

Author's Accepted Manuscript

Separation and characterisation of fused alumina
obtained from aluminium-chromium slag

Pengda Zhao, Han Zhang, Hongjun Gao, Yuqian
Zhu, Jun Yu, Qi Chen, Huizhong Zhao



www.elsevier.com/locate/ceri

PII: S0272-8842(17)32526-9
DOI: <https://doi.org/10.1016/j.ceramint.2017.11.073>
Reference: CER116728

To appear in: *Ceramics International*

Received date: 6 September 2017
Revised date: 10 November 2017
Accepted date: 10 November 2017

Cite this article as: Pengda Zhao, Han Zhang, Hongjun Gao, Yuqian Zhu, Jun Yu, Qi Chen and Huizhong Zhao, Separation and characterisation of fused alumina obtained from aluminium-chromium slag, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2017.11.073>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Separation and characterisation of fused alumina obtained from aluminium-chromium slag

Pengda Zhao^a, Han Zhang^a, Hongjun Gao^b, Yuqian Zhu^b, Jun Yu^a, Qi Chen^a, Huizhong Zhao^{a*}

^aState Key Laboratory of Refractories and Metallurgy, Wuhan University of Science & Technology, Wuhan 430081, P. R. China

^bJinzhou Ji Xin High Temperature Materials Co., Ltd, Jinzhou 121005, P. R. China

Abstract

Aluminium-chromium slag is a by-product of the thermal reduction of aluminium during chromium smelting, which is generally considered solid waste with a low utilisation rate. In this work, a fused carbonisation reduction method has been proposed to separate the Al_2O_3 and Cr_2O_3 from the slag and produce fused alumina and chromium carbide materials for refractory applications. The thermodynamic parameters of this process were determined using a standard thermal analysis method. In the molten slag, Cr_2O_3 reacts with C to produce high-density chromium carbide, which effectively precipitates at the bottom of the reaction vessel, while Al_2O_3 is converted into the corundum phase during cooling. The results of chemical analysis showed that the Al_2O_3 content in fused alumina was greater than 95 wt.%, while its main crystalline phase was the corundum with a bulk density of $3.57 \text{ g}\cdot\text{cm}^{-3}$, thermal conductivity of $6.4\text{--}7.4 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ (at temperatures above $600 \text{ }^\circ\text{C}$), and average thermal expansion coefficient of about $7.5\text{--}8.2\times 10^{-6}/^\circ\text{C}$ (in the temperature range of $800\text{--}1300 \text{ }^\circ\text{C}$).

Keywords: aluminium-chromium slag; fused alumina; thermodynamic properties; fused carbonisation reduction

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/7888048>

Download Persian Version:

<https://daneshyari.com/article/7888048>

[Daneshyari.com](https://daneshyari.com)