LEVENOL® F-200

Green ingredient to formulate sustainable Home Care products

KAO Chemicals Europe
Surfactants for Consumer Applications
Summary

• EU Trends in Home care
• LEVENOL® range
• LEVENOL® F-200
  • Benefits in formulation
• Summary
What to be considered when formulating Home care products?

**MARKET TRENDS**

**REGULATIONS**
EU market trends in Home Care

Towards a sustainable and eco-friendly cleaning
Eco-efficiency products using convenient formats

**EFFECTIVENESS**
Ratio COST / performance

**ECO-FRIENDLY PRODUCTS**
- Liquid concentrates
- Efficacy at low T

**CONVENIENT FORMATS**
- Easier to handle, transport & dispense

![Graphs showing launches in HH from 2009 to 2013]
Introduction

EU market trends in Home Care

Nr launches claiming a sustainable cleaning

Sustainable cleaning:
- Energy saving:
  - Concentrated Products
  - Higher effectiveness
  - Low washing temperatures
- Friendly to environment & human:
  - Low toxicity

⇒ Towards a sustainable and eco-friendly cleaning
Introduction

Market example: evolution of liquid detergents

⇒ Huge increase of concentrated products
⇒ Upward trend of unit-dose formats: high-concentrated product
Introduction

EU regulations in Home Care

Detergents regulation (EC) No. 648/2004
- Biodegradability: **MUST**
- Limits in phosphorous content (laundry June 2013)
- Labelling / ingredients

October 2005

REACH (EC) No 1907/2006
Registration of substances and its uses

June 2006

Classification/ Labelling /Packaging (EC) No 1272/2008
EU adaptation of Globally Harmonized System (GHS)

Mixtures in June 2015

⇒ Conditioned selection and combination of ingredients

LEVENOL®F-200: Green Ingredient for Laundry Detergents
LEVENOL® range

From nature...

to surface active agents

LEVENOL® are green multifunctional non ionic surfactants

Based on Ethoxylated Glycerine Ester Derivatives

\[
\begin{align*}
\text{CHO } (-\text{CH}_2\text{-CH}_2\text{-O})_y \text{- R'} \\
\text{CH}_2\text{O}(-\text{CH}_2\text{-CH}_2\text{-O})_z \text{- R'}
\end{align*}
\]

\[
\begin{align*}
x+y+z &= \text{EO number} \\
R' &= \text{H or R-CO} \\
R &= \text{coconut chain}
\end{align*}
\]
LEVENOL® range: Product Profile

Product Concentration (100% Act)

Vegetal Origin

Carbon & Water Food Print Reduction

Toxicological Profile: NON LABELLED Product

Eco-toxicological Profile: NON LABELLED Product
LEVENOL® range

- LEVENOL®C-421  Glycereth-2 Cocoate  10.9
- LEVENOL®C-201  Glycereth-17 Cocoate  12.5
- LEVENOL®C-301  Glycereth-7 Cocoate  13.5
- LEVENOL®F-200  Glycereth-6 Cocoate  15.2

Outstanding hydrotropic properties and ECO-toxicological profile

- Did-list nr 44
- Registered in Bra Miljöval
- Suitable for ECOLABEL formulas
# LEVENOL® range

## Key points of LEVENOL® F-200

In line with current market situation

<table>
<thead>
<tr>
<th>Product properties</th>
<th>Benefits in formulation</th>
<th>Environmental issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% concentrated &amp; Liquid product</td>
<td>Easy to handle &amp; cold processible</td>
<td>Energy saving during transport &amp; handling</td>
</tr>
<tr>
<td>Hydrotropic ability</td>
<td>Concentrates avoiding usage of glycols</td>
<td>Cost saving &amp; lower environment impact</td>
</tr>
<tr>
<td>Non labelled material</td>
<td>Formulas with better ECO-tox. profile</td>
<td>Lower toxicity</td>
</tr>
</tbody>
</table>
Non ionic present in the laundry detergent market
LEVENOL® F-200 well positioned in terms of sustainability

