Application Leaflet

DAPRO® BIO 9910

A 96% biobased carbon content defoamer

Unique chemistry, sustainable solutions

Key Benefits

- Vegetable composition to replace mineral oil defoamers
- Excellent defoaming properties
- Universal use for millbase and letdown process
- Universal use for different chemistries - pigmented and non-pigmented

Chemical and physical data

Composition	Emulsion of ultra fine dispersed wax particles in vegetable oil with minor addition of silicone
Active content	98—100 %
Appearance	Light amber wax liquid

Introduction

DAPRO® BIO 9910 is predominantly based on renewable materials. The defoamer is 100 % active and is an emulsion of ultra fine dispersed wax in vegetable oil. A minor addition of silicone completes the high defoaming performance.

Features

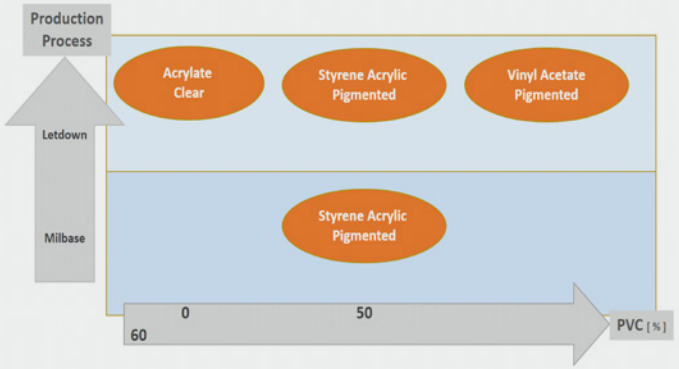
- Vegetable defoamer to replace mineral oil defoamers
- Due to its composition it increases the contribution to renewable and sustainable characteristic of formulas
- Universal use for millbase and letdown
- Universal use for different chemistries—pigmented / non-pigmented systems
- Similar or even better performance can be expected compared to mineral oil versions
- No impact on surface quality compared to mineral oil versions
- Long-term stability on the same level like mineral oil versions
- Due to the higher defoaming quality it‘s presumed that properties like scrub resistance, water sensitivity and diffusion resistance can be increased

Levels of use

Typically 0.1 - 0,5 %

A ladder study should be carried out to optimize the loading level.

FIGURE 1



Handling

DAPRO® BIO 9910 show excellent compatibility and can be used in the millbase and letdown process.

Due to the higher shear the use in millbase is favorable.

Stirring before use is recommended to ensure homogeneous material.

Keep containers tightly closed in a temperature conditioned room between 0 °C and 30 °C.

DAPRO® BIO 9910 has a shelf life of 18 months from date of manufacture.

Test results

In the following practical examples, DAPRO® BIO 9910 was tested in different formulations on its effectiveness in defoaming.

The results should provide information on different parameters of formulation comparing to mineral defoamer, DAPRO® DF 7010 (**FIGURE 1**).

1. Use in millbase vs letdown
2. Different chemistries (Acrylic vs Styrene Acrylic vs Vinyl-Acetate dispersions
3. Use in clear systems

FIGURE 2: Density

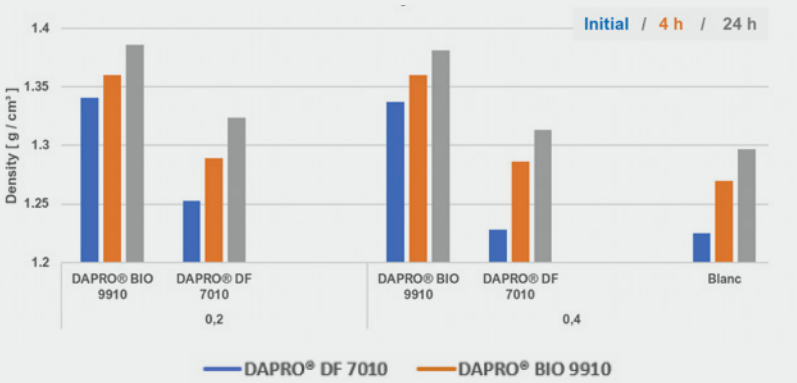
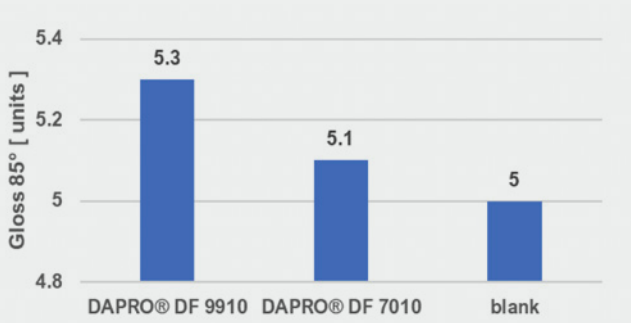


