

USE OF SESSILE DROP TECHNIQUE FOR STUDIES OF SMELTING REDUCTION

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Regional Research Laboratory, Council of Scientific and Industrial Research, "Smelting reduction processes which are based on use of non coking coal and oxygen involve substantial reduction of the FeO in the slag phase. In recent years many researchers have reported results of interesting investigations in this area. These studies have largely been concerned with reduction kinetics and foaming behaviour with experiments being carried out using induction, resistance heated or plasma furnaces. This paper describes a study on some fundamental aspects of reduction of FeO in CaO-SiO₂-FeO slags containing 5-40% FeO, in the temperature range of 1300- 1600 °C by the sessile drop technique. This technique involves continuous examination and video recording of a single drop of molten slag undergoing reduction on a graphite substrate inserted horizontally in an electrically heated tube furnace. A CCD camera makes constant in-situ recording of the shape and size of the droplet being reduced by the carbon surface. The camera data also helps to measure the contact angle and the interfacial area of contact. A constant stream of flowing argon helps to eliminate CO and CO₂ produced during the reaction and the gases evolved are measured and analysed by an IR CO/CO₂ detector. These data are used to study kinetics of reduction. A video of the actual happenings shows how the contact angle changes and how the droplet undergoes reduction under actual situation.