<table>
<thead>
<tr>
<th>Product name</th>
<th>LEVENOL® F-200</th>
<th>POE Fatty Alcohol C13C15-7EO</th>
<th>Coconut Polyglucoside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical description</td>
<td>EO Glycerine Ester</td>
<td>R-O(CH₂CH₂O)ₙH</td>
<td></td>
</tr>
<tr>
<td>Active matter %</td>
<td>100</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Classification</td>
<td>Non Classified</td>
<td>Labelling</td>
<td>100% natural origin</td>
</tr>
<tr>
<td>Advantages</td>
<td>Cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LEVENOL® F-200, easy to handle, even at low temperature
Pumpable below 0°C – COLD processible

**LEVENOL® F-200**

- DROPPING POINT
  - -5°C
  - 0°C

- CLEAR POINT
  - Dropping point
  - Clear point

**C1315-7EO**

- DROPPING POINT
  - 22°C
  - 35°C

- CLEAR POINT
  - Dropping point
  - Clear point
LEVENOL® F-200: Hydrotropic ability

Formulation benefits in liquid Laundry detergents
Good compatibility with other formula ingredients

- x3 concentrated HDLD
  - Reduction or avoidance of solvents
    Market products 8 – 15% solvents

- Liquid Tablets
  - Glycerine as solvent
  - Avoidance of glycols
    Market products 20 - 25% solvents - PG present
Current situation: Market composition of liquid laundry detergents

- **Concentrated detergents**
  - 75 ml / load: 25% (4%) + 66% (35 ml / load)
  - 35 ml / load: 15% (45%)

- **Liquid Tablets**
  - 35 ml / capsule: 25% (65%) + <10%
## Laundry Formulary Update

**New formulations from 2013**

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-235</td>
<td>Liquid fabric detergent</td>
<td>75 ml/wash</td>
</tr>
<tr>
<td>D-236</td>
<td>Concentrated liquid fabric detergent</td>
<td>35 ml/wash</td>
</tr>
<tr>
<td>D-234</td>
<td>Laundry liquid tablet (LAS based)</td>
<td>38 ml product/wash (1 tablet)</td>
</tr>
<tr>
<td>D-233</td>
<td>Laundry liquid tablet (LAS/LES based)</td>
<td>35 ml product/wash (1 tablet)</td>
</tr>
<tr>
<td>D-232</td>
<td>Laundry liquid tablet (LES based)</td>
<td>35 ml product/wash (1 tablet)</td>
</tr>
</tbody>
</table>
### Laundry formulary up-date

#### New formulations from 2013, Renewed D-232

**Laundry Liquid Tablet (LES based)**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>· Concentrated product for hydrosoluble capsules</td>
</tr>
<tr>
<td>· Without glycols</td>
</tr>
<tr>
<td>· Recommended dosage: 35 mL product/ wash (1 tablet)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPOSITION</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVENOL®F200</td>
<td>32.0</td>
</tr>
<tr>
<td>EMAL² 270D¹</td>
<td>19.6</td>
</tr>
<tr>
<td>Coconut Fatty Acid</td>
<td>15.0</td>
</tr>
<tr>
<td>MEA</td>
<td>4.7 approx.</td>
</tr>
<tr>
<td>Glycerine (99%)</td>
<td>27.1</td>
</tr>
</tbody>
</table>

Optional ingredients:
- Enzymes (Protease, amylase...) q.s.
- Chelating agents q.s.
- Optical brighteners q.s.
- Dyes / Perfume q.s.
- Preservative q.s.
- Other (opacifier...) q.s.

Water up to 100%

¹ 19.6% EMAL² 270D can be replaced by 19.6% EMAL² 270E.

