

Management of Mercury from Decommissioning of Chlor-Alkali Mercury Cell Plants



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KEY FIGURES

Headquarters

Av. Diagonal 593-595
08014 Barcelona (Spain)

Incorporation

1989 merger between ERT and CROS

Social structure

Stock company. Shares quoted on The Spanish stock exchange

Share capital

34,23 million Euros (100% *free float*)

Divisions

- Chlorine Related Businesses (Basic Chemicals and Plastics)
- Intermediate Chemicals
- Pharmaceuticals

Workforce¹

1,369 workers/11 facilities

Sales²

618.27 million Euros

Exports²

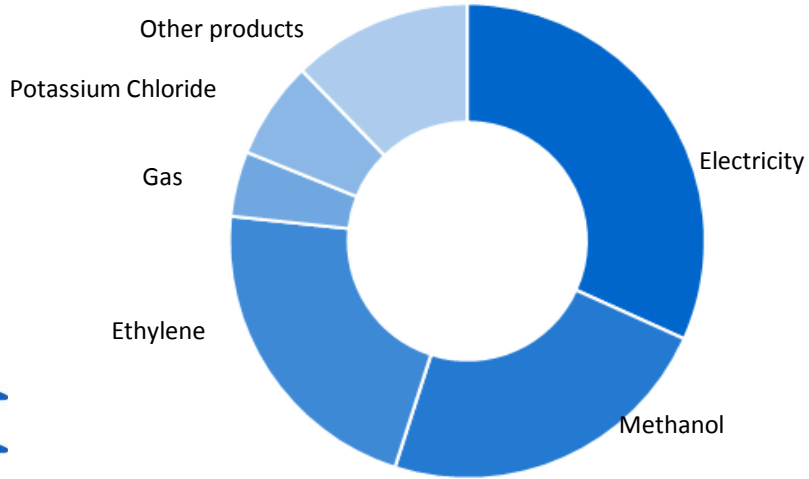
49% of sales

¹ Average year 2015

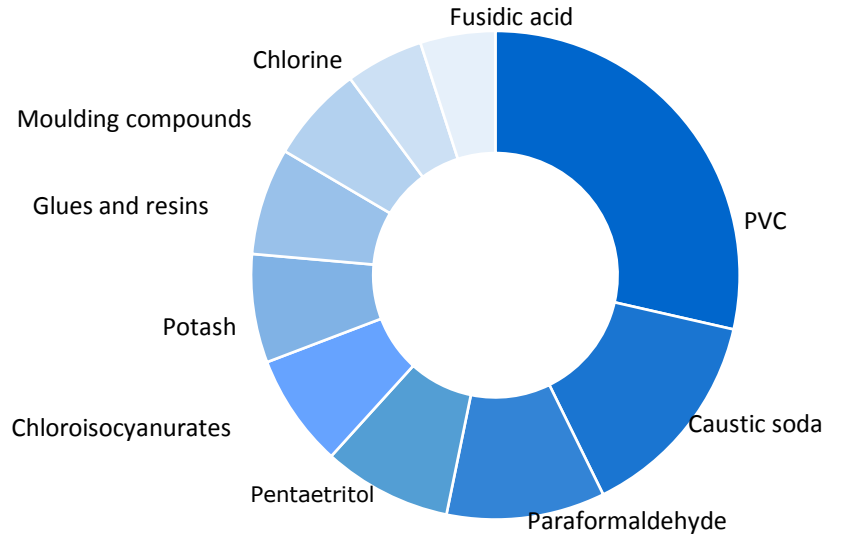
² Year 2015

Flow of the Activity

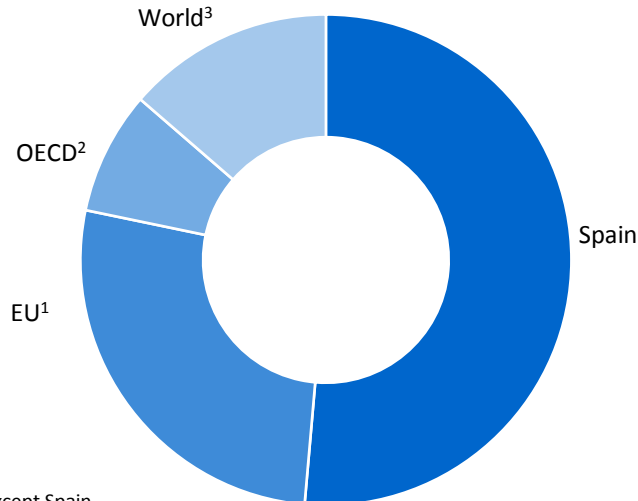
What do we buy?



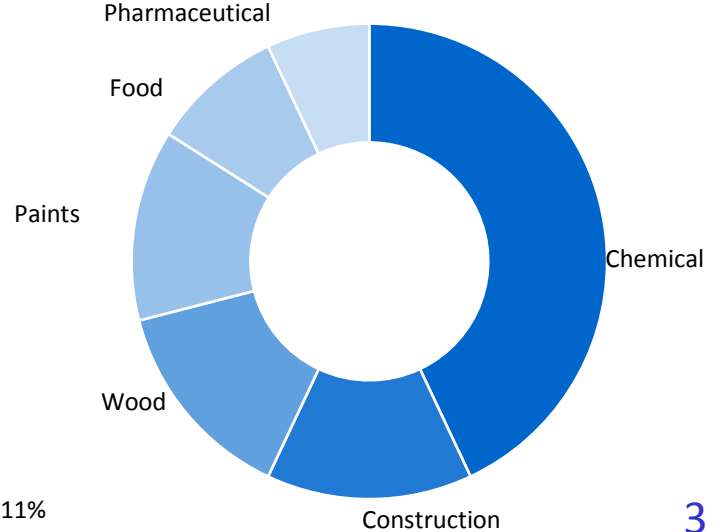
What do we sell?



Where do we sell?



To which sectors do we sell?



