



Defoamers for Water-Based Paints

As a leading global chemical manufacturer, ICL's R&D team is continuously developing innovative solutions which enable the manufacturing of sustainable, high-quality paints and coatings.



The LOPON® defoaming agents are highly effective products for defoaming water-based formulations. In order to meet the growing need for sustainable, eco-friendly products, most of our solutions are made from bio-renewable raw materials and are free of volatile organic compounds.



What is Foam?

Foam is the inclusion of gas bubbles in a liquid medium. While gas bubbles in pure liquids migrate rapidly to the surface and burst, the surface-active substances used in paints and varnishes stabilize them.

Stabilization occurs when surfactants cover the surface of gas bubbles with their hydrophobic end while the hydrophilic side of the surfactant molecule extends into the aqueous phase. Surfactants are also arranged on the surface according to their hydrophobicity/hydrophilicity. When a stabilized gas bubble rises to the surface, it is stabilized there by a surfactant double layer.

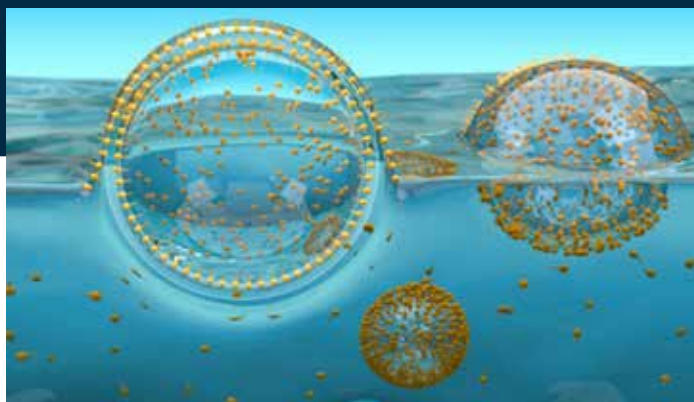
Manufacturing processes are negatively affected by stabilized foam. Shear forces necessary for dispersion are transmitted less efficiently, resulting in poor dispersion quality for the pigments and fillers.

As a consequence of volume increase in an uncontrolled manner with foam present, a drastic decrease in density results. Reproducible and reliable production and the accurate filling of containers are another problem caused by trapped foam.

In dried paint film, surface defects caused by foam are visually unappealing and reduce the potential performance.



Migration to the surface and bursting of gas bubbles in pure water.



Stabilization of gas bubbles in a liquid containing surface-active substances.



Dispersing without Defoamer: Foam is formed and increases volume in an uncontrolled manner.

Dispersing with 0.2% LOPON® E 81: Foam forming is strongly reduced.

Our Portfolio

Our LOPON® defoamers show a high level of effectiveness when used at low dosage levels.

For a comparable defoamer effect, a lower dosage of LOPON® E 81 is usually necessary when compared to a traditional mineral oil defoamer.

LOPON® E 81 is quite versatile due to its wide range of effects. In addition to our liquid defoamers, we also offer a powdery defoamer for use in powder systems.

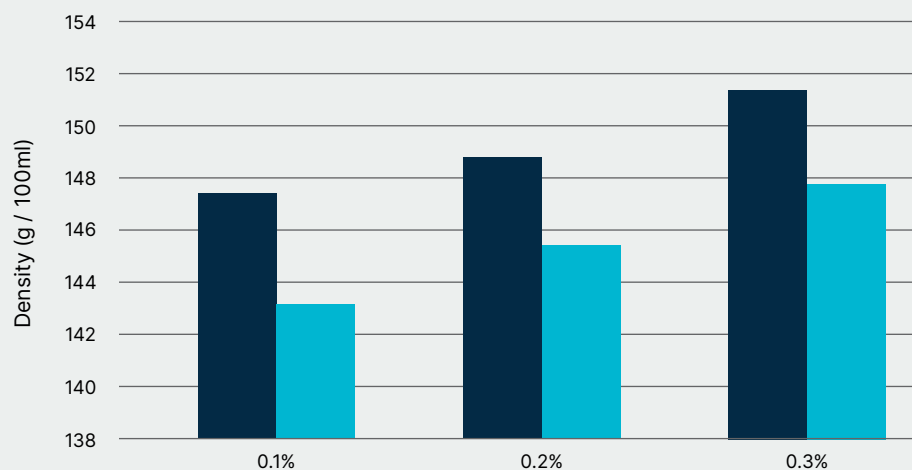
Products	Chemical Basis	Viscosity (mPas)	Low VOC	Mineral Oil Free	Silicon Free	Renewable Raw Materials (%)	Application(s)
LOPON® E 13	Vegetable Oil	3500 - 5000	✓	✓	✓	93	Low viscosity systems
LOPON® E 71	Polymer	3000 - 9000		✓	✓	2	High PVC paints, even surface
LOPON® E 81	Vegetable oil	3000 - 9000	✓	✓	✓	47	Universal
LOPON® E 100	Fatty acid esters	500 - 2000	✓	✓	✓	85	Glossy paints, varnishes
TARGON® P3	Vegetable oil	Powder	✓	✓	✓	26	Powder systems



Exterior Paint:
With a dosage of only 0.1% LOPON® E 81, a comparable effect is achieved as with 0.3% of a conventional mineral oil defoamer.

