The strength to change

Solvay’s position and strategy in hydrogen peroxide

London Investors Morning
September 30th, 2010
Agenda

- Overview of Solvay Group

- Hydrogen peroxide
  - Main end markets
  - Solvay’s leadership positions and geographical footprint
  - Solvay’s key strengths
Overview of Solvay Group
Strategic refocus – Reinvestment process

- Solvay, a new industrial benchmark based on
  - Two existing strong pillars with clear leadership positions
  - World scale facilities
  - Global presence with significant Asian and Latin American exposure
  - Strong product development culture
  - Very strong financial structure

- With global ambition, aimed at improving Solvay’s sustainability profile by focusing on investment in
  - High value added activities
  - Low energy footprint
  - Reduction of the cyclicality of the portfolio
  - Contribution to the geographic expansion
  - Sustainability targets of the Group

- Unchanged philosophy: sustained growth with leading positions; commitment to a conservative financial structure
Overview of Solvay Group

Solvay’s core competencies

- Strong leadership positions across the portfolio
- **Competitive cost structure** due to above industry-average plant capacities, cogeneration plants and raw material integration
- Sound balance sheet and tight capital management
- Solid track record of **successful portfolio management**
**Overview of Solvay Group**

**Diversified customer base (CH & PL excl IAS)**

<table>
<thead>
<tr>
<th>Industry</th>
<th>% of Sales</th>
<th>SBU Examples</th>
</tr>
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<tbody>
<tr>
<td><strong>Construction and architecture</strong></td>
<td>21%</td>
<td>Vinyls, Specialty Polymers, Fluor</td>
</tr>
<tr>
<td><strong>Chemical industry</strong></td>
<td>11%</td>
<td>Electrochemistry, Soda Ash, Fluor</td>
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<tr>
<td><strong>Glass industry</strong></td>
<td>9%</td>
<td>Soda Ash</td>
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<tr>
<td><strong>Water and Environment</strong></td>
<td>7%</td>
<td>Pipelife, Soda ash, Electrochemistry</td>
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<tr>
<td><strong>Electricity and Electronics</strong></td>
<td>6%</td>
<td>Specialty Polymers, Vinyls</td>
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<tr>
<td><strong>Detergents, cleaning and Hygiene products</strong></td>
<td>6%</td>
<td>Soda Ash, Electrochemistry, Hydrogen peroxide</td>
</tr>
<tr>
<td><strong>Paper</strong></td>
<td>6%</td>
<td>Hydrogen peroxide, Electrochemistry</td>
</tr>
<tr>
<td><strong>Packaging</strong></td>
<td>5%</td>
<td>Vinyls, Specialty Polymers</td>
</tr>
<tr>
<td><strong>Automotive industry</strong></td>
<td>4%</td>
<td>Specialty Polymers</td>
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Agenda

- Overview of Solvay Group
- Hydrogen peroxide
  - Main end markets
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  - Solvay’s key strengths
Main end markets of hydrogen peroxide

Hydrogen peroxide, a green oxidant that decomposes in water and oxygen

**BLEACHING**
- ✓ PULP
- ✓ PAPER RECYCLING
- ✓ TEXTILE

**DISINFECTION/ BIOCIDES**
- ✓ ASEPTIC GRADES FOR BEVERAGES PACKAGING
- ✓ PERACETIC ACID
- ✓ WATER TREATMENT

**INTERMEDIATE CHEMICAL SYNTHESIS**
- ✓ PROPYLENE OXIDE
- ✓ CAPROLACTAM

**CLEANING/ ETCHING**
- ✓ ELECTRONIC GRADES
Main end markets of $H_2O_2$
Standard grades – Pulp & paper

- Hydrogen peroxide replaced chlorine for paper production in the 90’s

- Main market for hydrogen peroxide
  > 50% of 2009 $H_2O_2$ sales volumes
    - Pulp bleaching = 85%
    - Paper recycling = 15%

- Expectations next 20 years
  1. Increase of global demand from pulp & paper industry for $H_2O_2$
  2. Consumption moving to emerging markets

<table>
<thead>
<tr>
<th>Mature markets</th>
<th>Emerging markets</th>
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<tbody>
<tr>
<td>Per capita consumption</td>
<td>A few 100 kg/y but in decline</td>
</tr>
<tr>
<td>Population evolution</td>
<td>Stagnation</td>
</tr>
<tr>
<td>Growth + urbanisation</td>
<td>Packaging</td>
</tr>
<tr>
<td></td>
<td>Magazine?</td>
</tr>
</tbody>
</table>
Main end markets of H$_2$O$_2$
Standard grades – Textile

Hydrogen peroxide is used as bleaching agent in the textile industry

Growing and moving market

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**2000 global market**
- H$_2$O$_2$ consumption: 190 kt/y
- China: 50%

**2013 global market**
- H$_2$O$_2$ consumption: 370 kt/y
- China: 70%
- Declining trend in the USA & in Europe
Hydrogen peroxide is more and more used in mining applications (gold, silver, uranium, …)

- To enhance the recovery of metals
- To detoxify water effluents after metal extraction
- To generate superactive oxidants on site (caro’s acid) when hydrogen peroxide is not active enough

- Entry point to develop industrial presence in remote locations
Main end markets of $\text{H}_2\text{O}_2$
Specialties – Disinfection

1. $\text{H}_2\text{O}_2$ aseptic grade: special grade with low dry residue used as disinfectant
2. Peracetic acid: a molecule combining $\text{H}_2\text{O}_2$ and acetic acid = biocide

Many applications stimulated by more stringent standards and legislations – food processing, aseptic packaging of beverages, animal farming, aquaculture, sewage, …

Growth potential in developed countries / high growth potential in emerging countries
Main end markets of H$_2$O$_2$
Specialties – Electronics

Cutting edge purification technology for production of high purity electronic grades – down to 100ppt impurity level (0.1 mg/ton).