FIGURE 3: Gloss 85°



Use in millbase

The defoaming performance for millbase use was studied in a PVC 50 system based on Styrene Acrylic. Incorporation was done for 15 min at 10 m/s. Further variation was done on the loading level - 0,2 vs 0,4 %.

Density of the system was monitored over time.

DAPRO® BIO 9910 is already very effective at low dosage of 0,2 %. An increase doesn‘t provide further increased performance in this system.

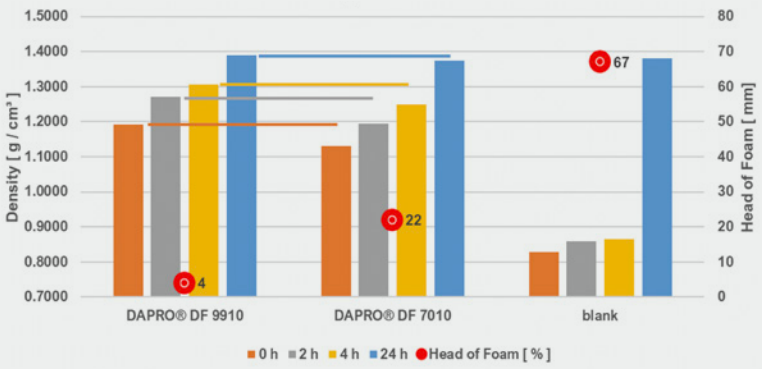
Compared to the mineral oil defoamer the vegetable defoamer is much more efficient which is confirmed by the higher density (**FIGURE 2**).

The final performance after 24 h is significantly higher than with the mineral oil defoamer. This means that the film contains much less entrapped air which can affect film properties by offering diffusion channels.

PVC 50 is matt - therefore the gloss values are very low. Nevertheless very small differences can be detected and fit to other positive observations made with DAPRO® BIO 9910. Slightly higher gloss values were seen which confirms very good compatibility (**FIGURE 3**).

Brush application-panel was free of any remaining bubbles in the film. The crater application didn‘t reveal any defect which confirms the very good compatibility of DAPRO® BIO 9910.

FIGURE 4: Density / Head of Foam



Use in letdown

The use in the letdown stage was done with the same material - PVC 50 Styrene Acrylic.

Usage level was kept to 0,2 % and incorporation was done with 4 m/s for 10 min.

Performance trend of DAPRO® BIO 9910 was confirmed as well in the letdown process. The vegetable defoamer is faster in defoaming the material than the mineral oil defoamer (**FIGURE 4**).

Head of Foam was measured and correlate with the density - means that DAPRO® BIO 9910 prevents the creation of foam during the production process.

The lower viscosity of the letdown stage allows here that material without and material with mineral oil defoamer achieves a higher density.

