

Off-Gas Carbon Monoxide (CO) Generated from Nickel Laterite Smelting Process at 75 MW Electric ARC Furnace (EAF) as Nickel Oxide (NiO) Reduction Agent

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Abstract:

The smelting process in the Electric Arc Furnace produces off-gas with a volume between 220-250 Nm³/h/MW or 650-750 Nm³/t, products with a composition of CO (58-64%), Hydrogen (2-15%), CO₂ (2-10%), Nitrogen (2-7%), Methane/CH₄. The considerable potential of carbon monoxide (CO) generated from the smelting process and the utilization of CO from off-gas has the potential to improve energy efficiency and reduce emissions. Carbon monoxide (CO) reduction agents are significantly more effective than nitrogen (N₂) due to their chemical reaction and ability to reduce nickel oxide while improving purity through impurity removal. The sustainable utilization of off-gas and carbon monoxide gas in the nickel laterite smelting industry is a novelty. Utilization of CO from off-gas in nickel laterite reduction by collecting CO gas originating from the metallurgical process; the CO gas is then cooled to a temperature of 120°C, scrubbing is carried out afterward so that pure CO gas is obtained, and then the separation technology is carried out. Monitoring is carried out throughout the process to ensure CO levels are within limits for use as a reducing agent that converts NiO to Ni. Based on this research, the continuous utilization of off-gas will reduce dependence on coal as coke and mitigate environmental pollution emissions.

Keywords:

Carbon Monoxide (CO), Nickel Oxide (NiO), Reduction Agent.