EURECO™

ε-phthalimido-peroxy-hexanoic acid (PAP)

An Effective Low Temperature Bleach

6th May 2013
EURECO™ – content

1. HARKE Chemicals GmbH – who we are

2. EURECO™
   - properties
   - energy savings
   - performance
   - equipment
   - disinfection
   - benefits
   - safety

3. summary
As an international marketer, distributor, service provider, affiliated contract packer and manufacturer, the HARKE Group opens industrial sales and supply markets for their customers and suppliers in Europe and worldwide.

Key Facts

Foundation: 1965
Ownership: Harke Family
Turnover: € 85 Million
Capital: € 10 Million
Employees: 140
## Sales Divisions / Business Units

<table>
<thead>
<tr>
<th>Divisions</th>
<th>Business Units</th>
<th>Business Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>HARKE LifeSciences</td>
<td>HARKE Pharma</td>
<td>HARKE Packaging</td>
</tr>
<tr>
<td>HARKE Food</td>
<td>HARKE FoodTec</td>
<td>HARKE Packaging Services</td>
</tr>
<tr>
<td>HARKE Nutrition</td>
<td>HARKE Animal &amp; PlantCare</td>
<td>HARKE Packaging Products</td>
</tr>
<tr>
<td>HARKE Wellness</td>
<td>HARKE SYNaqua®</td>
<td>HARKE Imaging</td>
</tr>
<tr>
<td>HARKE PersonalCare</td>
<td>HARKE Nutrition</td>
<td>HARKE ImageBlast</td>
</tr>
<tr>
<td>HARKE Nutrition</td>
<td>HARKE Services</td>
<td>HARKE ImageBlack</td>
</tr>
<tr>
<td>HARKE Chemicals</td>
<td>HARKE ChemConsult</td>
<td>HARKE ScreenPrint</td>
</tr>
<tr>
<td>HARKE BaseChem</td>
<td>HARKE RapidTexturing</td>
<td>HARKE TransferPrint</td>
</tr>
<tr>
<td>HARKE AquaWorld</td>
<td>HARKE Coatings</td>
<td>HARKE TransferPrint</td>
</tr>
<tr>
<td>HARKE Clean &amp; PersonalCare</td>
<td>HARKE Composites</td>
<td>HARKE RapidTexturing</td>
</tr>
<tr>
<td>HARKE PureChem</td>
<td>HARKE Polymers &amp; Additives</td>
<td>HARKE ChemConsult</td>
</tr>
<tr>
<td>HARKE ConstruChem</td>
<td>HARKE ChemTec</td>
<td>HARKE ChemConsult</td>
</tr>
</tbody>
</table>
EURECO™

$\varepsilon$-phthalimido-peroxy-hexanoic acid (PAP)

properties
EURECO™ is the registered trade-mark of Solvay for its commercial preparations based upon “PAP”, a preformed peracid patented and developed by Solvay.

\[ \text{\(\varepsilon\)-phthalamido-peroxy-hexanoic acid (PAP)} \]

EURECO™ is a unique auxiliary material for detergents, which readily delivers superior bleaching performance and disinfection at low temperature and under mild conditions.
PAP belongs to the chemical family of peroxycarboxilic acids which Solvay produces in Italy with proprietary technology.

PAP main physical properties are:
- crystalline, solid phase with high melting point
- sparingly water-soluble
- odourless
- white

PAP main chemical properties are:
- \( M = 277.28 \text{ g/mol} \)
- 5.7% “AvOx”
- Strong oxidant
EURECO™ LX is white milky aqueous suspension of PAP crystals, suitable for delivering high PAP level in total safety

Available in different concentrations:

- EURECO™ LX5 contains 5% of active
- EURECO™ LX10 contains 10% of active
- EURECO™ LX17 contains 17% of active
- EURECO™ LX20 contains 20% of active

PAP crystals are micronized through a proprietary technology patented by Solvay, thus allowing quick dispersion and dissolution
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$\varepsilon$-phthalimido-peroxy-hexanoic acid (PAP)

energy savings
energy consumption at different temperatures

![Graph showing energy consumption (KWh/wash) vs. temperature (°C). The graph demonstrates an increase in energy consumption as the temperature increases. At 0°C, the energy consumption is 0.2, at 40°C it is 0.4, and at 100°C it is 1.8.]
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ε-phthalimido-peroxy-hexanoic acid (PAP)

performance
bleach performance of PAP vs. Percarbonate + TAED
bleaching performance with a powder detergent

PAP dosage = \( \frac{1}{4} \) w/w of PCS + TAED

Reflectance values (%)

- **wfk Grass EMPA 164**
  - T = 30°C
  - T = 60°C

- **wfk Redwine 10L**
  - T = 30°C
  - T = 60°C
  - T = 30°C
bleaching performance with a liquid detergent

TEA EMPA art. 167

Reflectancy Values (%)
bleaching performance at different pH

Reflectancy values (%)

T=(°C)