FIGURE 5: Density

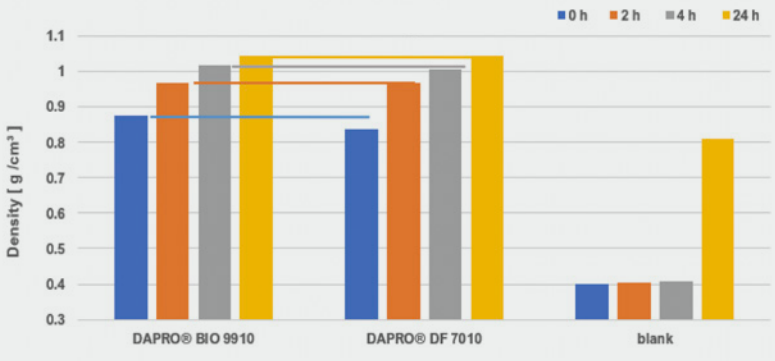
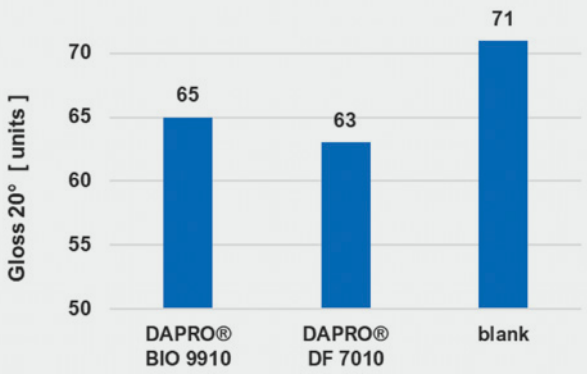


FIGURE 6: Gloss 20°



Use in non-pigmented systems

A greater challenge is posed by non-pigmented systems, which are susceptible to incompatibilities.

An Acrylic clearcoat was used to test the defoaming properties of DAPRO® BIO 9910.

The vegetable defoamer was used at a level of 0,2 % and incorporation was done with 4 m/s for 15 min.

The defoaming mechanism of DAPRO® BIO 9910 is very fast which can be noticed with the higher initial density versus the mineral defoamer (**FIGURE 5**).

The higher defoaming speed is compensated over time. The vegetable defoamer provides a similar final defoaming performance compared to the mineral oil defoamer.

Measurement of gloss reveals a slightly higher value compared to the mineral oil defoamer. This confirms again the very good compatibility with another chemistry (**FIGURE 6**).

Brush application-panel was free of any remaining bubbles in the film. The crater application didn‘t reveal any defect which confirms the very good compatibility of DAPRO® BIO 9910.

FIGURE 7

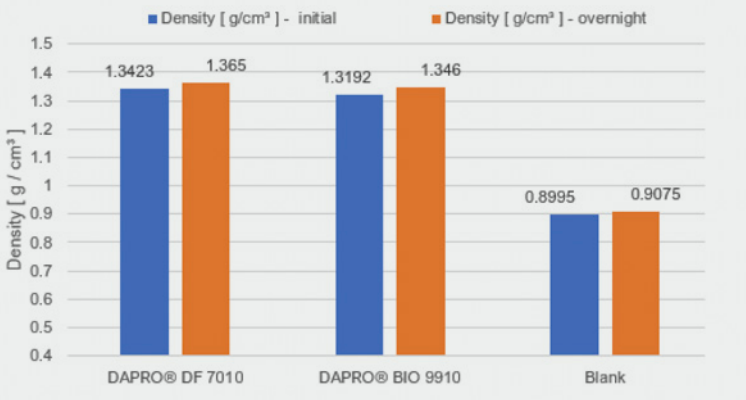
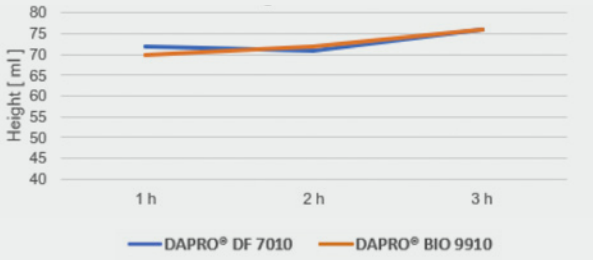


FIGURE 8: Longterm efficiency - Test after 3d @ RT
Bubbling over time



Use in non-pigmented system - Vinyl Acetate

A third chemistry was chosen for describing the performance of DAPRO® BIO 9910.

The vegetable defoamer was used at a level of 0,2 % and incorporation was done as letdown with 2 m/s for 15 min.