Key:

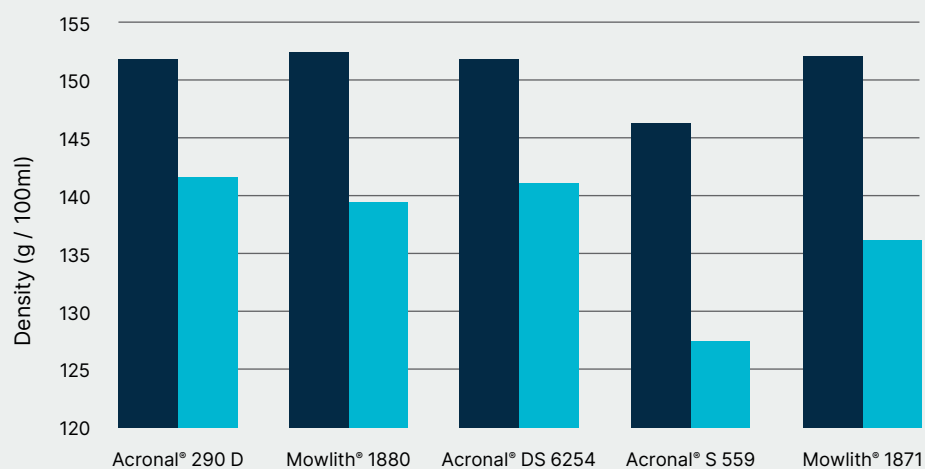
- LOPON® E 81
- Mineral Oil Defoamer



Effectiveness of LOPON® E 81 in different binders: density in g / 100 ml of emulsion paint.

Key:

- LOPON® E 81
- Without Defoamer



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Sustainable & Eco-Friendly

Over time emphasis has slowly shifted from mineral oil-based defoamers to more sustainable options. As a result, many of our LOPON® defoamers use renewable raw materials, which are also biodegradable.

LOPON® E 81 is quite versatile due to its wide range of effects and contains 47% renewable raw materials.

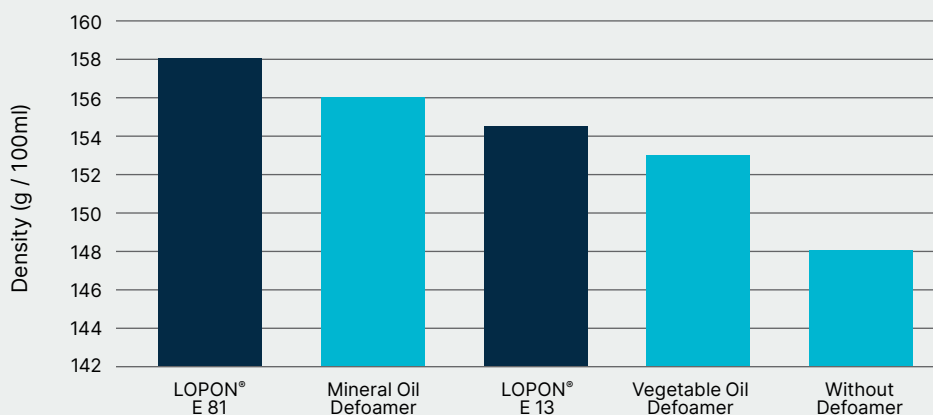
Even more environmentally friendly is LOPON® E 13, which contains 93% regrowing materials. Although its effectiveness is slightly lower than LOPON® E 81, it still outperforms biodegradable defoamers from other competitors.

All our LOPON® and TARGON® defoamers have been developed for water-based applications and are suitable for Ecolabel compliant formulations.

Effectiveness of LOPON® E 13 compared to different defoamers in a semi-gloss paint with a dosage of 0.3 %.

Key:

- LOPON®
- Competitors



Why Defoamers?

During the dispersion process, air is introduced into the paint through mixing or released when pigments and fillers are wetted. Defoamers are used to prevent unwanted foam as they destabilize the foam lamella and cause the bubbles to burst.

How Defoamers Work

For a defoamer to develop its optimum effectiveness, it must be insoluble in the formulation to be defoamed and compatible to prevent surface defects during application.