<table>
<thead>
<tr>
<th>TECHNICAL CHARACTERISTICS</th>
<th>Kao Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPEARANCE (20°C):</td>
<td>Clear viscous liquid</td>
</tr>
<tr>
<td>VISCOSITY BROOKFIELD (20°C, cPs):</td>
<td>1000 – 1300</td>
</tr>
<tr>
<td>pH (as it is):</td>
<td>8.0 - 8.5</td>
</tr>
<tr>
<td>SURFACTANT ACTIVE CONTENT (%):</td>
<td>65 approx.</td>
</tr>
<tr>
<td>WATER (%)</td>
<td>less than 10%</td>
</tr>
<tr>
<td>STABILITY TEST:</td>
<td>Correct</td>
</tr>
</tbody>
</table>

1 month 40°C/RT/5ºC
# Laundry formulary up-date

## Classification of formulations

*By calculation. Sum of ingredients.*

<table>
<thead>
<tr>
<th>Code Name Dosage</th>
<th>Classification of formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVENOL®F-200: Green Ingredient for Laundry Detergents</td>
<td>![Chemical hazard symbols]</td>
</tr>
</tbody>
</table>
**x2 concentrated HDLD**

**KAO x2**

**Formula composition**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVENOL® F-200</td>
<td>8.4</td>
</tr>
<tr>
<td>SULFONAX®</td>
<td>7.0</td>
</tr>
<tr>
<td>EMAL® 270D</td>
<td>7.0</td>
</tr>
<tr>
<td>Coconut Fatty Acid</td>
<td>3.2</td>
</tr>
<tr>
<td>NaOH (50%)</td>
<td>3.5 approx</td>
</tr>
<tr>
<td>Sodium Citrate</td>
<td>2.7</td>
</tr>
<tr>
<td>Additional ingredients</td>
<td>q.s.</td>
</tr>
<tr>
<td>Enzymes</td>
<td></td>
</tr>
<tr>
<td>Chelating agents</td>
<td></td>
</tr>
<tr>
<td>Optical brighteners</td>
<td></td>
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<td>Dyes / Perfume</td>
<td></td>
</tr>
<tr>
<td>Preservative</td>
<td></td>
</tr>
<tr>
<td>Deionised water</td>
<td>up to 100%</td>
</tr>
</tbody>
</table>

**Market Products**

*Dry Matter ≈ 29%*

*No solvents*

**KAO x2**

**Formula appearance**

- **LEVENOL® F-200**
  - 0% PG
  - Clear

- **POE Fatty Alcohol C1315-7EO**
  - 0% PG
  - Turbid
  - 4% PG
  - Clear

**Using LEVENOL® F-200, non solvent required to obtain clear formulations**
**KAO - Formula Composition**

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**Dry Matter** ≈ 29%

**No solvents**

Mkt 1 & Mkt 2 = Market Products

Dry Matter ≈ 25-28%

Solvents ≈ 4%

---

**ECO WASH (20°C):** KAO formula shows equivalent performance to market products ⇒ *New Opportunity* for LEVENOL® F-200

**% soil removal**

- **Surfactant base**
- **ECO WASH T 20°C**
- Washing Machine of new generation MIELE Softtronic W5722
- Mean value: E101, E104, E141, E125, wfk10D, wfk20D, wfk10TE

**Dosage 75mL / wash**

**x2 concentrated HDLD**
x2 concentrated HDLD

KAO - Formula Composition

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Dry Matter ≈ 29%
No solvents

Mkt 1 & Mkt 2 = Market Products
Dry Matter ≈ 25-28%
Solvents ≈ 4%

ECO WASH (20ºC): KAO formula shows equivalent performance to market products ⇒ New Opportunity for LEVENOL®F-200
KAO - Formula Composition

Performance vs. market products

Dosage 75mL / wash

% soil removal

T 20°C

Washing Machine of new generation MIELE Softtronic W5722

- ECO WASH (20°C): KAO formula shows equivalent performance to market products ⇒ New Opportunity for LEVENOL®F-200

**Ingredient** | %
---|---
LEVENOL®F-200 | 8.4
SULFONAX® | 7.0
EMAL®270D | 7.0
Coconut Fatty Acid | 3.2
NaOH (50%) | 3.5 approx
Sodium Citrate | 2.7
Additional ingredients | q.s.
Enzymes
Chelating agents
Optical brighteners
Dyes / Perfume
Preservative
Deionised water | up to 100%