Performance of DAPRO® BIO 9910 is very similar to the performance on the mineral oil defoamer. Both defoamer achieved their final performance overnight (**FIGURE 7**).

Gloss values were determined but didn‘t reveal Any impact in the matt system - all values were in between 2 and 3 units at 85°.

Brush application-panel was free of any remaining bubbles in the film. The crater application didn‘t reveal any defect which confirms the very good compatibility of DAPRO® BIO 9910.

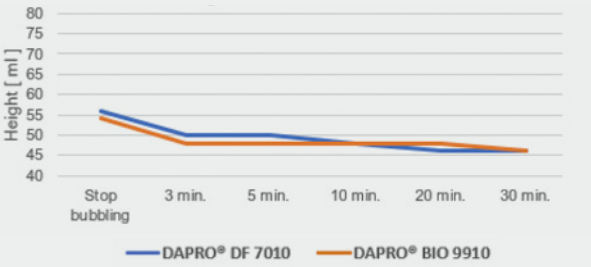
This system was used to study long-term stability.

Material was tested with bubbling test after 3d and compared to the performance of a mineral oil defoamer.

Stressing the material over 3 h doesn‘t end up in different performance compared to the mineral oil defoamer (**FIGURE 8**).

The height of foam is in both cases equal.

FIGURE 9: Longterm efficiency - Test after 3d @ RT
Defoaming behaviour after bubble test



Monitoring of the defoaming behavior after the bubbling test provide very similar defoaming performance of both defoamers (**FIGURE 9**).

Material was aged for 7d at 50 °C and the same test procedure was repeated.

Stressing the material over 3 h doesn't end up in different performance compared to the mineral oil defoamer (**FIGURE 10**).

The height of foam is in both cases equal.

Monitoring of the defoaming behavior after the bubbling test provide similar defoaming performance of both defoamers. The visible difference is within the measurement error of the test method (**FIGURE 11**).

FIGURE 10: Longterm efficiency - Test after 3d @ 50°
Bubbling over time

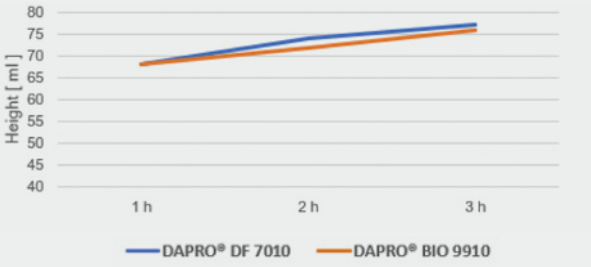


FIGURE 11: Longterm efficiency - Test after 3d @ RT
Defoaming behaviour after bubble test

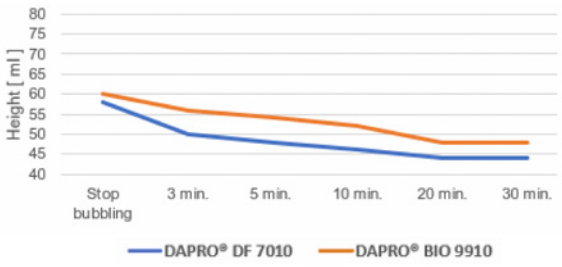


FIGURE 12: Density [g/cm³]

