Available online at www.CivileJournal.org

Civil Engineering Journal

Vol. 6, No. 5, May, 2020

# Optimalization of the Ferronickel Production Process through Improving Desulfurization Effectiveness

Izet Ibrahimi [a], Nurten Deva [a*], Sabri Mehmeti [a]

[a] *Faculty of Geosciences; University of Mitrovica "Isa Boletini" Ukshin Kovaçica, 40000 Mitrovicë, Kosovo.*

Received 19 December 2019; Accepted 22 March 2020

**Abstract**

Desulphurization of Ferronickel in the converters with oxygen is the most complex part of the technological process in the Drenas foundry. Sulphur in the ferronickel melting is mostly in the form of FeS, with a melting temperature of 1195°C, and it has tendency to dissolve indefinitely in liquid iron. Our objective is to determine the sulphur removal coefficient, as a key indicator of the desulphurization efficiency in the converter, by measuring the activity and concentration of sulphur and other elements in liquid Fe and melting. Determination of this coefficient is done according to the analytical method, while comparing the current process parameters with those of the new desulfurization methods, other indicators of the refining process are determined. The refining process and the effective conduct of the study depend on the XRD analysis database of metal and slag, and as well of the technological refining process analysis data. Research has shown that desulfurization efficiency is a function of the sulphur removal coefficient, respectively; metal composition, slag, oxygen activity, $CaO/SiO_2$ ratio, sulphide capacity, fluidity, surface pressure, etc.). In addition to this coefficient, other indicators of refining process optimization are defined.

*Keywords:* Ferronickel; Slag; Sulphur Portion Coefficient; Desulphurization; Sulphide Capacity; Refined Ferronickel.

## 1. Introduction

The pyrometallurgical obtaining of ferronickel from oxide-laterite ores, regardless of the degree of technical-technological excellence even in the newer processes, has many unresolved technical and technological problems, first of all the process of refining ferronickel in the converter is followed by low efficiency due to the lack of desulphurization outside the furnace as well as the low desulphurization dynamics in the converter. During pyrometallurgical processing the converter is one of the most important aggregates to produce and to refine ferronickel. The oxygen blowing process is necessary to decrease the sulphur, phosphorus, carbon, silicon and the iron content in the FeNi metal to the requested levels [1].

During the production of ferronickel in the electric furnace, in addition to iron and nickel, and other metals such as cobalt, manganese, chromium, sulphur, copper, silicon, phosphorus, carbon, etc., pass to the alloy, which adversely affects the properties of it and their removing presents additional difficulties, adversely affecting the process economy.

Since ferronickel, is used for the production of various steels must contain a minimum amount of sulphur below 0.04% [2, 3], then it is necessary to make the deepest desulphurisation, whether through out-furnace desulphurisation, before that the metal passes to the converter or during process of refining in the converter. With technological advancements, the requirement for minimum sulphur content in steels has reached up to 0.02%, while for special

* Corresponding author: nurten.deva@umib.net

http://dx.doi.org/10.28991/cej-2020-03091516