DISPERISING AGENTS FOR WATER-BASED PAINTS

As a leading global chemical manufacturer, ICL’s R&D team is continuously developing industrial solutions to manufacture safe, high-quality products for the paints and coatings industry.

We provide condensed phosphates and organic polymers which are extensively used as dispersing agents in pigmented water-based systems – primarily in water-based paints.

Impact for a sustainable future
WHY DISPERSING AGENTS?

By introducing mechanical forces, pigment agglomerates are broken up into primary particles and smaller aggregates during the dispersion process.

The function of dispersing agents is to stabilize primary particles, preventing reagglomeration.

To achieve proper dispersion, molecules of the dispersing agent adsorb onto the surface of the pigment particles and generate repulsive forces between individual pigment particles. Pigment particles are kept at a distance through electrostatic and/or steric stabilization.

BENEFITS OF DISPERSING AGENTS

Stabilizing a dispersion not only prevents pigment particles from reagglomerating, but also optimizes the distribution of pigments and other fillers.

Stabilization leads to improvements in hiding power, scrub resistance and storage stability. Properly stabilized dispersions allow for a higher PVC.

Left: Pigment preparation without dispersing agent; right: Pigment preparation with 0.1 % POLYRON® N. Adding just 0.1 % POLYRON® N, the viscosity can be strongly reduced at the same PVC, thus a flowable paint can be achieved.
**STABILIZATION MECHANISMS**

**Electrostatic stabilization**

In an aqueous medium, the adsorbed dispersing agent dissociates into anionically charged macro-molecules and low molecular weight cations. This results in an electrical double layer around each pigment particle. When pigment particles approach each other in solution, the repulsive forces due to their identical charge keep them apart.

**Steric stabilization**

During the dispersion phase the adsorbed dispersing agent forms a polymer shell around each pigment particle. When pigment particles approach each other, the polymeric shells penetrate one another. This penetration minimizes the mobility of the polymer chains resulting in a reduction of entropy. To compensate for this loss of entropy, the pigment particles must increase their distance from one another.

**Electrosteric stabilization**

Electrosteric stabilization combines both mechanisms, electrostatic as well as steric stabilization.
In addition to their good dispersing power, polyphosphates chelate multivalent cations.

In aqueous systems they dissociate according to the electrostatic stabilization mechanism to form anionic polyions.

These anionically charged macromolecules complex multivalent cations such as Ca\(^{2+}\) and therefore also act as water softeners.

ADDITIONAL BENEFITS OF POLYPHOSPHATES

The dispersing and calcium binding capacity of polyphosphates depends on their chain length.

Best results are shown by polyphosphates with a chain length between 6 and 10.

WHY POLYRON\(^{®}\) N?

Polyacrylates have the advantage of being structurally similar to the binder.

Polyacrylate dispersing agents are compatible with many binders, resulting in improved film formation and positive impact to scrub resistance and gloss.

COMBINATION OF POLYPHOSPHATES AND POLYACRYLATES

Combining polyphosphates and polyacrylates has a complementary effect. Being highly polar, the polyphosphates cover the surface of the pigment quickly and yield a high charge density.

Stabilization is 100 % electrostatic. Polyacrylates are comparatively less polar. They cover the surface of the pigment with a lower charge density but serve as buffers and adhere at the interface.
## OUR PORTFOLIO OF DISPERSING AGENTS

