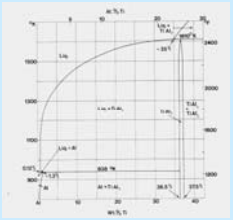
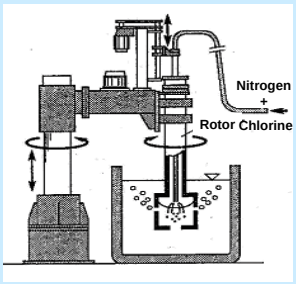
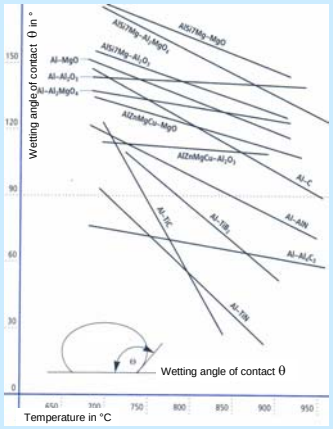
Removal of Titanium from Aluminium Melts by Reactive Gas Purging







Principle

When recycling coated aluminium sheet in modern saltless stationary multi-chamber hearth furnaces, titanium can accumulate in the melt by aluminothermic reduction of titanium oxide.

The remelting process can be expanded by refining the aluminium melt with a gas purging process, which is conventionally used to remove dissolved impurities like hydrogen. The idea is to remove titanium through gas purging with nitrogen. The dissolved titanium gets into contact with nitrogen and titanium nitride might form. The titanium nitride is a solid impurity and can possibly be removed by flotation and precipitation in the dross.

To improve the results of purging with nitrogen, tests were conducted with reactive gas. The reactive gas, a mixture of chlorine with nitrogen, should improve the wetting angle of contact of the titanium nitrides to improve flotation.

Crucial Working Parameters

- **purging time**
- **temperature (affects wetting angle of contact)**
- **gas composition (nitrogen and nitrogen-chlorine mixture)**

Pilot Scale furnace

- **resistance furnace**
- **max. temp. 1500°C**
- **FOSECO - Impeller**

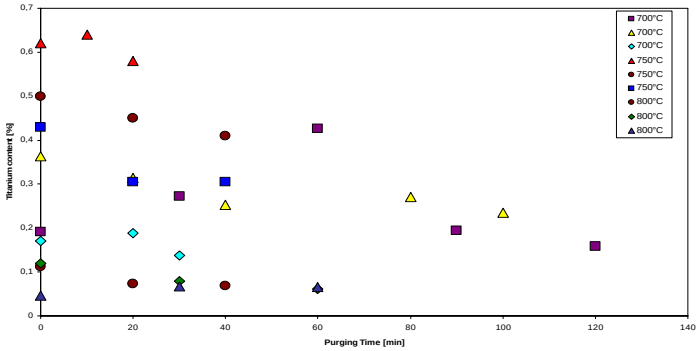
Equipment at IME

Pilot Scale Resistance Furnace with FOSECO Impeller

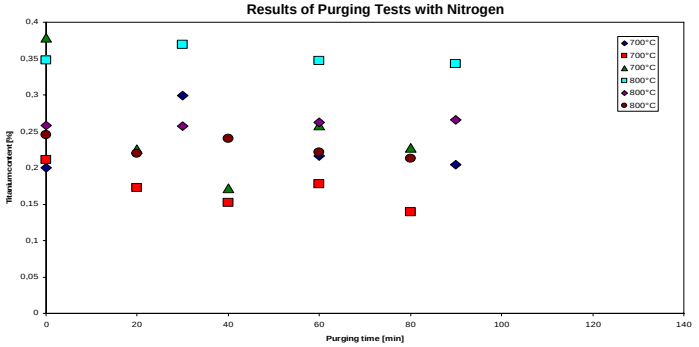
Furnace in Purging Process

Used Material

Results and Outlook



Results of Purging Tests with Nitrogen



Results of Purging Tests with Nitrogen and Chlorine

Results

- **Elimination of titanium is possible.**
- **Different temperatures show no result concerning flotation when purging only with nitrogen. They show better results with lower temperature when purging with nitrogen-chlorine mixture.**
- **No magnesium is eliminated during the refining process.**

Outlook

- **The degree of the elimination varies strongly, so ways should be found to get a stable elimination.**
- **To get an better overview, the chlorine contentof the gas mixture should be raised.**

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