¹ Except Spain

² Except EU countries

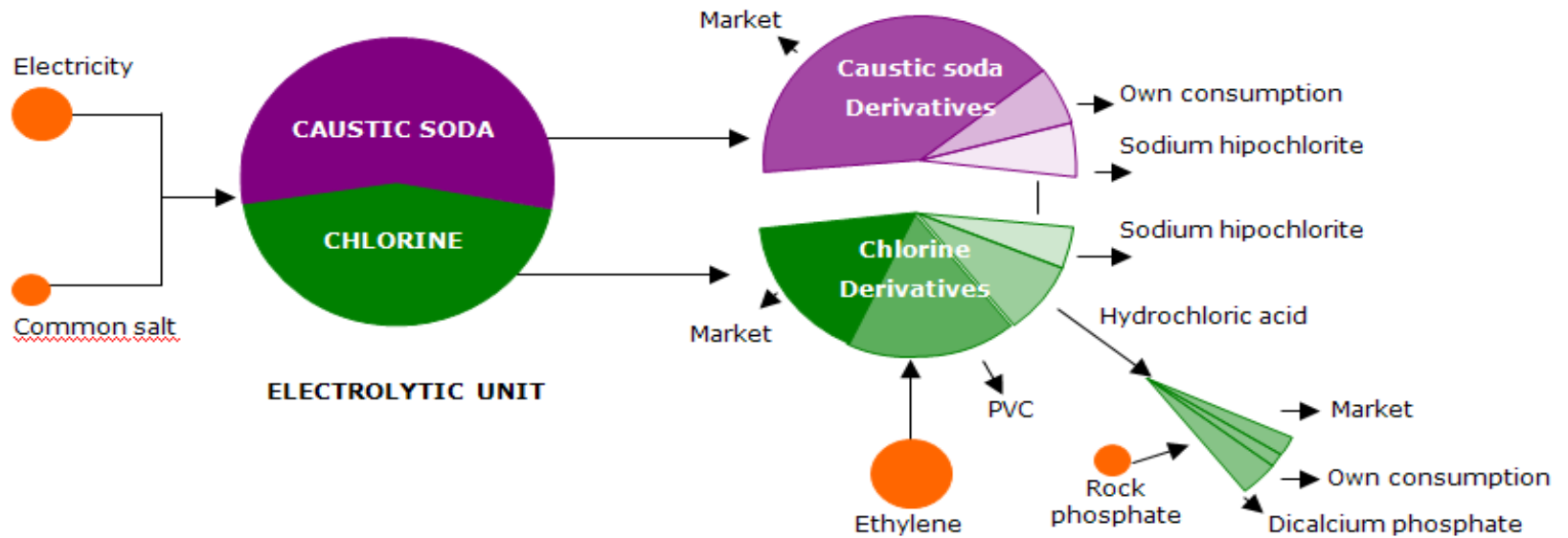
³ Rest of the world

Industrial Structure

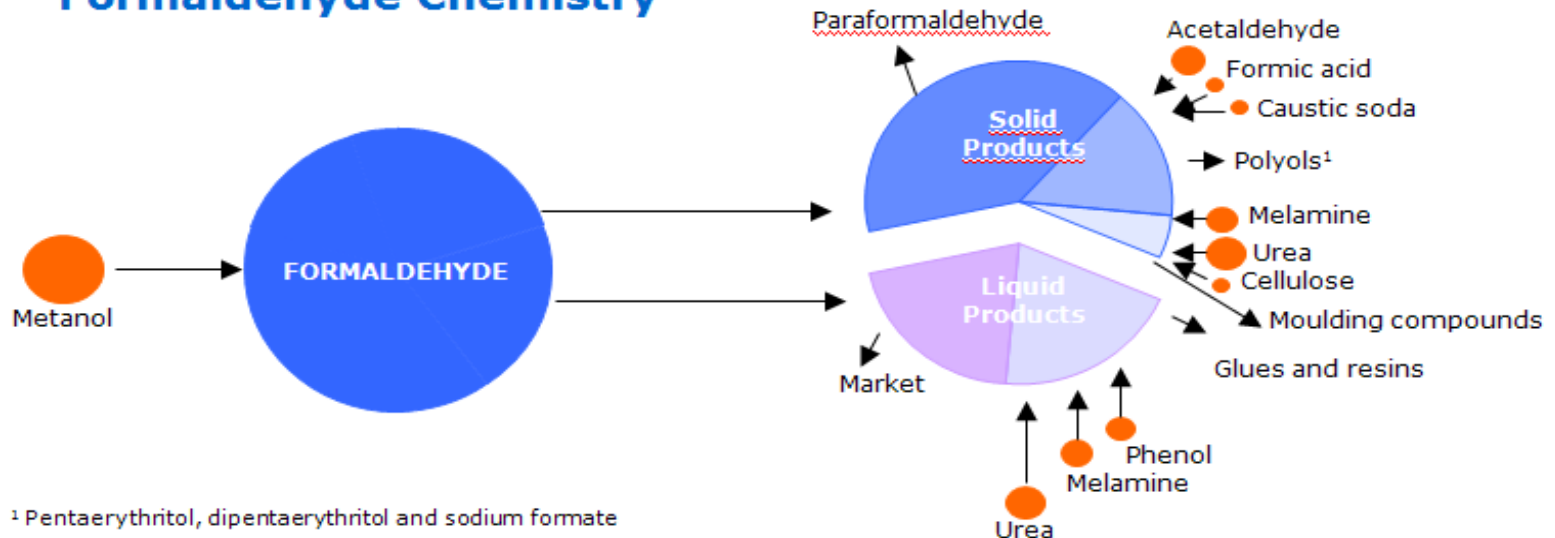
Division	Facilities	Products	Applications
Basic Chemicals	Cardona, Flix, Tarragona, Sabiñanigo and Vila-Seca I	Caustic potash Caustic soda Chlorine Chloroisocyanurates Hydrochloric acid Sodium chlorate Sodium chloride Sodium chlorite Sodium hypochlorite	Chemical industry General industry Derivatives manufacturing Swimming pools General industry Paper pulp bleaching Chemical industry Water treatment Water treatment
Plastics	Monzón and Vila-seca II	EDC PVC VCM	VCM manufacturing Construction PVC manufacturing
Intermediate Chemicals	Almussafes, Cerdanyola and Tortosa	Formaldehyde Glues and resins Moulding compounds Paraformaldehyde Pentaerythritol Sodium formate	Derivatives manufacturing Wood industry Electrotechnics Resins Paints Tanning industry
Pharmaceuticals	Aranjuez	Erythromycin Fusidic acid Phosfomycin	Antibiotic Skin infections Antibiotic

