

Aluminum Degassing

Applied Analytics Application Note No. AN-065



Application Summary

Analytes:	chlorine (Cl₂)
Detector:	OMA-300
Process Stream:	aluminum degassing

Introduction

During aluminum casting, moisture in air reacts with the molten aluminum to form hydrogen, which has been experimentally determined to be the only soluble gas in molten aluminum. When cast, if hydrogen is present in the molten aluminum, porosity or voids will form in the final casting. This casting defect will compromise the material properties of the final product such as its tensile strength or toughness.

To prevent this, molten aluminum is treated with a mixture of chlorine gas and an inert carrier gas like argon or nitrogen. The chlorine will react with hydrogen, or any other impurities present like alkaline metals to form chlorides. These reaction products will then be removed from the molten aluminum with the aid of the carrier gas.

Because both chlorine and hydrogen chloride (a product of the chlorination reaction) are dangerous pollutants, foundries actively seek to minimize chlorine levels in the degassing mixture to precise ratios with the aim of reducing pollution and improving industrial hygiene. Process analyzers, like AAI's OMA-300, play a crucial role in these efforts by providing real-time concentration. This will enable the foundry to produce performance castings while minimizing the negatives presented by the degassing mixture.

System Benefits

- » Continuously measures chlorine levels using UV-Vis spectrophotometer
- » Totally solid-state build with no moving parts — modern design for low maintenance
- » Additional software benches for up to 4 chemical analytes
- » Ultra-safe fiber optic design with no sample gas inside analyzer unit

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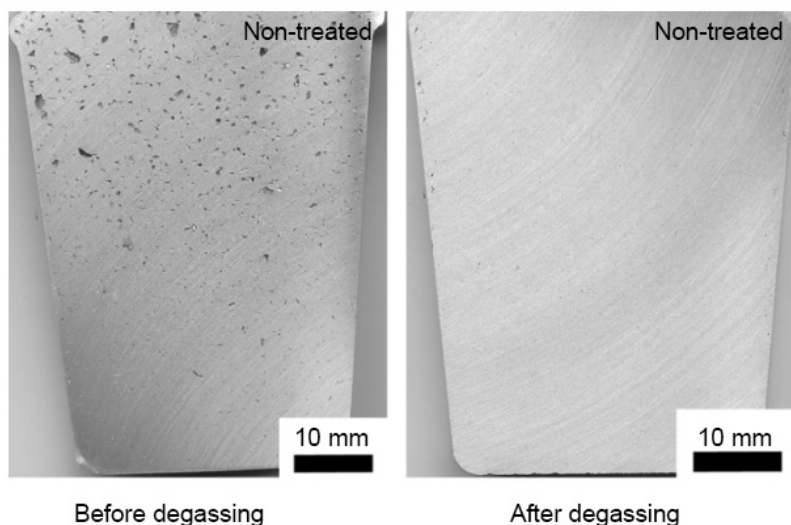


Figure 1

Figure 1: Shows two cross sections of aluminum alloy A356. The image on the left has not been degassed prior to casting, while the image on the right has been degassed for 10 minutes prior to being cast.

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Further Reading

Subject	Location
Human Machine Interface Data sheet	https://aai.solutions/documents/AA_DS202A_HMI.pdf
OMA Series Process Analyzers Data Sheet	https://aai.solutions/documents/AA_DS001X_OMAseries.pdf



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