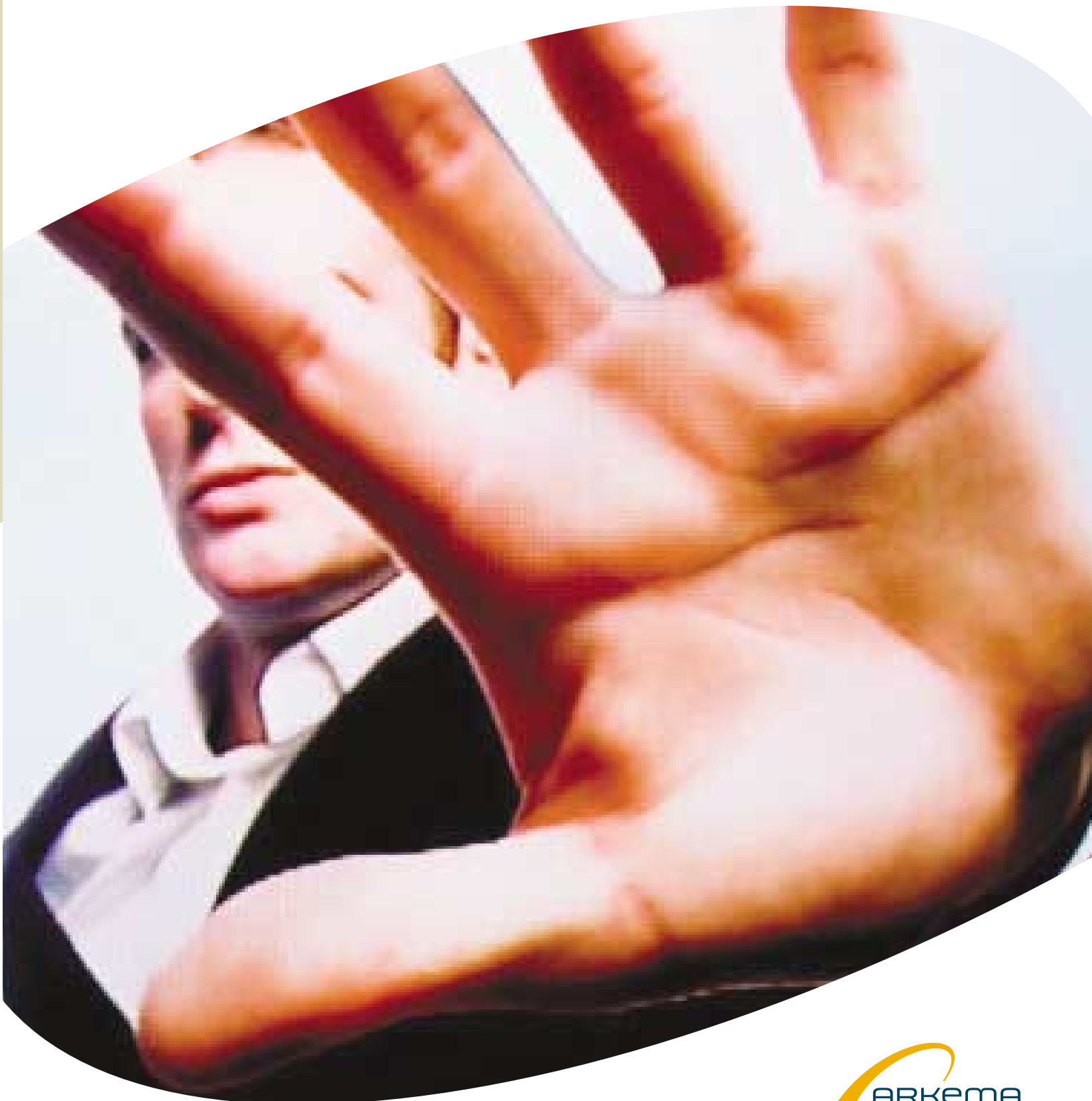


# Term-N-ator<sup>®</sup> P

The most effective  
shortstopper for PVC...ever!

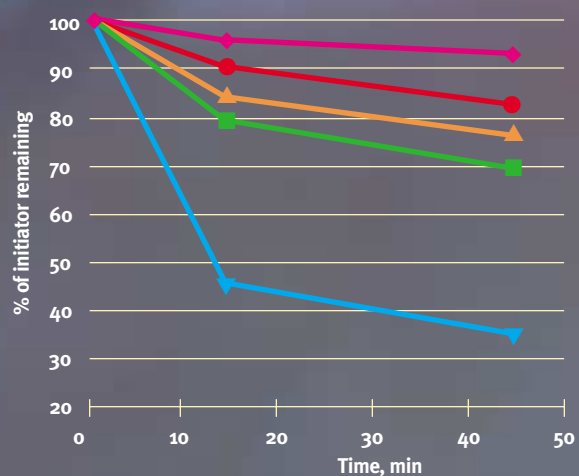


# Term-N-ator<sup>®</sup> P

Arkema is proud to promote Term-N-ator<sup>®</sup> P, a specially formulated, powerful radical scavenger specific for the PVC industry that combines high radical efficiency, excellent water solubility, and low toxicity.