<table>
<thead>
<tr>
<th>Product</th>
<th>Chemical basis</th>
<th>Supplied as</th>
<th>Solid Content [%]</th>
<th>Solvent</th>
<th>pH value</th>
<th>low VOC</th>
<th>Interior points</th>
<th>Exterior points &amp; plasters</th>
<th>Emulsion silicate paints</th>
<th>Silicone resin paints</th>
<th>Varnish / Lacquer</th>
<th>Advantages / properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inorganic Dispersing Agents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLYRON® N</td>
<td>Sodium polyphosphate</td>
<td>powder</td>
<td>100</td>
<td></td>
<td>7.6 (1 %)</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Optimum dispersing and calcium binding properties</td>
</tr>
<tr>
<td>POLYRON® N NEW</td>
<td>Sodium polyphosphate</td>
<td>micro agglomerate</td>
<td>100</td>
<td></td>
<td>7.5 (1 %)</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Optimum dispersing and calcium binding properties</td>
</tr>
<tr>
<td>POLYRON® 322</td>
<td>Sodium polyphosphate</td>
<td>powder</td>
<td>100</td>
<td></td>
<td>6.6 (1 %)</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Good dispersing and calcium binding properties</td>
</tr>
<tr>
<td>POLYRON® 322 NEW</td>
<td>Sodium polyphosphate</td>
<td>micro agglomerate</td>
<td>100</td>
<td></td>
<td>6.6 (1 %)</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Good dispersing and calcium binding properties</td>
</tr>
<tr>
<td><strong>Organic Dispersing Agents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOPON® P</td>
<td>Amine phosphonate</td>
<td>liquid</td>
<td>38-42</td>
<td>water</td>
<td>7.0</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td>High calcium binding capacity. Prevention of efflorescence at colored facade paints</td>
</tr>
<tr>
<td>LOPON® PL</td>
<td>Amine phosphonate + polyacrylate copolymer</td>
<td>liquid</td>
<td>48-50</td>
<td>water</td>
<td>8.5</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td>Good dispersing property, improved color levelling</td>
</tr>
<tr>
<td>LOPON® PD</td>
<td>Sodium polycarboxylate</td>
<td>liquid</td>
<td>~24</td>
<td>water</td>
<td>11.0</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for glossy paints</td>
</tr>
<tr>
<td>LOPON® 890</td>
<td>Sodium polycrylate - low molecular weight</td>
<td>liquid</td>
<td>44-46</td>
<td>water</td>
<td>8.5</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for white and colored wall paints</td>
</tr>
<tr>
<td>LOPON® DA 200</td>
<td>Sodium polycrylate - low molecular weight</td>
<td>liquid</td>
<td>42-45</td>
<td>water</td>
<td>7.8</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for white and colored wall paints</td>
</tr>
<tr>
<td>LOPON® DA 201</td>
<td>Potassium polycrylate - low molecular weight</td>
<td>liquid</td>
<td>40-45</td>
<td>water</td>
<td>7.8</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for facade paints and mineral paints</td>
</tr>
<tr>
<td>LOPON® DA 202</td>
<td>Ammonium polycrylate - low molecular weight</td>
<td>liquid</td>
<td>38-44</td>
<td>water</td>
<td>7.0</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for interior and exterior paints</td>
</tr>
<tr>
<td>LOPON® DA 203</td>
<td>Lithium polycrylate - low molecular weight</td>
<td>liquid</td>
<td>33-37</td>
<td>water</td>
<td>8.5</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for antiallergenic and environmentally friendly paints, free of preservatives</td>
</tr>
<tr>
<td>LOPON® DA 204</td>
<td>Organic amino polycrylate - low molecular weight</td>
<td>liquid</td>
<td>57-61</td>
<td>water</td>
<td>7.5</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for white and colored wall paints</td>
</tr>
<tr>
<td>LOPON® DA 400</td>
<td>Sodium polycrylate - middle molecular weight</td>
<td>liquid</td>
<td>38-42</td>
<td>water</td>
<td>7.8</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for white wall paints</td>
</tr>
<tr>
<td>LOPON® DA 401</td>
<td>Potassium polycrylate - middle molecular weight</td>
<td>liquid</td>
<td>38-43</td>
<td>water</td>
<td>7.8</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for emulsion silicate paints and facade paints</td>
</tr>
<tr>
<td>LOPON® DA 402</td>
<td>Ammonium polycrylate - middle molecular weight</td>
<td>liquid</td>
<td>36-42</td>
<td>water</td>
<td>7.0</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for interior and exterior paints</td>
</tr>
<tr>
<td>LOPON® DA 403</td>
<td>Lithium polycrylate - middle molecular weight</td>
<td>liquid</td>
<td>33-37</td>
<td>water</td>
<td>8.5</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for antiallergenic and environmentally friendly paints, free of preservatives</td>
</tr>
<tr>
<td>LOPON® DA 404</td>
<td>Organic amino polycrylate - middle molecular weight</td>
<td>liquid</td>
<td>57-61</td>
<td>water</td>
<td>7.5</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Dispersing agent for white and colored wall paints</td>
</tr>
<tr>
<td>LOPON® 892</td>
<td>Sodium polycrylate</td>
<td>powder</td>
<td>100</td>
<td></td>
<td>8.3 (1 %)</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Dispersing agent for powder systems</td>
</tr>
<tr>
<td>LOPON® 826</td>
<td>Preparation</td>
<td>liquid</td>
<td>52-54</td>
<td>water</td>
<td>&gt; 13</td>
<td>✓</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Dispersing agent for emulsion silicate paints</td>
</tr>
</tbody>
</table>
MAIN APPLICATIONS

All our dispersing agents are specially designed for water-based formulations.

Applications include

- emulsion paints
- silicate emulsion paints
- silicone resin paints
- pigment pastes
- varnishes
- plasters
- adhesives

These products may be used for decorative wall paints in both indoor and outdoor applications.

FURTHER PRODUCTS

In addition to dispersing agents, we also offer defoamers and stabilizers specially for silicate paints and biocide-free paints.

We would be glad to advise you here as well.

You can find our versatile additives for the construction industry under the brand name TARGON®.

ICL also has an extensive portfolio of organic and inorganic corrosion inhibitors as well as flash rust inhibitors. The HALOX® product line is supplemented by tannin stain inhibitors.

For more information please visit our website www.halox.com or contact us directly at coatings@icl-group.com

We look forward to helping you!
This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should not therefore be construed as guaranteeing specific properties of the products described or their suitability for a particular application. No legal liability shall be derived from it. Any existing industrial property rights must be observed. The quality of our products is guaranteed under our terms and conditions.

BK Giulini GmbH
Dr.-Albert-Reimann-Strasse 2
68526 Ladenburg, Germany

T +49 6203 77-0
coatings@icl-group.com

BK Giulini is a wholly owned subsidiary of the ICL Group.

Impact for a sustainable future

www.icl-group.com