Process analysis, process design of pilot plant, first practical experiences

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Outline

1. Analysis of the experimental results carried out by RTD performers;
2. Preliminary process analysis;
3. Preliminary experimental activity on pilot plant;
4. Suggestion for the modification of the mobile pilot plant;
5. Realisation of the mobile unit (in progress);
6. Planning of pilot plant tests;
Process analysis: CRT and spent lamps powders

Figure 1 – Flowsheet process developed by SPD 5.1 (1000 t/y of CRT-SL powder)

Process analysis: treatment of PCB

1000 t/y of PCB  
Au 300 g/t
Process analysis: treatment of LCD (In recovery)
Process analysis: Li spent batteries

Conclusions

- CRT and spent lamps powder process seems to be technically and economically feasible: with some process optimisation a limit of 200-500 t/y could be reasonably reached (Relight produces at this moment about 20 t/y);

- Li-SB recycling by the developed process seems to be technically and economically feasible (250 t/y);

- PCB recycling is technically feasible. The precious metal content and their possible recovery are the key factors of the process to have acceptable economical margins. Pilot plant tests are strongly necessary to optimise this process;

- LCD panels treatment seems to be technically feasible: about 400 t/y of LCD panels seems a right production rate;

Pilot plant tests will permit to establish process optimisation in large scale and to produce acceptable and significant amount of final products for suitable marked analysis.

→ THEN ECONOMICAL ANALYSIS OF THE DEVELOPED PROCESSES
D 4.1 - Project design and realisation of the pilot plant (up-grading of existing facilities - Colico)

Overview of the pilot plant and the scrubber unit

A particular of the filtration unit
A particular of the filtration unit

A particular of the EW cell
Main considerations

- Dimension has been designed to permit an easy transportation: the first estimation was roughly evaluated. The actual size permit about 500 t/y of waste (powders).

- Several companies that could be easily reached has been contacted: logistic aspects for the first tests in Relight (mobile plant + consumable);
  - OMIG (Lecco) → 125.000 € (without filtration and container)
  - SASIL (Biella) → 120.000 € all included

- Flexible plant for all the studied processes
Pilot Plant Tests: status of its building

Pilot Plant Tests: experimental tests

Pilot tests

- CRT (Relight & Greentronics)
- Spent lamps (Religh & Greentronics)
- PCB (SET-trade)
- LCD (Relight)
- Li-spent batteries (crushing ?) - Pilot lab scale (HTR)
Products of HYDROWEEE

Plastic (LCD)

ZnS

$\text{CoCO}_3$

Powder with In (LCD)

Zn

$\text{ZnS} \cdot \text{Y}_2\left(\text{C}_2\text{O}_4\right)_3$

CoCO3

2 (500 μm)