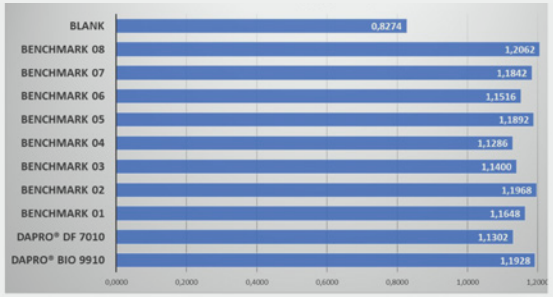


FIGURE 13: Gloss 20°

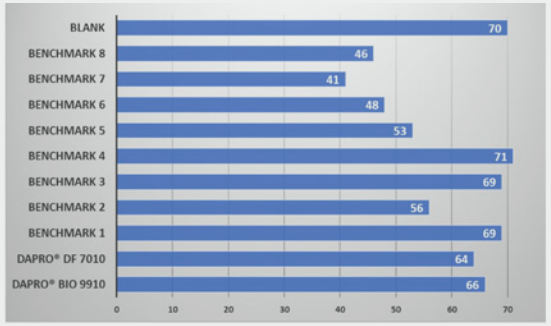
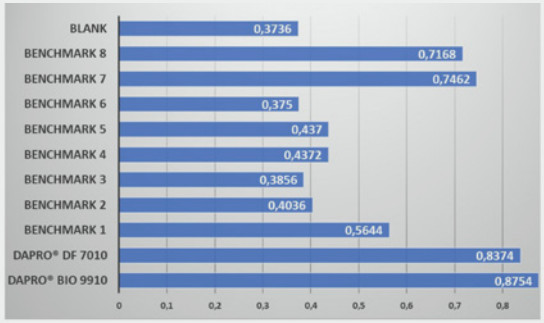


FIGURE 14: Density [g/cm³]



Benchmark testing

An extensive study was made in Styrene Acrylic PVC 50 paint. One of the best defoaming performance was offered by DAPRO® BIO 9910 (**FIGURE 12**).

Benchmark defoamers were chosen by the provided description. All are promoted for the decorative market and all products claim to have a sustainable character.

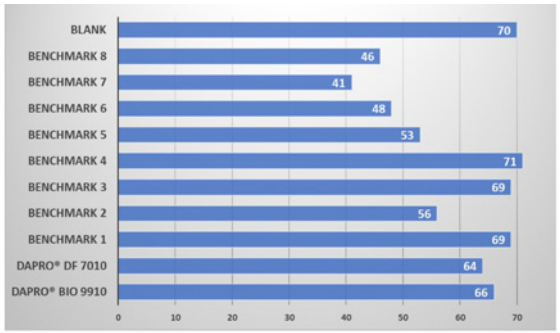
Gloss values of a matt paint are very low and difference won‘t be picked up. Nevertheless differences can be measured. It confirm all previous measurement trends of DAPRO® BIO 9910 - less impact than mineral oil defoamers and even the lowest impact compared to other vegetable / bio defoamers (**FIGURE 13**).

