



## Environmental performance - Zinc direct leaching Stand alone

### Zinc direct leaching process – The environmental solution

Outotec's atmospheric zinc concentrate leaching process offers the ability to leach zinc concentrates directly without need of a roaster. This makes treatment of zinc concentrate possible close to the mine site and avoids the need to transport concentrate.

Zinc concentrate is leached in sulfuric acid solution using Outotec atmospheric leaching reactors with the help of oxygen and spent acid from the cellhouse. Sulfur is converted to elemental form and, together with the leach residues, is separated for further processing.

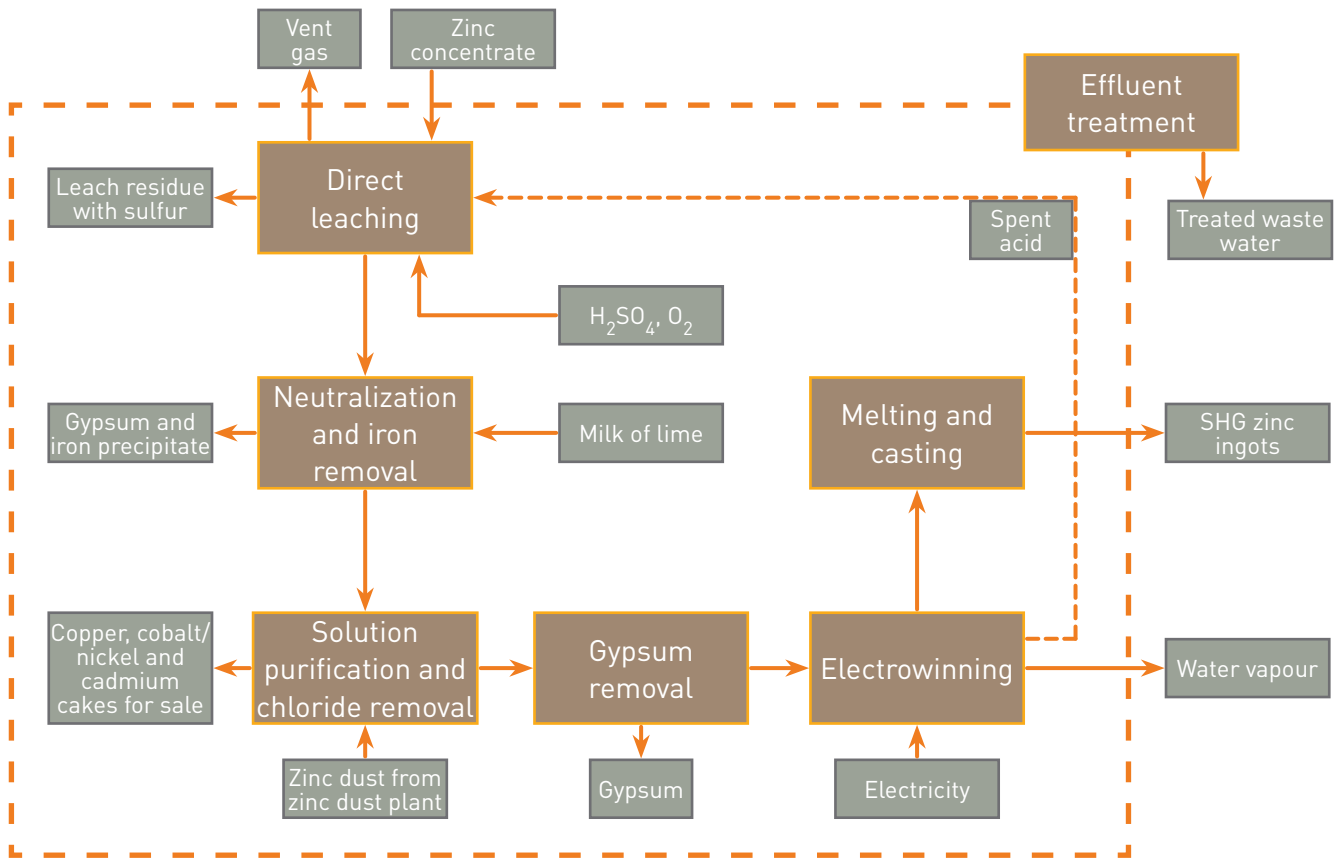
In iron precipitation a neutralization agent such as calcium hydroxide is needed. It is possible to precipitate iron as goethite or jarosite and thus minimize the amount of residue.

More noble metals such as copper, cobalt, nickel and cadmium can be recovered as saleable by-products before electrowinning. Cobalt and nickel can be removed using either arsenic or antimony based processes. The purified zinc sulfate solution is passed through low emission OKTOP® cooling towers and a gypsum

removal step before electrowinning. Zinc cathodes produced in electrowinning are melted and can be cast as SHG zinc ingots or alloys.

The Outotec Zinc direct leaching process together with OKTOP® key process equipment offers high recovery of zinc together with optimized water and energy consumption. These features, together with environmentally acceptable iron and sulfur residue and zero SO<sub>2</sub> emissions to atmosphere, make this process a prime candidate for any project where protection of the environment is important.

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The above flowsheet shows a typical process configuration for a stand-alone zinc direct leaching operation. The table below indicates the raw material and consumable feeds to the process together with waste generated and emissions from the process.

**Input/t Zinc ingot**

Concentrate	2 t
ZnO	0.4 t
As <sub>2</sub> O <sub>3</sub>	1.0 kg
Total energy (electricity)	3500 kWh
O <sub>2</sub>	0.4 t
H <sub>2</sub> SO <sub>4</sub>	0.2 t
Water	3 t

**Output/t Zinc ingot**

Fe residue	0.7 t
S residue	0.9 t
Pb cake	100 kg
Cu cake	10 kg
Co/Ni cake	3 kg
Cd cake	3 kg
Waste water	1.5 t
Emissions to air (H <sub>2</sub> O)	1.5 t
Emissions to air (Zn)	30 g

The information contained herein is produced by Outotec for use as an illustrative example only and may not reflect all the realities of actual processes as plant conditions and raw material bases vary. In no event should you rely only on the information contained herein without prior consultations with Outotec.