





SIDISA 2012 26th – 29th June 2012, Milano ALUMINIUM BEHAVIOUR DURING INCINERATION AND ITS RECOVERY FROM BOTTOM ASH

L. Biganzoli DIIAR – Environmental Section





Eng. Laura Biganzoli

PhD student at Politecnico di Milano Department of Environmental Engineering

Research group on waste management Prof. Stefano Cernuschi Prof. Michele Giugliano Eng. Mario Grosso Eng. Lucia Rigamonti



- Background
- Goal
- Field tests and samples analysis
- Data processing
- Results



The project is the development of a previous research on aluminium recovery from the bottom ash.



N.B.: aluminium represents about 60% of the total non-ferrous metals



5

Aluminium recycling is influenced by the oxidation level of the scraps.



Assumption is based on experimental tests made in Belgium for FAR/Pechiney (about 15 years ago)

This is a very uncertain data

→ research project on volatilisation/oxidation processes involving aluminium in the furnace.



Aim of the project:

metallic Al

1) <u>To evaluate the partitioning of AI in the</u> residues of the incineration process

2) <u>To estimate the oxidation level of AI in</u> the residues of the incineration process

To assess the amount of AI potentially recoverable from the BA

total Al







The experimentation was carried out in an incineration plant located in Northern Italy.

Waste was doped in order to increase its content of aluminium from 0.7% to more than 3.5 %









TESTED MATERIALS

1. Rigid aluminium packaging: 6-7th June 2011

Beverage cans (post–consumer, squeezed)



13.2 g 220-250 μm (base 95-155 μm (walls) Food trays (pre-consumer)



4.28 g

50 µm



2. Flexible aluminium packaging: 13th July 2011



 $12\ \mu m$



42 µm

Mix of foils:

aluminium foils + Poly-laminated foils



 $10\,\mu m$

Paper 30 g m⁻²

Glue solvent 2 g m⁻²



10 μm Paper 20 g m⁻² PE 9 g m⁻² Wax 11 g m⁻²

Laura Biganzoli



12/60/12 μm Triplex Alu/PE/Alu Glue solvent 2,5 g m⁻² each side



38 µm

PE 45 μm











POLITECNICO DI MILANO

Laura Biganzoli

ALUMINIUM ANALYSIS





Total AI in fly ash (cans)







POLITECNICO DI MILANO



Thickness vs recovery





Al oxidation level

	Aluminium oxidation level (%)		
Residue	Cans	Trays	Foils
Fly ash	47	45	66
Bottom ash fraction < 0.8 mm before grinding	96	4	94
Bottom ash fraction < 0.8 mm after grinding	30	37	75
Ingots*	0	0	0
AVERAGE	9.2	17.4	58.8

*Aluminium contained in the ingots is all metallic by definition.

**Fly ash contribution could not be estimated.



Thickness vs oxidation





•If an advance bottom ash treatment is considered, about 80% of cans, 51% of trays and 26% of foil can be recovered

PROBLEMS AND LIMITATIONS

- •Waste retention time in the furnace
- •Drying of samples in uncontrolled conditions
- •Analysis of metallic Al for fly ash
- •Aluminium concentration in the BA quenching water



New experimental campaign: 30-31th January and 1st February 2012 on - aluminium foil

- aluminium poly-laminated foil
- spray cans

- Comparison between aluminium foil and poly-laminated foil
- Evaluation of the drying process
- Measurement of aluminium concentration in the BA quenching water





Thank you

for the attention

Email: laura.biganzoli@mail.polimi.it