In the suspension process of polyvinyl chloride (PVC), radical scavengers are used to stop the polymerization process and provide residual antioxidant in PVC resins. The use of such a radical scavenger, commonly referred to as a shortstopper, not only removes residual organic peroxides used in the process but also helps control the cross-linking density of the PVC resins. As such, shortstoppers impart to PVC resins improved thermal stability and product quality.

## An efficient radical scavenger



Term-N-ator<sup>®</sup> P shortstopper exhibits excellent kinetics in reacting with organic peroxides. In a benchmarking study, Term-N-ator<sup>®</sup> P shows much faster reaction rate toward Lup 223 (di 2-ethyl-hexyl peroxydicarbonate) than do conventional radical scavengers such as Bisphenol A (BPA), sodium nitrite and Irganox<sup>®</sup>.

◆ Control    ▼ Term-N-ator P    ▲ BPA    ● NaNO<sub>2</sub>    ■ Irganox

## As a PVC shortstopper

With its high radical scavenging efficiency, Term-N-ator<sup>®</sup> P stops PVC processes upon its addition to the PVC reactor. The amount of Term-N-ator<sup>®</sup> P shortstopper needed to stop the polymerization process depends on the residual peroxide level at the time the shortstopper is introduced.

### Comparative Shortstopper Performance\*

Shortstopper	Molar Efficiency (per mole peroxide)	Weight Efficiency (wt SS per wt BPA)
BPA	5.6	1.0
BHA	<1.2	<0.2
Irganox <sup>®</sup>	7.8	2.3
NaNO <sub>2</sub>	<1.8	<0.1
Term-N-ator <sup>®</sup> P	6.6	0.5

\*Data are developed with peroxydicarbonate as a single initiator. Molar efficiency is defined as the mole of shortstopper needed to stop the process when 1 mole of residual peroxydicarbonate is present in the system. Weight efficiency is defined as the weight of shortstopper needed to stop the process when 1 part (by weight) of BPA is needed for the same purpose.

Irganox<sup>®</sup> is a registered trademark of Ciba Specialty Chemicals Corporation

## Use it sparingly!

Term-N-ator<sup>®</sup> P is a highly effective shortstopper. So be careful to use only the amount appropriate for your process.

Here's how it works: As you may know, VCM is added to a hot, emulsified, aqueous solution and initiators are added to start the polymerization process. The reaction is carried out at elevated temperature and pressure. After several hours, the pressure in the reactor starts to decrease as the VCM is consumed. When the pressure drops anywhere from 2 – 20 psi, the reaction is mostly complete and that's when Term-N-ator<sup>®</sup> P is added to the reactor. Only about 10 – 100 ppm of Term-n-ator<sup>®</sup> P is required to stop the reaction at the desired stage. Unused VCM is recycled as Term-N-ator<sup>®</sup> P remains in the aqueous suspension.

## Food contact application

Term-N-ator<sup>®</sup> P may be used in PVC food contact applications without restrictions as set forth in 21CFR176.170 © Keller & Heckman May 19, 2004

We have developed a highly sensitive, in-house method to analyze residual Term-N-ator<sup>®</sup> P in PVC resins (detection limit: 10 ppb), and our results have indicated that no residual Term-N-ator<sup>®</sup> P would be present in PVC resins when it is used as a shortstopper. (We cannot guarantee that other similar shortstoppers are not present in PVC resins as Term-N-ator<sup>®</sup> P is specifically formulated for shortstopping PVC free radical reactions.)

## As a PVC stabilizer

Term-N-ator<sup>®</sup> P could be introduced to PVC compounding formulations to improve the color for extruded products, but an overload of Term-N-ator<sup>®</sup> P is detrimental.

Additive	PVC Yellowness Index			
	2 Min.	4 Min.	6 Min.	8 Min.
None	21.7	43.9	81.7	114.3
10 ppm Term-N-ator P	22.8	39.5	76.5	111.8
35 ppm Term-N-ator P	20.4	39.3	69.7	108.3

Experimental: Term-N-ator P was added as part of compounding formulation. A good representative time for color determination is ~6 mins.

### Term-N-ator<sup>®</sup> P Highlights

- High efficiency & low toxicity
- High water solubility
- Water as solvent to deliver
- Less VOC emission
- No residual Term-N-ator<sup>®</sup> P in PVC resins
- Multi-purpose applications
- As shortstopper
- As “runaway” reaction killer
- As process modulator
- As VCM stabilizer
- As peroxide “stunner”
- As anti-scaling agent

## Put the benefits of Term-N-ator® P in your PVC.

To request a sample of Term-N-ator® P shortstopper or for more information, including additional test results, please contact an Arkema representative at (800) 628-4453.

Please call us, and let's get started on finding the right solution for your PVC manufacturing.

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