

**AN ATTEMPT AT OPTIMIZING THE FLOW  
CHARACTERISTICS OF BLAST FURNACE SLAG BY  
INVESTIGATION WITH SLAG OBTAINED FROM BLAST  
FURNACE OF ROURKELA STEEL PLANT, SAIL**

A THESIS SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENT FOR THE DEGREE OF

**Bachelor of Technology  
in  
Metallurgical and Materials Engineering**

**By**

**PALLABI PATNAIK (10604030)**

**SHIVANI KISHOR DUMPAWAR (10604017)**



**Department of Metallurgical and Materials Engineering**

**National Institute of Technology**

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**2010**

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**UNDER GUIDANCE OF  
PROF. U. K. MOHANTY**



**Department of Metallurgical and Materials Engineering**

**National Institute of Technology**

**Rourkela**

**2010**

**II**



**National Institute of Technology**

**Rourkela**

**CERTIFICATE**

This is to certify that the thesis entitled, "**An attempt at optimising the flow characteristics of Blast Furnace Slag by investigation with slag obtained from Blast Furnace of Rourkela Steel Plant, SAIL**" submitted by **Pallabi Patnaik (10604030)** and **Shivani Kishor Dumpawar (10604017)** in partial fulfillments for the requirements for the award of **Bachelor of Technology Degree in Metallurgical and Materials Engineering** at National Institute of Technology, Rourkela is an authentic work carried out by them under my supervision and guidance.

To the best of my knowledge, the matter embodied in the thesis has not been submitted to any other University/Institute for the award of any Degree or Diploma.

Date:

Prof. Upendra Kumar Mohanty  
Dept. of Metallurgical and Materials  
Engineering  
National Institute of Technology  
Rourkela-769008

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**Pallabi Patnaik (10604030)**

**Shivani Kishor Dumpawar (10604017)**

B. Tech

Metallurgical and Materials Engineering

NIT Rourkela

# ABSTRACT

Due to the softening-melting of the burden in the cohesive zone of the blast furnace, the ore layer becomes compacted and the gas passes predominantly through the sandwiched coke layer known as coke slits. For improved productivity and reduced coke rate, it is required to minimize the size and lower the position of the cohesive zone in the blast furnace. This work is designed by arriving at a slag composition through actual experimentations which will ensure the lowering of the cohesive zone of the blast furnace with simultaneous decrease in the difference between the softening temperature (ST) and flow temperature (FT) of the slag. Slag samples from SAIL, Rourkela were collected and their flow characteristics were measured using the heating microscope. With the same composition as obtained from the steel plant, a synthetic slag was prepared in the laboratory using pure oxides, by another group. It was melted to 1600 °C and then water quenched to form the glassy state. Flow characteristics for the same were also determined. The flow characteristics data of Blast Furnace slag were compared with that obtained from synthetic slag. All the slag samples were sent to DISIR, Rajgangpur for slag analysis as well as to determine the mineralogical phases present in them, for which the slag samples were heated to 1500 °C followed by slow cooling to convert them to crystalline form. Then, XRD analysis was done to determine the mineralogical phases. Finally, with relevant phase diagram study, we arrived at a composition which will ensure the lowering of cohesive zone.

# CONTENTS

Certificate	III
Acknowledgement	IV
Abstract	V
List of Figures	VIII
List of Tables	IX
CHAPTER 1	1
1. Introduction	2
1.1. Blast Furnace	4
1.2. Blast Furnace Process	4
1.3. Blast Furnace Reactions	8
1.3.1. Reactions in the upper zone	8
1.3.2. Reactions in the middle zone	9
1.3.3. Reactions in the lower zone	9
1.4. Different zones of Blast Furnace	10
1.4.1. Cohesive Zone	10
1.4.1.1. Gas Permeability	11
1.4.1.2. Extent of indirect reduction	11
1.4.1.3. Si content of pig iron	11
1.5. Blast Furnace Slag	12
1.5.1. Origin	12
1.5.2. Forms of slag	13
1.5.3. Blast Furnace Slag Structure	14
1.5.4. Market Sources	15

1.5.5.	Slag Composition	15
1.5.6.	Slag viscosity	17
1.5.7.	Flow characteristics of slag	18
1.5.7.1.	Initial deformation temperature (IDT)	18
1.5.7.2.	Softening temperature (ST)	18
1.5.7.3.	Hemispherical temperature (HT)	18
1.5.7.4.	Flow temperature (FT)	18
CHAPTER 2		19
2.	Literature Survey	20
CHAPTER 3		28
3.	Experimental Details	29
3.1.	Experimental Procedure	29
3.2.	Experimental Apparatus	32
3.2.1.	Heating Microscope	32
3.2.2.	Planetary Ball Mill	33
3.3.	Experimental results and discussion	35
3.3.1.	Flow characteristics measurement	35
3.3.1.1.	Variation of HT, FT with wt % $Al_2O_3$ and wt % MgO	36
3.3.1.2.	Comparison of HT, FT data with that of Synthetic Slag	37
3.3.2.	XRD and Microscopic Analysis	38
3.3.3.	Phase Diagram Study	41
CHAPTER 4		42
4.	Conclusion	43
REFERENCES		44

# LIST OF FIGURES

- Fig. 1 A sketch showing Blast Furnace Process.
- Fig. 2 Cohesive Zone .
- Fig. 3 General schematic of blast furnace operation and blast furnace slag production.
- Fig. 4 Schematic representation of the silicate tetrahedron in crystalline and molten silica. The oxygen and silicon atoms are shown white and black respectively.
- Fig. 5 Quenched Synthetic slag prepared in the laboratory (left) and Blast Furnace Slag from Rourkela Steel Plant (right).
- Fig. 6 Pictorial view of Leitz heating microscope.
- Fig. 7 A schematic diagram of the heating microscope.
- Fig. 8 A four station planetary mill.
- Fig. 9 Mechanism inside the ball mill.
- Fig. 10 Micro photographs illustrating the characteristic temperatures of slag samples.
- Fig. 11 Relationship between ST, FT and wt %  $\text{Al}_2\text{O}_3$ .
- Fig. 12 Relationship between ST, FT and wt %  $\text{MgO}$ .
- Fig. 13 XRD plots showing traces of mineralogical phases in case of (a) BF I (b) BF II (c) BF III (d) BF IV (e) Synthetic Slag. In all cases, Gehlenite was found to be the major phase. However, some traces of Anorthite and Spinel were also present.
- Fig. 14 SEM micrographs (magnification 100X) showing that the crystalline phase is Gehlenite.
- Fig. 15 System  $\text{CaAl}_2\text{Si}_2\text{O}_8$ - $\text{MgAl}_2\text{O}_4$ . Heavy lines indicate binary relationships.

# LIST OF TABLES

- Table-I: Typical composition of blast furnace slag.
- Table II: Comparison of the effect of MgO on the viscosities of various slags.
- Table III: Chemical Composition of Slag as obtained from SAIL, Rourkela.
- Table IV: Details of the charge generating the slag as obtained from SAIL, Rourkela.
- Table V: Flow Characteristics of Blast Furnace slag samples as measured in the laboratory using the Hot-Stage microscope.
- Table VI: Flow Characteristics of Synthetic Slag as measured in the laboratory using the Hot-Stage microscope.
- Table VII: Chemical Composition of Slag as obtained from DISIR, Rajgangpur.
- Table VIII: XRD and Microscopic results of slag samples as obtained from DISIR, Rajgangpur.