Dry Matter ≈ 29%
No solvents

Mkt 1 & Mkt 2 = Market Products
Dry Matter ≈ 25-28%
Solvents ≈ 4%
LEVENOL®F-200 in concentrated laundry liquid detergents
Main benefit related with the reduction or avoidance of solvents

**Benefits in Formulation**

**Concentrated HDLD**
Composition (%)

<table>
<thead>
<tr>
<th>Market reference</th>
<th>Formula with L.F200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Solvent</td>
</tr>
<tr>
<td>7%</td>
<td>15%</td>
</tr>
<tr>
<td>Active content</td>
<td>Water</td>
</tr>
<tr>
<td>45%</td>
<td>Others 7%</td>
</tr>
</tbody>
</table>

* Dosage 35ml/wash
x3 concentrated HDLD

KAO x3
Formula composition

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>%</th>
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<tbody>
<tr>
<td>LEVENOL® F-200</td>
<td>15.8</td>
</tr>
<tr>
<td>EMAL® 270D</td>
<td>12.9</td>
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<tr>
<td>SULFONAX®</td>
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<tr>
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<td>Triethanolamine</td>
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Market Products

Dry Matter ≈ 53 - 55%
No solvents

Using LEVENOL® F-200, non solvent required to obtain clear formulations
**KAO x3 - Formula Composition**

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<tr>
<td>Deionised water</td>
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</tbody>
</table>

**KAO x3**
- Dry Matter ≈ 53%
- No solvents

**Mkt 1 & Mkt 2 = Market Products**
- Dry Matter ≈ 53 - 55%
- Solvents ≈ 8 - 15%

**% soil removal**

- KAO formula shows equivalent performance to market products.

⇒ Opportunity for LEVENOL® F-200
**KAO x3 - Formula Composition**

**Ingredient** | **%**
--- | ---
LEVENOL®F-200 | 15.8
EMAL®270D | 12.9
SULFONAX® | 11.5
Coconut Fatty Acid | 5.0
NaOH (50%) | 3.6 approx
Triethanolamine | 4.4
Sodium Citrate | 5.0
Additional ingredients | q.s.
- Enzymes
- Chelating agents
- Optical brighteners
- Dyes / Perfume
- Preservative
- Deionised water | up to 100%

**KAO x3**
- Dry Matter ≈ 53%
- No solvents

**Mkt 1 & Mkt 2 = Market Products**

**Dry Matter** ≈ 53 - 55%

**Solvents** ≈ 8 - 15%

**Performance vs. market products**

- **% soil removal**
- **T 20°C**
- **Washing Machine of new generation** MIELE Softtronic W5722

- **Dosage 35mL / wash**

- **KAO formula shows equivalent performance to market products.**

⇒ **Opportunity for LEVENOL®F-200**
KAO x3 - Formula
Composition

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KAO x3
Dry Matter ≈ 53%
No solvents

Mkt 1 & Mkt 2 = Market Products
Dry Matter ≈ 53 - 55%
Solvents ≈ 8 - 15%

KAO formula shows equivalent performance to market products.
⇒ Opportunity for LEVENOL® F-200

% soil removal

Dosage 35mL / wash

T 20°C
Washing Machine of new generation MIELE Softtronic W5722
Formulation of Liquid TABLETS
**Formulation of Liquid Tablets**

**Definition:** Unit-dose containing a high-concentrated liquid detergent in a hydrosoluble film.

**Typical composition**

- **Water** → <10%
- **Solvents** → 25%
- **Mixtures PG / Glycerine**
- **Surfactants** → 65%
- **Other** (enzymes, chelating agents, perfume...)

