PREFACE

In view of the growing demand of high silicon steel in the electrical industry, the need for low aluminium ferro silicon was long felt in India. National Metallurgical Laboratory, Jamshedpur, India was approached by Science and Technology Department, Govt. of India to find a technology for the refined ferro silicon 75.

M/S Bhadravati Iron and Steel Company, Mysore, India a major producer of ferro silicon was also very much eager to develop such a technology for the growing demand of low aluminium ferro silicon.

The Non Ferrous Process Division of NML took up the challenge and the author was entrusted to find out the technology of refining of ferro silicon.

Research and Development Centre for Iron and Steel, Steel Authority of India funded the project.

SUMMARY AND CONCLUSION

Low aluminium ferro-silicon 75 has tremendous impact on the property development of electrical steels. Impurities like the oxides of aluminium and calcium in ferro-silicon 75 have deleterious effect on both the electrical and magnetic properties. It depresses and impairs the magnetic flux, permeability and saturation magnetic flux and increases eddy current loss, hysteresis loss etc of electrical steels. Therefore, it becomes imperative to purify ferro-silicon in order to remove inclusions of aluminium and oxides of calcium to make it useful for the making of electrical steels.

Literature review shows that [4,5,6,10,11,14,15,16] there are several competing processes to achieve low aluminium ferro-silicon such as control of raw materials, use of solid-liquid oxides, addition of synthetic slags ($CaO.SiO_2$-SiO_2), refining of ferro-silicon by the addition of lime and injection of carbon dioxide gas and also by the use of chlorine gas. However, literature is very meagre on the kinetic studies, parameter optimisation and mass transfer studies, thermodynamic analysis etc. in any one of the processes mentioned. Further material characterisation of 'as received' material of ferro-silicon 75 and that of refined product obtained by any of the process are very limited. Most of the processes are patented and there is dearth of information on the above aspects in the refining process of ferro-silicon 75. Hence the present study has been undertaken and it deals with refining of ferro-silicon by two methods which are of commercial importance.