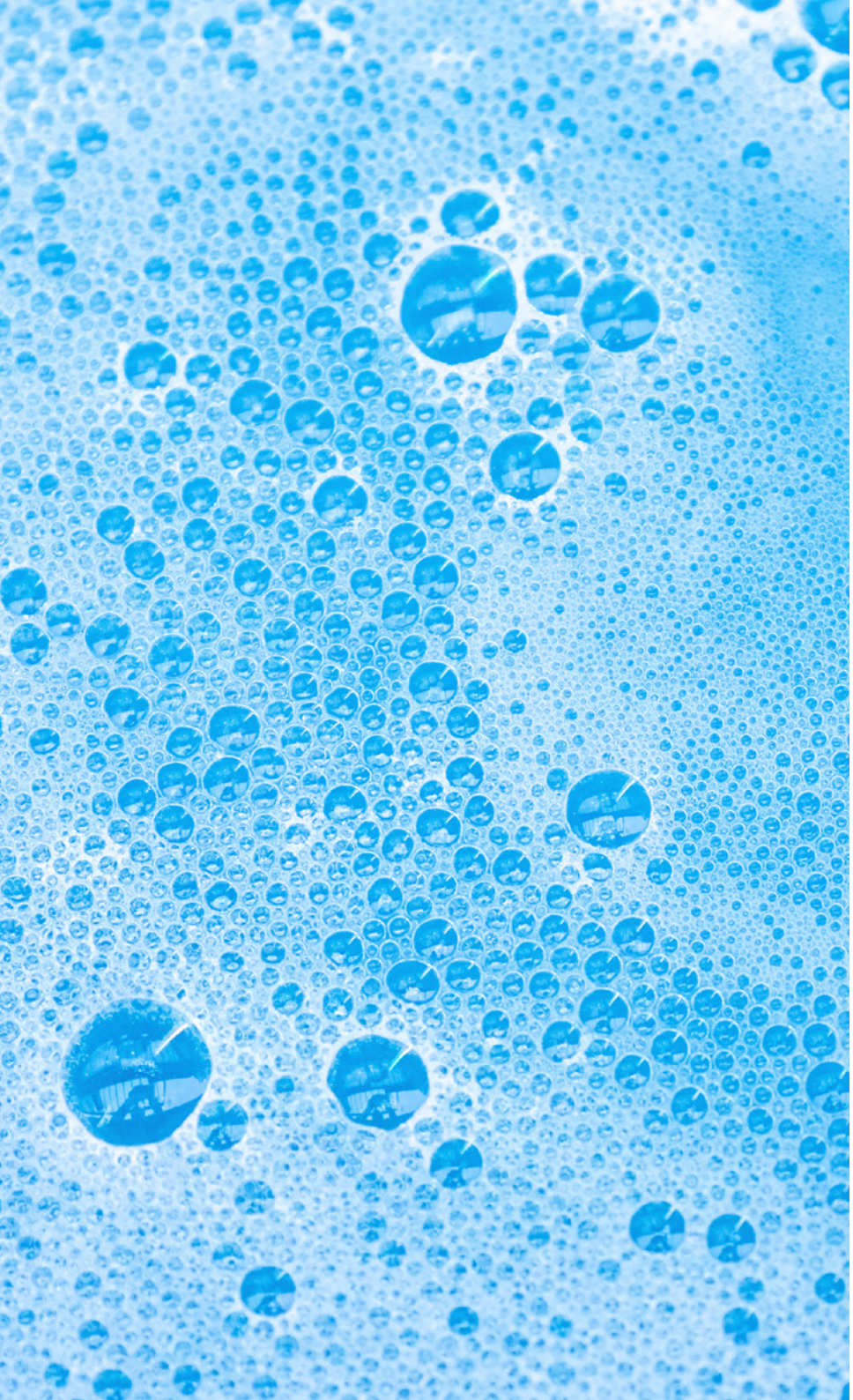
A second extensive study was made in acrylic clearcoat.

DAPRO® BIO 9910 shows here the best defoaming performance and outperforms all other defoamers (**FIGURE 14**).

In combination with the very low impact on gloss the defoamer provides the best package in performance (**FIGURE 15**).

FIGURE 15: Gloss 20°





Summary

DAPRO® BIO 9910 is a vegetable defoamer and provides the opportunity to replace effectively mineral oil defoamers.

The use is very flexible and can be used in millbase and letdown production processes.

The defoaming performance is very effective in different chemistries (Acrylic, Styrene Acrylic, Vinyl-Acetate) and different PVC (Clearcoat to high PVC).

Higher performance than with mineral oil defoamers can be expected due to effective ingredients that are responsible for defoaming. The right choice of ingredients resulted in very good compatibility which is shown in no impact on gloss, no crater, no surface defects compared to mineral oil defoamers.

Based on the excellent defoaming performance it is presumed that paint properties like scrub resistance and diffusion resistance can be improved.

Benchmark testing has shown outperforming results and the ability to provide higher performance than benchmark candidates

NOTE:

The information herein is currently believed to be accurate. We do not guarantee its accuracy. Purchasers shall not rely on statements herein when purchasing any products. Purchasers should make their own investigations to determine if such products are suitable for a particular use. The products discussed are sold without warranty, express or implied, including a warranty of merchantability and fitness for use. Purchasers will be subject to a separate agreement which will not incorporate this document.

May 2024

For more details
please contact:

North America
Elementis
469 Old Trenton Road
East Windsor,
NJ 08512, USA
Tel: +1 609 443 2500

Europe
Elementis UK Ltd c/o
Porto Business Plaza
Santos Pousada Street, 290
4300-189, Porto, Portugal

Asia
Deuchem (Shanghai) Chemical
Co., Ltd.
99, Lianyang Road
Songjiang Industrial Zone
Shanghai, China 201613
Tel: +86 21 577 40348

elementis.com

Unique chemistry, sustainable solutions