20°C  30°C  40°C

PCS + TAED (HD pH 10,5)
PAP (HDD pH 10,5)
PAP (HDD pH 8,7)
PAP (HDD 9,5)
The dosage of EURECO™ LX17: for bleaching may range from 1 to 16 g/litre of washing liquor

An example of dosage is reported in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Dosage (a textile to bath ratio 1:4 is considered)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use in main wash</td>
<td>Use in the rinsing stage</td>
</tr>
<tr>
<td>EURECO™ LX17</td>
<td>EURECO™ LX17</td>
<td>EURECO™ LX17</td>
</tr>
<tr>
<td></td>
<td>g/kg textile</td>
<td>g/litre of bath</td>
</tr>
<tr>
<td>Low stained fabrics</td>
<td>4 – 7</td>
<td>1.0 – 1.8</td>
</tr>
<tr>
<td>Normal stained fabrics</td>
<td>7 – 10</td>
<td>1.7 – 2.5</td>
</tr>
<tr>
<td>Heavily stained fabrics</td>
<td>10 – 16</td>
<td>2.8 – 4.2</td>
</tr>
</tbody>
</table>

Note: EURECO™ LX17 should not be used for bleaching silk, polyamide or elastomeric fabrics
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ε-phthalimido-peroxy-hexanoic acid (PAP)

equipment
The moderate viscosity is designed to comply with the technical requirements of the automated dosage systems installed on the tunnel industrial laundries as well as on OPL (On-Premises Laundries).
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disinfection
## ANTIBACTERIAL ACTIVITY of PAP at 20°C (REDUCTION of BACTERIA)

<table>
<thead>
<tr>
<th>PAP CONCENTRATION (mg/l)</th>
<th>Staphylococcus aureus ATCC 6538</th>
<th>Pseudomonas Aeruginosa ATCC 15442</th>
<th>Escherichia coli ATCC 10536</th>
<th>Enterococcus faecium ATCC 10541</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIC ACTIVITY</strong> (PrEN 1040 BASIC ACTIVITY)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>$1.2 \times 10^4$</td>
<td>$&lt; 5.0 \times 10^3$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>$&gt; 1.3 \times 10^5$</td>
<td>$5.6 \times 10^3$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>$&gt; 1.3 \times 10^5$</td>
<td>$&gt; 1.0 \times 10^5$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INTERFERING SUBSTANCE</strong> (PrEN 1276) <strong>INTERFERING SUBSTANCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>$2.5 \times 10^4$</td>
<td>$&lt; 1.2 \times 10^4$</td>
<td>$&lt; 1.1 \times 10^4$</td>
<td>$&lt; 6.7 \times 10^3$</td>
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<tr>
<td>500</td>
<td>$&gt; 2.7 \times 10^5$</td>
<td>$&lt; 1.2 \times 10^4$</td>
<td>$2.1 \times 10^5$</td>
<td>$&lt; 1.3 \times 10^5$</td>
</tr>
<tr>
<td>1000</td>
<td>$&gt; 2.7 \times 10^5$</td>
<td>$1.7 \times 10^5$</td>
<td>$&gt; 2.3 \times 10^5$</td>
<td>$&gt; 1.3 \times 10^5$</td>
</tr>
<tr>
<td><strong>SURFACE TEST</strong> (CEN/TC216)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1000</td>
<td>$1.2 \times 10^4$</td>
<td>$1.2 \times 10^4$</td>
<td>$&gt; 1.4 \times 10^4$</td>
<td>$1.0 \times 10^4$</td>
</tr>
</tbody>
</table>
EURECO™

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benefits
Savings:

- Low wearing out of textiles: textiles lifespan can last even two times longer in comparison with Chlorine bleaches

  Process with Hypo @85°C

  Process with PAP @ 50°C

- Damage to fibres after 25 washes

- Low energy consumption: the washing temperature can be lowered down
- Low rinsing water: less alkalis means less rinsing of textiles
- Low waste water treatment: the final pH triggering of the waste water can be avoided
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safety
Safety

Ease of use for non professional workers

**EURECO™ is:**

- not aggressive for the skin
- not smelling
- no oxidizer (GHS)

→ Low risk for the Company
Safety

<table>
<thead>
<tr>
<th>EURECO™</th>
<th>Eye Irritation 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LX5</td>
<td>H319 Causes serious eye irritation</td>
</tr>
<tr>
<td></td>
<td><strong>attention</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>EURECO™</th>
<th>Eye Damage 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>LX10, LX17, LX20</td>
<td>H318 Causes serious eye damage</td>
</tr>
<tr>
<td></td>
<td><strong>danger</strong></td>
</tr>
</tbody>
</table>

The eco/toxicological profile is exceptionally favourable

- no long-term/chronic effects
- not toxic to humans
- inherently biodegradable
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summary
EURECO™ — summary

Performance

- High bleach efficiency
- Wide disinfection range already at low temperatures

Processing

- Bleach @ mild pH
- Low dosage of alkalis

Savings

- Low wearing out of textiles
- Low energy consumption
- Low rinsing water
- Low waste water treatment

Safety

- Ease of use for non professional workers
- Low risk for the Company
Thank you for your attention!

www.harke.com