Another requirement is a positive penetration coefficient so that the defoamer drops can penetrate the foam lamella and the liquid/air interface. The entry barrier increases with higher surfactant content.

Defoamers use various mechanisms to be effective. For instance, using a “bridging” mechanism (Figure 1), the defoamer drop breaks through the foam lamella on both sides. This is followed by a “dewetting” or “stretching” mechanism (Figures 2, 3) which causes bubbles to burst.

Another defoaming mechanism is known as the “spreading” mechanism (Figure 4). After penetrating the liquid/air interface the defoamer drop spreads at the interface and displaces the surfactants. The former elastic foam lamella is replaced by a film with lower cohesive forces (Figure 5).

The entry barrier is reduced and additional defoamer drops enlarge the surface of the spread film. The spreading leads to a flow in the foam lamella which causes it to become thinner until it bursts.



Figure 1 (Bridging Mechanism): Defoamer drop breaks through the foam lamella on both sides.



Figure 2: Dewetting of the defoamer drop.

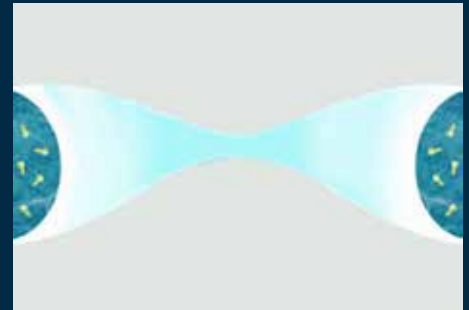


Figure 3: Stretching of the defoamer drop.

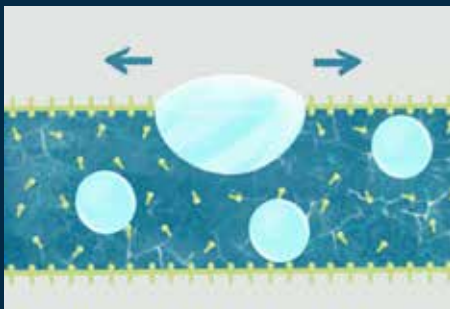


Figure 4 (Spreading Mechanism): The defoamer drop spreads at the interface.

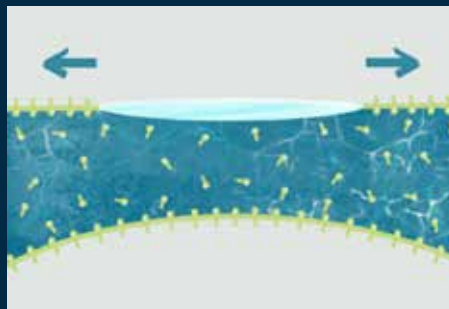


Figure 5: Thinning of foam lamella as a result of spreading.



REACH



ICL is one of the world's leading fertilizer and specialty chemicals producers committed to fulfilling humanity's ever-evolving needs. Our major production activities are located in Israel, Europe, the US, South America and China, and are supported by major global marketing and logistics networks.

Our Commitment: Successful relationships begin at the product development planning stage and extend through plant trials and product launch. Customers come to us with challenges, and we are dedicated to providing them with solutions. For manufacturers who rely on quality coatings, ICL offers proven performance, long-term corrosion and tannin stain protection, and protection of the world around us.

Technical Service: Our technical support capabilities allow us to help customers achieve better products. We are committed to building our product portfolio and continually exploring and expanding the frontiers of today's coatings technologies. This includes delivering timely assistance on coating formulation questions, aiding formulators in achieving total system compatibility and identifying an optimum inhibitor package to address individual cost and performance targets. We take the problem, analyze the parameters, work jointly with company product experts and create solutions that exceed customer expectations.

Quality / REACH Statement / Responsible Care: As a responsible international supplier of specialty chemicals, ICL is committed to advancing the principles of sustainability in the industries in which we operate. We incorporate quality, health, safety and environment management systems into all phases of the chemical life cycle. We pledge continuous improvement to provide the highest quality of products while protecting the safety of our people, our business partners, and the environment.

ICL is ISO 9001, ISO 14001:2004 and RC 14001:2014 certified. We are committed to our Responsible Care® initiatives and are consistent with the Responsible Care® code of Product Stewardship. We remain fully engaged in the implementation of the European Union's Registration, Evaluation, Authorization and Restriction of Chemicals legislation (REACH). The impact it will have on the future availability of chemicals is of vital importance for ICL, our customers and the entire global chemical industry.

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Additional Product Lines

HALOX®: An extensive portfolio of organic and inorganic corrosion and flash rust inhibitors, supplemented by tannin stain inhibitors.

LOPON® & POLYRON®: Dispersing agents and stabilizers specially formulated for silicate and biocide-free paints.

TARGON®: Versatile additives for the construction industry.