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**Jian Pan, Deqing Zhu,
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Central South University, China.**Reduction-volatilization behaviors of Fe, Pb and Zn during the updraft pre-reductive sintering process of zinc-bearing wastes**

Zinc-bearing dust was generated in the steel industry from iron and steel companies, which contains many valuable and hazardous elements, such as iron, zinc and lead. Currently, approximately 40 million tons of Zinc-bearing dust is estimated to be produced and dumped in the China annually, resulting in resource wastes and potentially damages to the ecological environment. It is therefore extremely urgent to develop appropriate technology for comprehensive utilization of dust from both economic and environmental perspectives. In our previous papers, an innovative process of updraft pre-reductive sintering process was proposed to treat Zinc-bearing dust. Thus, to better understand the mechanism of reduction and volatilization behaviors of Fe, Pb and Zn in the new process, in this study, an investigation on reduction kinetics of related oxides in the Zinc-bearing dust was conducted by simulating pre-reductive sintering process. The results show that the reactions are controlled by chemical reaction, and the calculated activation energies are 43.88 and 72.33 kJ.mol⁻¹, respectively, for the reductions of iron oxides and ZnO. Meanwhile, the reducing reaction of PbO is controlled by gas diffusion and its activation energy is determined as 18.22 kJ.mol⁻¹. Based on the dynamic analysis, high temperature and strong reduction atmosphere is beneficial to reduction of iron oxides and removal of Pb and Zn.

Biography

Jian Pan received his Master and PhD degree in Mineral Processing Engineering from Central South University in 2000 and 2007, respectively. He joined Commonwealth Scientific and Industrial Research Organization (CSIRO) as a visiting scientist from 2015 to 2016. His research currently focuses on: 1) fundamentals and technologies of iron ore agglomeration; 2) short-process technology of ferrous metallurgy; and 3) separation and recovery of metal values from metallurgical wastes. He has published more than 40 journal papers and has been serving as an editorial board member of *Mineral Process and Extractive Metallurgy* (Transactions of the Institutions of Mining and Metallurgy).

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