Used in the production of

- semiconductors with the most demanding applications in car, telecommunication, and consumer electronics industries
- photovoltaic cells
- LCD
Main end markets of H₂O₂
Specialties – Electronics

- Entry point to broaden portfolio with other key high purity chemicals
  - Fluorhydric acid,
  - Chlorhydric acid,
  - Phosphoric acid

- Objective: become a strong integrated player in ultra pure wet chemicals for the electronics industry
Main end markets - Solvay’s H2O2 sales
Sales volumes from 2005 to 2015

Strong growth of H$_2$O$_2$ consumption by chemicals sector (HPPO)$^{(1)}$

In 2015, H$_2$O$_2$ market will be based on two strong pillars:

- Pulp & paper
- Propylene oxide

$^{(1)}$: HPPO considered at 50%
Leadership positions and geographical footprint
Solvay, the global leader in H$_2$O$_2$

As of January 2010; capacities at 100%
Leadership positions and geographical footprint
Solvay, the global leader in H$_2$O$_2$
Leadership positions and geographical footprint
Focus on China

- Hydrogen peroxide joint venture with Huatai Group, a pulp & paper player integrated in chemicals production
  - Build a new plant of 50 kt per year in Shandong province by 2011
  - Production of standard grades (pulp & paper, textile, chemicals, …) and specialties (high purity grades and peracetic acid)

- Project for a second plant in South of China focused on regional pulp & paper industry
Leadership positions and geographical footprint
Focus on Thailand

- Construction of hydrogen peroxide for propylene oxide (HPPO) mega plant (330 kt per year) in Joint Venture with Dow Chemical
  - To supply H\(_2\)O\(_2\) to adjacent propylene oxide plant of Dow Chemical
  - Start-up expected in 3Q 2011

- Synergies of large integrated site

- Strong basis to support Solvay’s growth in the region
Leadership positions and geographical footprint
Focus on South America

- Strong expansion of production capacity of Solvay’s hydrogen peroxide unit in Brazil over the 10 last years

![Production capacity of Solvay's H2O2 unit in Brazil (in kt/y)](chart)

- Continuous investments in distribution / terminals network in South America (Chili, Argentina, Colombia, Peru, …)
Solvay’s key strengths in H₂O₂

- Strong leadership position in:
  - Standard grades
  - Specialty grades

- Global presence ⇒ follow the consolidation of two major industries: pulp & paper and chemicals

- High productivity technology

- Intensive R&D programs
Solvay’s key strengths in H$_2$O$_2$
High productivity technology

**Anthraquinone auto-oxidation process**
Solvay’s key strengths in H$_2$O$_2$
High productivity technology

- One of the key ingredients of the working solution, the anthraquinone (AQ), determines the productivity of the process
  - Solvay has developed a proprietary AQ (AMYL AQ) which gives a higher productivity than the AQ used by the industry (ETHYL AQ)

- The high productivity technology allows to build the largest capacities with
  - The lowest specific investment cost
  - Reduced fixed costs
  - Optimized variable costs
Solvay’s key strengths in $\text{H}_2\text{O}_2$
High productivity technology and HPPO

- **SOLVAY** has the capability to engineer and build mega plants
  - **HPPO** mega plants, the largest $\text{H}_2\text{O}_2$ plants in the world
    (Antwerpen: 230 kt/y; Thailand: 330 kt/y)

- **HPPO** in partnership with BASF and Dow Chemical
  - Alliance between leaders
  - The quality of $\text{H}_2\text{O}_2$ has been developed and adapted to the HPPO process during many years
  - BASF, Dow Chemical and Solvay have a privileged relationship to build future projects
Solvay’s key strengths in H$_2$O$_2$

Research and development

- Being the technology leader in H$_2$O$_2$, Solvay innovates in
  - Technical solutions for the AO process, adapted to the different levels of plant sizes (from mini to mega)
  - The next generation technology with a strong focus on sustainability (direct synthesis, H$_2$O$_2$ production in fuel cells, …)
  - New markets through application developments and privileged customer relationships

- Strong internal and external R&D partnerships (a.o. in Asia)
Conclusion
Strategic alignment of hydrogen peroxide activity

- **Sustainability targets & low energy footprint**
  - H$_2$O$_2$ as a green oxidant ⇒ by-product is water
  - Environmental benefits of HPPO technology: 70% less waste water, 35% less energy consumption, 25% lower CAPEX

- **High value added activities**
  - Development of high value added special grades

- **Reduction of the cyclicality of the portfolio**
  - HPPO ⇒ 45% of 2011 capacity downstream integrated; less exposure to cycles

- **Geographic expansion**
  - High growth expected in Asia; major ongoing investments there
  - Asia $\frac{1}{4}$th of 2015 sales
Questions & Answers
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