UNSATURATED FATTY ALCOHOLS

Rofanol®

Ecogreen Oleochemicals
State-of-the Art Technology
Designed for High Standard Products

Palm plantations in Indonesia are some of the main sources for our Oleochemicals. Rofanole are exclusively derived from renewable, vegetable sources.

Unsaturated Fatty Alcohols
By 1931, Deutsche Hydrierwerke (DHW) in Rodleben/Germany patented and initiated the world’s first production of fatty alcohols based on the evolving technology of catalytic, high pressure hydrogenation.

Based on long experience in hydrogenation technology, another product line was introduced in 1966. These were the unsaturated fatty alcohols, which keep their unsaturated function during the hydrogenation process.

In 1998, a new “state of the art” processing plant for unsaturated fatty alcohols went on stream at DHW Deutsche Hydrierwerke GmbH in Rodleben. DHW’s unsaturated fatty alcohols are distributed worldwide under the trade name Rofanol. Their main applications occur in solvents, defoamers, super-fatting agents, plasticisers, oily components and as esters in lubricants.

In 1991, DHW was incorporated in the worldwide network of research and production facilities of our oleochemicals group. With the creation of Ecogreen Oleochemicals in 2000, DHW reinforced its position as a global producer and supplier of unsaturated fatty alcohols, primary fatty amines, sorbitols and other sugar alcohols as well as of a new range of specialty fatty esters and ethers.

Longtime R&D experience combined with additional synergies from global oleochemistry allows DHW to present itself as a strong and reliable partner for industrial cooperation. DHW in Rodleben offers starting from vegetable based raw materials tailor-made oleochemical derivatives to be used in the production of nutritional products, cosmetic and pharmaceutical goods as well as additives for industrial purposes.

Progress from Nature
Over the years, as worldwide awareness for environmental issues have grown, gentle processing technologies and the use of renewable resources have become increasingly important. Our technological expertise making use of natural ingredients for the production of chemical substances qualifies DHW at Rodleben to fulfill its obligations in meeting the requirements for a sustainable, ecologically sound world. The concept of a chemical production site based on human needs and environmental awareness is already reality within our company today.
## Unsaturated Fatty Alcohols

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Consistency</th>
<th>C-Chain Distribution</th>
<th>Acid Value</th>
<th>Saponification Value</th>
<th>Hydroxyl Value</th>
<th>Iodine Value</th>
<th>Water Content</th>
<th>Solidification Range</th>
<th>Color APHA/Hazen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oleyl-Cetyl Alcohol</td>
<td>Solid</td>
<td>12 – 2 0 – 2</td>
<td>max. 0.2</td>
<td>max. 1.0</td>
<td>120 – 160</td>
<td>50</td>
<td>max. 0.1</td>
<td>29 – 37</td>
<td>max. 100</td>
</tr>
<tr>
<td>Oleyl Alcohol</td>
<td>Liquid</td>
<td>14 – 0</td>
<td>max. 0.2</td>
<td>max. 1.0</td>
<td>120 – 160</td>
<td>50</td>
<td>max. 0.1</td>
<td>29 – 37</td>
<td>max. 100</td>
</tr>
</tbody>
</table>

### Applications of Unsaturated Fatty Alcohols

#### Color Cosmetics
**Products:** Lipsticks, Mascara, Eye-Liners, Eye-Shadows
**Function:** Consistency Promoter, Emollient, Superfatting Agent, Solubilizer
**Range:** Non-modified Unsaturated Fatty Alcohols

#### Hair Treatments
**Products:** Hair Dyes, Hair Colors
**Function:** Solubilizer, Superfatting Agent
**Range:** Non-modified Unsaturated Fatty Alcohols, Ethoxylates

#### Skincare, Personal Care, Pharmaceutical Products
**Products:** Skin Creams, Skin Lotions, Toothpastes, Ointments, Suppositories
**Function:** Consistency Regulator, Emollient, Superfatting Agent, Co-Emulsifier
**Range:** Sulfates, Ethersulfates, Ethoxylates, Propoxylates, Non-modified Unsaturated Fatty Alcohols

#### Detergents and Cleaners
**Products:** Detergents, Syndet Bars, Dish Washing Agents
**Function:** Surfactant, Foam Regulator, Consistency Promoter
**Range:** Non-modified Unsaturated Fatty Alcohols, Ethoxylates, Propoxylates

#### Textile Auxiliaries
**Processes:** Spinning, Throwing, Weaving, Dyeing, Finishing of Synthetic Fibers
**Products:** Clothing, Blankets, Sheets, Mats, Tire Cords, Belts, Ropes, Tent Fabrics
**Function:** Lubricant, Emulsifier, Antistatic Agent, Water Repellent - Use at Increased Process Temperatures
**Range:** Esters, Ethoxylates, Propoxylates, Non-modified Unsaturated Fatty Alcohols

#### Agriculture
**Products:** Insecticide Formulations, Feedstuff Additive
**Function:** Emulsifier, Active Component
**Range:** Non-modified Unsaturated Fatty Alcohols

#### Defoaming
**Product:** Detergents
**Process:** Yeast Fermentation
**Range:** Ethoxylates

#### Polymer Processing
**Products:** Rubber, PVC, PU-Molding
**Function:** Process Auxiliary, Plasticizer, Demolding Agent
**Range:** Non-modified Unsaturated Fatty Alcohols and all Derivatives

#### Metal Working
**Process:** Drilling, Milling, Cutting, Rolling
**Function:** as Additive in Lubricants, Anticorrosive Agents, Polishing Agents, Cleaner Emulsifier
**Range:** Non-modified Unsaturated Fatty Alcohols and all Derivatives

#### Printing Industry
**Products:** Color Pastes, Inks, Stencils
**Function:** Softener, Solubilizer, Dispersing Aid
**Range:** Non-modified Unsaturated Fatty Alcohols, Ethoxylates, Propoxylates

#### Ore Flotation
**Function:** Flotation Aid
**Range:** Sulfates, Phosphates

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The products described above detail our standard portfolio. Additionally, any customized solution is available on request.
Customer orientation is our principal mission, where we strive to offer tailored solutions for products and services. In technical marketing, our research department's expertise exists in numerous applications, and the input of our customers' requests is our primary concern.

Careful control assures consistent product quality. Using up-to-date modern equipment, the analytical methods follow the latest international standard procedures. Whenever specific requirements exist, the procedures and the documentation of results are detailed according to the customer's needs.

Our standards provide for the responsible care. The raw materials are based on renewable sources and manufactured with “state of the art technology.” Sewage treatment facilities at our production sites ensure that the scenic Elbe river valley in Germany and the Pacific bays in Indonesia remain the way nature intended it to be. Beavers, storks, and sea inhabitants can thrive, live, and breed for their next generations' offspring.
A Strong Global Partner in Oleochemicals

Our strength is experience in the manufacture of products based on renewable raw materials together with our direct access to natural resources. Our core business is based on the production of saturated and unsaturated natural fatty alcohols from palm-kernel or coconut oil. Polyols, fatty amines and speciality chemicals broaden our current product portfolio and by day we add new products to our range. Throughout the world our people develop products, technological solutions, performance optimizations and new application formulas. With our initiatives, we want you to benefit from the global strength of our dynamic group.

We look forward to working with you!