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journal or publication title	Science reports of the Research Institutes, Tohoku University. Ser. A, Physics, chemistry and metallurgy
volume	23
page range	151-151
year	1971
URL	http://hdl.handle.net/10097/27616

On the Deoxidation of Liquid Iron with Bubbles of Argon–Calcium Gas Mixture*

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Abstract

To clarify the applicability of gaseous metal for the purification of liquid iron and steel, a study was made on the deoxidation with Ar-Ca gas bubbles floating up in iron melt. The present study will also give some informations on the behavior of complex deoxidizer containing calcium. The results obtained are as follows:

(1) At 1550°C, the interaction parameters were $e_0^{(\text{Ca})} = -535$ and $e_{\text{Ca}}^{(0)} = -1330$, and the equilibrium constant for the reaction of $[\text{Ca}] + [\text{O}] = \text{CaO}$ was $\log K_{\text{Ca}} = \log a_{\text{Ca}} a_{\text{O}} = -9.82$.

(2) The decrease in $[\text{O}]$ was directly proportional to the amount of calcium added in the range of high oxygen content ($[\text{O}] > 150$ ppm) and was expressed by an exponential function of it in the range of low oxygen content ($[\text{O}] < 100$ ppm). This phenomenon is interpreted as follows; the deoxidation process is controlled by the supply of calcium from the bubble side to the reaction zone in the former and by the supply of oxygen from the bulk of melt to that zone in the latter case.

(3) The increase in the floating distance of Ar-Ca bubbles in the metal bath raised the efficiency of calcium utilization.

* The 202th report of Research Institute of Mineral Dressing and Metallurgy. Published in the Transactions of the Iron and Steel Institute of Japan, **11** (1971), 260.