**KEY points:**

- High amount of surfactants ANIONIC/NI/SOAP
- Film compatibility
  - < 10% water
  - High content of solvents Mixtures PG/ Glycerine

⇒ Liquid Tablets are challenging from the point of view of formulation
Formulation of Liquid Tablets

Technical target: Formula development using LEVENOL® F-200 avoiding the usage of glycols

Main benefits:
- Formula cost reduction
- Avoidance of solvents from non-natural origin

Product requirements

<table>
<thead>
<tr>
<th>Product appearance</th>
<th>Clear &amp; stable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>Competitive cleaning efficacy vs. market products</td>
</tr>
</tbody>
</table>
## Product appearance

<table>
<thead>
<tr>
<th>Solvent system</th>
<th>EO Fatty Alcohol C1315-7EO</th>
<th>LEVENOL® F-200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula appearance</td>
<td>PG / Glycerine</td>
<td>Glycerine</td>
</tr>
<tr>
<td>Clear formulations without glycols using L.F200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Model formulation:
- 65% surfactants
- LAS 42
- NI 28
- SOAP 30
- 20% solvents
- <10% water
**LEVENOL® F-200: Hydrotropic ability**

Usage in **Liquid Tablets**

**Non glycols** required to obtain clear formulations

### Formula appearance

<table>
<thead>
<tr>
<th>Formula characteristics</th>
<th>L.F-200</th>
<th>C1315-7EO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycerine</td>
<td>Clear</td>
<td>Glycerine</td>
</tr>
<tr>
<td>Propylene Glycol</td>
<td>Clear</td>
<td>Propylene Glycol</td>
</tr>
<tr>
<td>Phase separation</td>
<td>Turbid paste</td>
<td>Turbid</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear</td>
<td>Clear</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Formula characteristics</th>
<th>L.F-200</th>
<th>C1315-7EO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycol free</td>
<td></td>
<td>With std NI, clear formulas need <strong>glycol addition</strong></td>
</tr>
</tbody>
</table>

**Formula characteristics**:

- **60 - 65% act. matter**
  - LAS: SLES
  - ANIONIC: 28% 31%
  - NON IONIC: 42% 54%
  - Coconut Soap: 30% 15%

- **18–23% Solvent**
- **<10% Water**
- Other: builders, enzymes, optical brighteners...
  - pH 8.0 – 8.5
Optimized formulations to expand the usage of L.F200

**Surfactant ratio**
- L.F200
- POE Fatty Alc.
- LES
- LAS
- SOAP

**Ratio**
- PG/Glycerine
  - Glycerine
  - PG

**Builders / chelating agents**
- Phosphates
- Phosphates
- Citrate
- Citrate
- Phosphates

⇒ Better eco-toxicological profile and lower cost than market products with competitive performance.

**KEY points:**
- Glycerine as solvent
- Possibility to formulate LES based fulfilling ECOLABEL.
Liquid Tablets

Cleaning efficacy comparison vs. market products
Formulas using L.F200 competitive performance, even at low wash temperatures.

% soil removal

Wash machine, 20°C, 20ºHF, 35g detergent

Surfactant base

Mean E101, E104, wfk10D, wfk20D, E141, wfk10TE, E125

ARIEL P&G
SKIP KAO
KAO LAS
KAO LES

1 2 3 4 5
Labelling of Home care Formulations
Labelling of HH formulations

From June 2015:
Implementation of Classification, Labelling and Packaging system (CLP) for mixtures

Impact of CLP in Home Care

More restrictive classification criteria affecting ingredients and mixtures

Consequence:
Most of Home Care products will show the same labelling
Labelling of HH formulations

Technical target: Formula development using LEVENOL® in Home Care with an optimized labelling:

Selected Product Range
- Laundry liquid detergents
- All Purpose Cleaners

Main benefits: Better eco-toxicological profile

Product requirements

<table>
<thead>
<tr>
<th>Labelling under CLP</th>
<th>Lowest possible classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>Competitive vs. market products</td>
</tr>
</tbody>
</table>
## Formula classification under CLP