Outline of the Business

Chlorine-Caustic Soda Chemistry

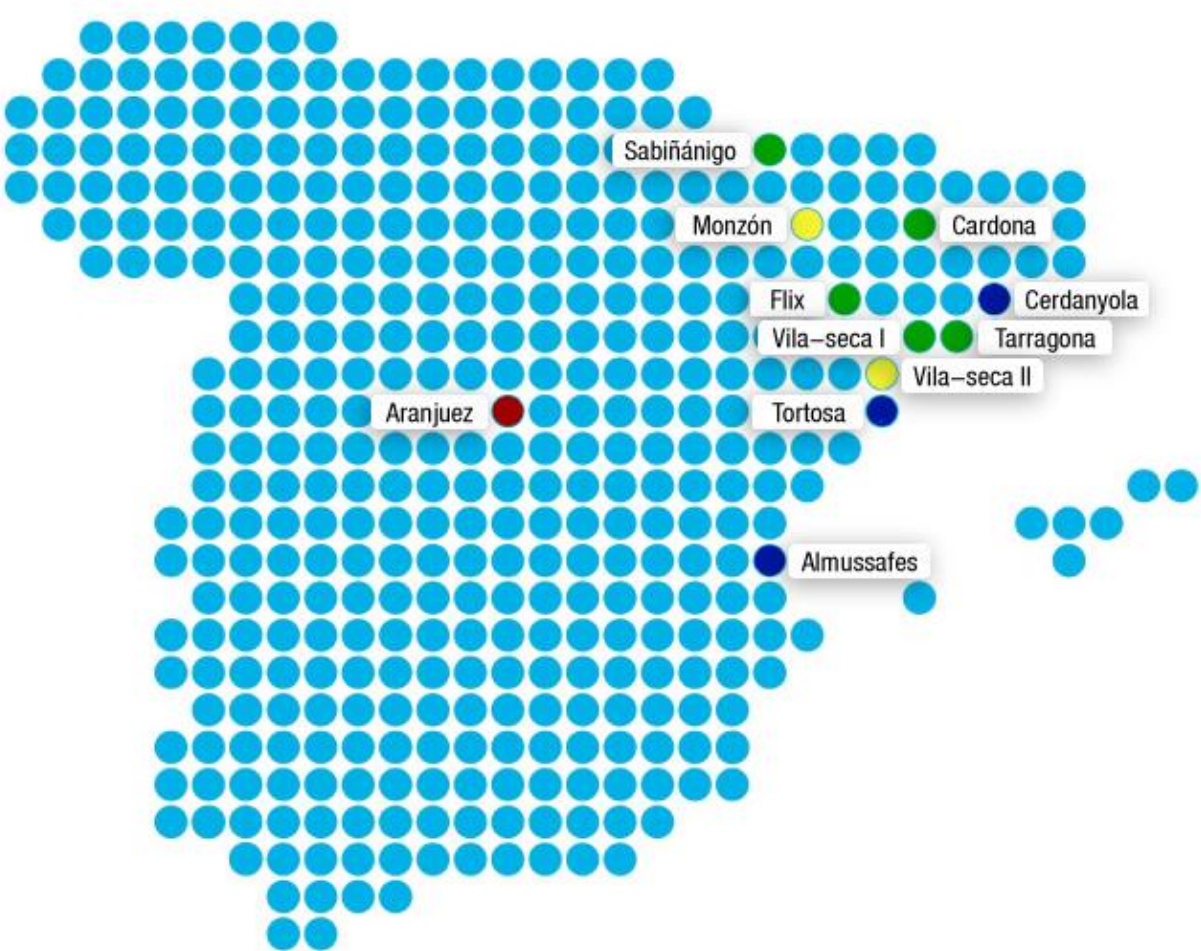


Formaldehyde Chemistry



¹ Pentaerythritol, dipentaerythritol and sodium formate


Production Facilities



● Basic Chemicals ● Plastics ● Intermediate Chemicals ● Pharmaceuticals

Chlor-Alkali Facilities

Installed Chlorine production capacities (2014)



Site	Products	Technology	Capacity (kt Cl ₂ /year)
Sabiñánigo	Cl ₂ -KOH	Membrane	30
Vila-seca	Cl ₂ -NaOH	Membrane	55
Vila-seca	Cl ₂ -NaOH	Mercury	135
Flix	Cl ₂ -NaOH	Mercury	88

Ercros in Flix (Tarragona): recent experience

Electrolytic Unit IV-A (commisioned in 1975, shut-down in 2009)

Technology: Mercury cathode, DeNora cells 14M2 y 14M3

Design Capacity (after expansion in 1986): 70,000 t/year



AERIAL VIEW OF THE DECOMMISSIONED FACILITIES



Electrolytic Unit IV-A Decommissioning

Major Milestones

Previous phase:

- Safe shutdown (emptying and cleaning of all the equipments)
- Transferring clean mercury into suitable containers and temporal storage in a restricted area of the cell room
- Disassembling of equipment containing mercury (skilled maintenance personnel under supervision of technical production personnel)

Decommissioning:

- Creation of Decommissioning Project Team (multidisciplinary, with internal auditory)
- Decommissioning Project based on technical Guidelines (EuroChlor), internal procedures) and HSE requirements
- Construction of a temporary mercury Storage according to legal requirements and transport of mercury containers inside
- Decommissioning of the cell room and auxiliary installations (subcontracted) with specific decontamination procedures depending on the material

Flix Site Temporary Mercury Warehouse

Mercury Recovery:

