Hydrometallurgical treatment of zinc bearing residues and what the challenges are today?

Philippe HENRY
SA Jean Goldschmidt International Director
philippe@jean-goldschmidt.be
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- Presentation of JGI/HYDROMETAL
- Example of zinc treatments
- Zinc sulfate production
- Challenges?
A long tradition in non-ferrous metals

1960 Setting up of CERRO INTERNATIONAL in Brussels, European subsidiary of an American Group (owner of mines and refineries in Peru) by Jean Goldschmidt.

1981 Repurchase of Cerro International by Jean Goldschmidt and creation of JEAN GOLDSCHMIDT INTERNATIONAL s.a. (JGI).

1985 Creation of the subsidiary HYDROMETAL in Engis.
The polyvalency of a Group

The Group is composed by 2 complementary entities:

- **JGI**: headquarters, taking in charge of commercial and financial activities.
- **HYDROMETAL**: treatment facility, valorisation and recycling.
Jean Goldschmidt International (JGI)

- 25 in Brussels (Belgium)
- Sourcing and purchasing raw materials for Hydrometal.
- Marketing products and by-products from Hydrometal.
- Global trading business in raw materials, metals and concentrates.
Jean Goldschmidt International (JGI)

- Representative offices in Bangkok and Shanghai.

- Agents in Poland, Mexico and the US.
HYDROMETAL

- 70 full-time workers in Engis (Liège – Belgium)
- Industrial leg of JGI Group
- 62,000 tons in 2014.

- Fully licensed for treatment of toxic and hazardous waste.
- ISO 14001 – OHSAS 18001
- ISO 9001 for the production of high purity tin

- Belgian Business Sustainable Development Award 2012.
An experienced actor in recycling

Our mission is being
- your recycling partner
- at the **service of the environment**.

- Our activity allow us to avoid waste landfilling.
- Our activity allow us to reduce the use of the limited natural resources.
- Our hydrometallurgical processes consume quite few energy and produce therefore small quantities of CO$_2$. 
Non-ferrous metals

• Our activity starts where others stop theirs.
• Our complex non-ferrous raw materials come from industrial activities around the world.
• They contain base metals (Zn, Pb, Sn, Cu and Ni), precious metals, minor metals (Co, Se, Te, Mo, Bi, In, Re, Ge, Ga...) and Rare Earth Elements.
• Contaminated, degraded, diluted reagents are used in our production of salts and metal concentrates.
Hydrometallurgical treatment of zinc materials

Example of Zn treatment:
- Washing of waelz oxide: 30,000t per year current capacity;
- Washing of other type of zinc oxide: 10,000t per year;
- Recycling of Zn/Ni from chemical wastes
- Recycling of Zn/Co from zinc purification sludges
- But also zinc sulfate production, our historical activity.
Hydrometallurgical treatment of zinc materials

• Operation started in 1985 by recycling ZnO dusts from secondary copper industry to produce zinc sulfate.

• Current production is ≈ 20000t liquid zinc sulfate per year for three different applications
  - Agrochemical industry
  - Pigment industry
  - Wet Zinc oxide production (SILOX)
    - zinc units are becoming more expensive (complex material) due to direct competition with smelters...
Challenges for hydro recycling of secondaries

Zinc smelters (EW-ISF,..) are recycling much more quantities of secondaries and this is reducing the availability of « cheap, non complex » materials for zinc salt production;

We need to source other type of complex materials to be more competitive:

- Zinc oxide with higher level of halogens and impurities (F, Cl, Mo, Ni, Co, Sn, Se,..);
- Rich EAFD to guarantee to get volume for ZnSO4 production;
Valorisation of Zn/Fe from EAFD

EAFD

\[ \text{H}_2\text{SO}_4 \] \rightarrow \text{LEACHING} \rightarrow \text{ZnSO}_4 \text{ solution} \rightarrow \text{LEACHING/PURIFICATION} \rightarrow \text{ZnSO}_4 \rightarrow \text{HYDROZINCITE} \rightarrow \text{Active ZnO SILOX} \]

\[ \text{Pb/Ca residue} \]
Quality of yellow pigment:

<table>
<thead>
<tr>
<th>EAFD</th>
<th>%</th>
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<tbody>
<tr>
<td>Fe</td>
<td>23.7</td>
</tr>
<tr>
<td>Zn</td>
<td>32.8</td>
</tr>
<tr>
<td>Pb+Mg+Mn</td>
<td>1.6</td>
</tr>
<tr>
<td>Al+SiO2</td>
<td>1.8</td>
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<tr>
<td>Salt</td>
<td>6.0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>l</th>
<th>a</th>
<th>b</th>
<th>ΔE / ref</th>
<th>Strength / ref (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>54.3</td>
<td>16.6</td>
<td>52.7</td>
<td>1.5</td>
<td>102</td>
</tr>
</tbody>
</table>
Hydrometallurgical treatment of zinc materials

- **Objective:**
  - Confirm the technico economical viability of this process by a technical campaign of 1000 t pigment in 2016
  - Confirm the quality of ZnO produced
  - Find a partner for the use of pigment
Thank you for your attention! …