Market overview and new applications for oleochemicals in Asia

HYDERABAD 14 APRIL 2016
AGENDA

1. Oleochemical market dimension and main Players;

2. Oleochemical opportunities in India;

3. Single plant versus integrated oleochemical complexes;

4. Conclusions
Market perception of Oleochemical

Oleochemical is the sum of the processes which convert the vegetable oil into sustainable products
Advantages of Oleochemical

- Costant growth of raw material availability
- “Green Image”
- Minor toxicity
- Better dermatological compatibility
1. Oleochemical market dimension and main Players
World oleochemical production

Fatty Acids production capacity (2015) ≈ 11,5 MM Tonn

Fatty Alcohols production capacity (2015) ≈ 4,5 MM Tonn
SEA remain the main production market due to raw material availability and consequent upstream integration for all major oleochemical producers;

India is a market to be followed closely due to the increasing consumption of oleochemical products. **There is potential in India for new installed capacities in oleochemical**;

China remain mainly a consumer of Oleo products and not a significant growth is foreseen in the next decade. The production should be sensibly lower then the installed capacity;

Fatty Alcohols capacity increase is strongly influenced by the Crude Oil price (Synthetic Alcohols). Main Fatty Alcohols players will remain in SEA.
Oleochemical route
Market utilization of oleo products
Glycerine Market

Current Production

- Market driven by Biodiesel production;
- Oleochemical contribution remain stable;

- Europe and SEA are main production area;
- China production is smaller than internal consumption;

Production by Region

- Europe
- SEA
- South America
- China
- Others
Glycerine Market

Estimated production (2025)

MM Tonn Glycerol

- Others
- Fatty Alcohols
- Soap
- Fatty acids
- Biodiesel

2013 2014 2015 2020 2025
2. Oleochemical opportunities in India
1. High male labour force participation rate (age 15+) ≈ 80%
   (World average ≈ 77 %) (*)

2. High GDP pro capita increase in the last years; (*)

3. High potential opportunities in the following industrial sectors:
   - Pharmaceutical;
   - Automotive components;
   - Food;
   - Soap and Toiletry;
   - Detergents & Cosmetics;
   - Manufacturing (Steel, coating, resins, pant, polyol, etc);

(*) Source: World Bank 2014 database
Oleochemical Route

Oleochemical Complex

Fatty Acids

Fatty Alcohols

Derivatives
Oleochemical Route
Fatty acids

Pharmac. & Food

Fatty Acids

Soap, Detergent & Cosmetic

Rubber, Latex, Paints & Coatings

Candles, Waxes, & Lubricant
Oleochemical route
Fatty Acids derivatives

Derivatives

Cosmetic, toiletry, slip agent & softener

Elastomers, biolubricants, polyols & plastics

Biocides, food processing & paper
Oleochemical route
Fatty Alcohols

- Detergent (AES, ES, AS)
- Fatty Alcohols
  - Lubricant, plasticizer,
  - Food product, textile
- Cosmetic, personal care
Glycerine Route

Glycerol → Technical Grade
Pharma grade

Cosmetics
Animal food
Tobacco Industry
Pharmaceutical Food
Polyurethane
Alkid resins
Propylene Glycol
Epychlorhydrin
Green Methanol
Etc…
Glycerine route
Propylene Glycol

- Deicing/Antifreeze
- Polyester resins
- Cosmetic & Personal care
- Food industry
Glycerine route
Epichlorohydrin

ECH

Epoxy resins

WT resins

Pharmac. Industry

textile industry

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3. Single plant versus integrated oleochemical complex
Single Plant
(up to early 2000)

VEGETABLE OIL

FATTY ACIDS COMPLEX

FATTY ALCOHOLS PLANT

DETERGENTS AND SURFACTANTS
Integrated Oleochemical Complex multipurpose industrial area

- **FAD**
  - **FATTY ACIDS**
    - **TRANSESTERIFICATION FOR BIODIESEL**
    - **MONO/DI/TRI GLYCERIDES**
      - **Crude Glycerine**
      - **Fatty Matter**
  - **GLYCEROL ESTERIFICATION**
  - **VEGETABLE OIL PRETREATMENT**
    - **FATTY ACIDS PLANT**
    - **FATTY ACIDS ESTERIFICATION**
    - **METHYL ESTER FRACTIONATION**
      - **METHYL ESTERS**
        - **METHYLESTERS**
      - **METHYL ESTER HYDROGENATION**
        - **FATTY ALCOHOLS**
  - **SULPHONATION**
    - **MES**
    - **PHARMA GLYCERINE**
      - **GLYCERINE REFINING**

- **Vegetable Oil**
  - **FATTY ACIDS**
  - **MES**
  - **Glycerine**
  - **Fatty Alcohols**
  - **Methylesters**
  - **Sulphonation**

- **Crude Glycerine**
  - **Fatty Matter**
  - **Mono/Di/Tri Glycerides**
  - **Transesterification for Biodiesel**
## Single plant vs Integrated Complex Comparison

<table>
<thead>
<tr>
<th>SINGLE PLANT</th>
<th>INTEGRATED COMPLEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>• STANDARD FEEDSTOCKS (Lauric Oils &amp; Palm Oil)</td>
<td>WIDE FEEDSTOCKS RANGE (Lauric Oils, PO, PST, FAD, Sludge Oils, Acid Oils, etc)</td>
</tr>
<tr>
<td>• LOW PRODUCTION FLEXIBILITY</td>
<td>HIGH PRODUCTION FLEXIBILITY</td>
</tr>
<tr>
<td>• STANDARD PRODUCT SPECIFICATIONS</td>
<td>TAILOR MADE PRODUCT SPECIFICATIONS</td>
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<tr>
<td>• STANDARD PLANT CONFIGURATIONS</td>
<td>TAILOR MADE PLANT CONFIGURATIONS</td>
</tr>
<tr>
<td>• LOW INTEGRATION WITH OTHER TECHNOLOGIES</td>
<td>HIGH INTEGRATION WITH OTHER TECHNOLOGIES (Biodiesel, MES, Fatty Alcohols, etc.)</td>
</tr>
</tbody>
</table>
4. Conclusions
Oleochemical business and India opportunities

- Oleochemical business, perceived as sustainable and green, is growing at constant rate;

- India has big potential in oleochemical, especially in Personal Care, Soap, detergents and manufacturing industry;

- The availability of unsaturated oil can also create potential for oleochemical derivatives like polyols and biolubricants;

- the market competition requires the set up of oleochemical complexes, which have to be flexible and able to provide a wide range of products;
THANK YOU FOR YOUR ATTENTION

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