### Development of concentrated laundry detergents

<table>
<thead>
<tr>
<th>Typical ingredients</th>
<th>Classification as ingredient</th>
<th>Contribution to mixtures classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Max % to avoid labelling</td>
</tr>
<tr>
<td><strong>ANIONIC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAS</td>
<td>H314, H318</td>
<td>0,9%</td>
</tr>
<tr>
<td>LES</td>
<td>H315, H318</td>
<td>4,9%</td>
</tr>
<tr>
<td><strong>NON IONIC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EO7 Fatty Alc.</td>
<td>H318, H412</td>
<td>0,9%</td>
</tr>
<tr>
<td>L.F200</td>
<td>NL</td>
<td>100,0%</td>
</tr>
<tr>
<td><strong>SOAP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coconut SOAP</td>
<td>H315, H319</td>
<td>9,9%</td>
</tr>
</tbody>
</table>

⇒ CLP classification system very restrictive for mixtures
Development of concentrated laundry detergents

Mixture classification by calculation

Liquid Tablets
- 1 tablet / wash
- 65% a.m.

⇒ No possible to avoid
⇒ High % of Act. Matter

Concentrated
- 35 ml / wash
- 45% a.m.

⇒ Using L.F200 is possible to label only as irritant, in compositions with high NI%

Concentrated
- 75 ml / wash
- 25% a.m.

⇒ Using L.F200 is possible to label only as irritant, for wider ratios among surfactants

⇒ Concentrated detergent using LEVENOL® F-200 better classification under CLP.
Development of a non labelled Hard Surface cleaner

Typical composition

- Some type of HSC based only in non ionic surfactants
- Active matter content < 10%

Floor cleaner Composition

Formula classification

⇒ All Purpose Cleaners: Non labelled formulas with a good cleaning efficacy can be developed using LEVENOL®F-200
Formulas with better Eco-toxicological profile

Formulation example: *neutral pH APC* - **ECOLABEL**

**Criterion 1 - Toxicity to aquatic organisms**

\[
CDV_{\text{chronic}} = \sum_{i}^{n} \frac{\text{weight}_i \cdot DF_i}{TF_{\text{chronic}} (i)}
\]

- **CDV**  Critical dilution volume
- **DF**  Degradation factor
- **TF\(_{\text{chronic}}\)**  Toxicity factor based on chronic toxicity on aquatic organisms

**Non ionic contribution**

<table>
<thead>
<tr>
<th></th>
<th>C911-9EO</th>
<th>LEVENOL F-200</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DF</strong></td>
<td>0,16</td>
<td>0,16</td>
</tr>
<tr>
<td><strong>TF chronic</strong></td>
<td>0,04</td>
<td>0,12</td>
</tr>
</tbody>
</table>

NON IONIC: 4.5%  pH 7.0 – 7.5
LEVENOL®F-200: Non labelled product

Formulas with better Eco-toxicological profile
Formulation example: *neutral pH APC - ECOLABEL*

Criterion 1 -
Toxicity to aquatic organisms

\[
CDV_{\text{chronic}} = \sum_{i} \frac{\text{weight}_i \cdot DF_i}{TF_{\text{chronic}}(i)}
\]

- **CDV** Critical dilution volume
- **DF** Degradation factor
- **TF\text{chronic}** Toxicity factor based on chronic toxicity on aquatic organisms

**CDV chronic**

<table>
<thead>
<tr>
<th>Classification limit</th>
<th>52000 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product as it is</td>
<td></td>
</tr>
<tr>
<td>Diluted in water (12g/L)</td>
<td>18000 L</td>
</tr>
</tbody>
</table>

NON IONIC: 4.5%

pH 7.0 – 7.5
**Summary**

**LEVENOL® range**

- Green ingredient
  - Vegetable origin
  - 100% concentrated
  - Non labelled product

**Product handling**

- Easy to handle, even at low temperature
- COLD Processible

**Hydrotropic ability**

- Reduction or avoidance of solvents in concentrated HDLD
- Avoidance of glycols in liquid tablets

**Good Eco-toxicological profile**

- Suitable for non labelled and ECOLABEL formulations