plant**



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It's who we are.™*

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Activated Inhibitor and Retarder Increase Revenues and Improve Wastewater Treatment

A 120 KTA styrene plant in Asia experienced fouling problems during startup that forced them to reprocess significant quantities of off-spec material containing high levels of heavies and polymers. This resulted in very high styrene losses in their tar column bottoms. The plant applied high dosages of DNBP to compensate, which caused unacceptable waste water contamination.

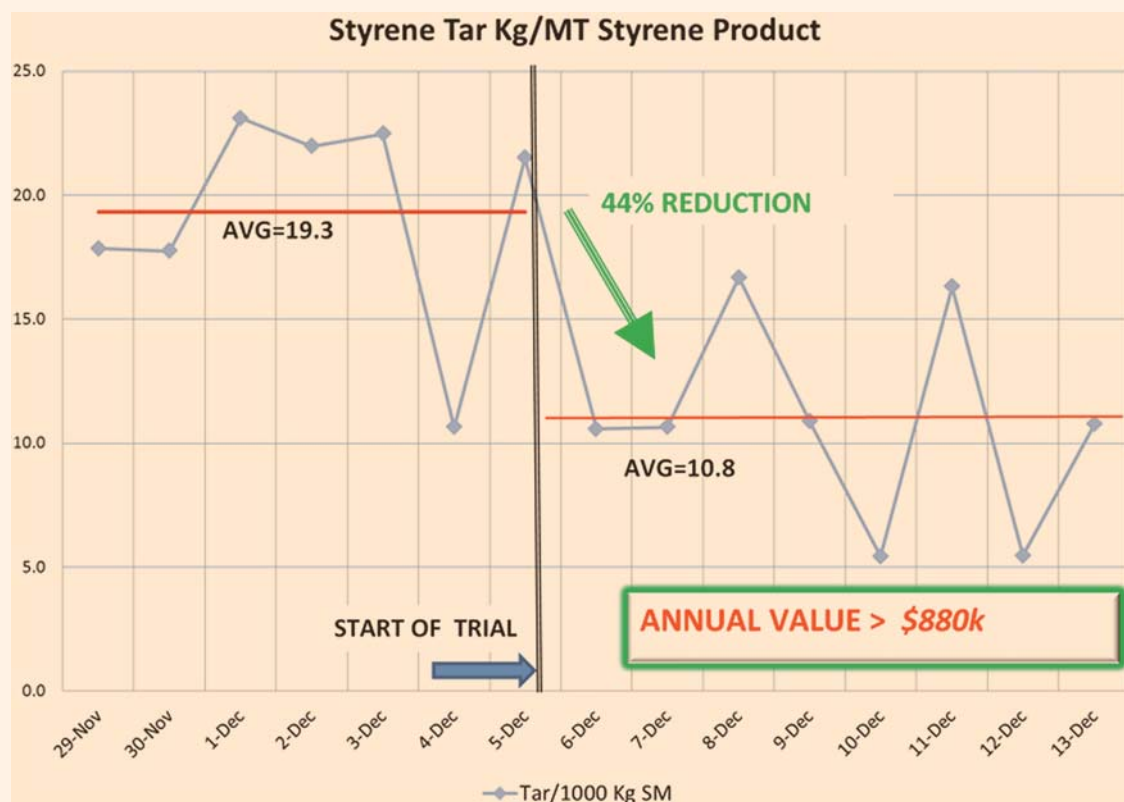
Dorf Ketal's technical team prescribed a new, non-toxic activated true inhibitor and activated retarder that allowed the plant to control polymer formation and reduce DNBP usage by more than 90 percent.

The plant's styrene recovery rate increased by 50 kg/h during the trial and tar recycle decreased by more than 50 percent. The resulting reduction in tower loading allowed the plant to increase distillation feed and throughput, substantially improving revenues.

Bottom Line: Dorf Ketal treatment increased plant revenues more than \$ 74,000 USD per month. DNBP water contamination problems were eliminated.

Performance Observation: Even with very high content of heavies in the feed, the required total dosage of non-toxic inhibitor and activated retarder was significantly lower than that of DNBP alone.

Savings with Dorf Ketal Activated Polymerization Control Chemistry



Another
Case
Study
on
Reverse
Side

Activated Inhibitor and Retarder Solves Costly Maintenance Problem

A 120KTA Lummus ethylbenzene process styrene monomer plant in China experienced severe fouling in the primary tower despite the use of conventional dispersant and antipolymerant, forcing the plant to clean the filter and bottom pump strainer daily. The severity of the problem is evident in Figure 1 below.

Dorf Ketal's technical team recommended the new, non-toxic activated true inhibitor and activated retarder, which eliminated the fouling problem. The results are shown in Figure 2 below.

Bottom Line: The plant substantially reduced maintenance cost and downtime, improving profitability.

Performance Observation: Prevention is the best way to manage costly styrene polymerization, and nothing works better than Dorf Ketal's new activated inhibitor and retarder.

Figure 1: With Conventional Treatment Program



Figure 2: With Dorf Ketal's Treatment Program



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