- Emptying decomposers, cells and mercury pipes
- Recovery from equipment (sodium hydroxide and hydrogen pipes and vessels)
- Recovery from cell room during dismantling

Cleaning with water to achieve purity criteria

Filling into suitable containers (steel made, drop and impact resistant, tight closure)

Building a storage according to legal requirements:

- Secondary containment for retaining 110% of any single container
- Well lit and weatherproof
- Impervious and resistant floor
- Fire alarms
- Mercury concentration monitoring
- Restricted area and periodically monitored

Temporary Mercury Warehouse Flix Facility





Close future

November 2017: Mercury plants will shut down



RECOVERY OF ALL MERCURY COMING FROM CELL ROOM EQUIPMENT
BEFORE AND DURING DECOMMISIONING

MAIN PROBLEM: METALLIC MERCURY BECOMES A RESIDUE

- Enough suitable containers for temporary storage
- Conditioning of temporary warehouse/s
- Monitoring, maintenance and surveillance of temporary warehouse/s
- **Mercury disposal**

Temporary mercury storage

Requirements:

- Technical (Directive 2011/97/EU and BAT specifications)
- HSE (Seveso III Directive obligations)
- Integrated Environmental Authorisation
- Operational (monitoring, maintenance and surveillance)

Company Approach about Mercury Disposal

- EU regulatory compliance
- Technically and safe disposal process to transform mercury in an irreversible and stabilized material
- Legal certainty of transferring of responsibility over the residue
- Need for Availability of treatment capacity within a reasonable period of time (limited by regulatory authorities ?)
- Phased plan of disposal (high cost operation)

Thank you for your attention

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