

lead blast furnace gas is probably less than 0.1 pct. The actual amount must be determined by gas analysis techniques that eliminate the interference of Ar.

1. John T. Chao *et al.*: *Met. Trans. B*, 1978, vol. 9B, pp. 293-300.
2. *Handbook of Chemistry and Physics*, Robert C. Weast, ed., 54th Edition, p. F191, CRC Press, Cleveland, 1974.

Authors' Reply

J. T. CHAO, P. J. DUGDALE, D. R. MORRIS, AND
F. R. STEWARD

The authors wish to thank Morris and Knoepke for their convincing explanation of the apparent presence of oxygen in the furnace gases of the lead blast furnace. The possibility that this oxygen was in fact argon, was

overlooked in the work reported and apparently in the works cited.^{1,2} Thus, Caraghan and Wilson using a gas chromatograph reported oxygen concentrations in the range 0 to 2 pct at any level within the iron blast furnace. In the case of lead blast furnaces, Alcock has reported 3.9 to 4.0 pct oxygen in the Trail (British Columbia) furnace. He states that measurements have been made of gas composition at the tuyere level and at the top of some lead blast furnaces, and that the presence of approximately 1 pct O₂ indicates incomplete combustion of the blast air. The method of gas analysis used for these measurements was not reported. The possibility that the oxygen was at least in part, argon seemed not to have been considered.

1. N. J. Caraghan and A. R. Wilson: *J. Iron Steel Inst.*, 1970, vol. 208, pp. 231-246.
2. C. B. Alcock: *Principles of Pyrometallurgy*, p. 217, Academic Press, NY, 1976.

Correction to *Met. Trans. B*, 1979, vol. 10B

Flow Regimes in Submerged Gas Injection by E. O. Hoefele and J. K. Brimacombe

Page 634

Left column, third line from bottom should read "in the first three frames (0 to 0.036 s); the growth is . . ."

Page 642

Left column, third paragraph, third sentence should read "The greater penetration found in systems with low ρ_g/ρ_l is an indication that the bubbles are more elongated and that consequently the expansion angle of the jet is smaller."