

Pengaruh reduktor batubara dalam proses reduksi bijih mangan lokal menjadi FeMn (Ferromangan) pada Submerged Arc Furnace (SAF) = Effect coal on reduction process of local manganese to FeMn (Ferromangan) with Submerged Arc Furnace (SAF)

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Abstrak

[Kurangnya penguasaan teknologi pengolahan bijih mangan menjadi ferromangan merupakan salah satu penyebab tingginya impor ferromangan yang dilakukan oleh industri baja nasional. Kualitas produk ferromangan dan juga pencapaian konsumsi energi listrik yang efisien per Kg ferromangan yang dihasilkan menjadi faktor penting pengembangan teknologi ini. Jumlah batubara sebagai reduktor merupakan salah satu parameter utama kesuksesan produksi yang nantinya akan dilihat berdasarkan kualitas FeMn (Kadar Mn hingga 75%) dan seberapa besar power consumption-nya. Pada penelitian ini akan dilakukan proses pembuatan ferromangan dari bahan baku bijih mangan lokal dengan menggunakan SAF (Submerged Arc Furnace). Variabel yang akan dipakai adalah jumlah batubara sebagai reduktor, yaitu 40.33%, 47%, 53.67%, dan 60.33%. Karakterisasi produk menggunakan XRF (input dan output produk), XRD (Mn Ore), dan Proksimat analisis (batubara).

Hasil penelitian menunjukkan dengan kenaikan jumlah reduktor maka massa produk, kadar mangan, yield product, massa off gas, konsumsi energi, dan persentase fosfor dan sulfur akan meningkat pula. Jumlah produk ferromangan tertinggi didapat pada angka 9.1 kg dengan menggunakan batubara 53.67%. kadar Mn tertinggi didapat pada angka 72% dengan pemakaian batubara 53.67% dan kadar terkecil yaitu 63.12% dengan pemakaian batubara 40.33%. Off gass tertinggi pada angka 33.5 kg dengan pemakaian batubara 60.33% menunjukkan proses reduksi yang tidak optimal, dimana proses reduksi tidak berjalan sempurna. Energi yang paling tinggi di dapatkan pada berat batubara 40.33% yaitu 12.45 Kwh/Kg FeMn, sedangkan yang paling optimum dari segi energi, yaitu didapatkan pada berat batubara 47% dengan 7.56 Kwh/Kg FeMn. %P yang paling tinggi dengan pemakaian batubara 53.67% dengan hasil 0.74% fosfor. Sedangkan untuk %S yang paling tinggi dengan pemakaian batubara 16.1 Kg dengan hasil 0.9% sulfur. Batubara dengan persentase 47% merupakan yang paling optimum apabila dilihat dari aspek ekonomi, %P %S, konsumsi energi, dan kadar mangan. Due to lack of knowledge and capability to develop new technology for reduction of ferromanganese metal, the number of imported ferromanganese are also increasing in Indonesia. This present study will carried out new perspective to produce ferromanganese metal from Indonesian local manganese ore itself to maintain the demand of ferromanganese product for local industries. The experiment will based on medium grade manganese ore from Jember, East Java ? Indonesia and using mini submerged arc furnace (SAF) as its technology to reduce manganese ore into ferromanganese metal. Influence of various number of coal as its reductor agent have been investigated. The optimized parameter has been established to obtain maximum yield. The experiments with 30 kg of manganese ore, 12 kg of limestone, and various number of coal ranging from 40.33%, 47%, 53.67%, and 60.33% have been carried out. The efforts have also been made to reduce the electrical consumption and the cost of production by using coal instead of cokes.

The result showed that an increase in number of reductor increases the amount of product, manganese

content, yield ratio, mass of offgas, energy consumption, phosphorus and sulfur content. Biggest number of ferromanganese which can be produced is 9.1 kg with 72% manganese content inside the metal from 53.67% coal and the smallest manganese content is 63.12%Mn from 40.33% coal. Biggest number of off gasses is 33.5 kg which came from 60.33% coal and this phenomena showed that reduction process is not efficient. Highest energy consumption came from 40.33% coal which is 12.45 kwh/kg FeMn product, and the most efficient energy is produced by 53.67% coal which is 7.56 kwh/kg FeMn product. Biggest phosphorus and sulfur content came from 53.67% coal which is 0.74%P and 0.9%S. As the last result, the most optimum research has been carried out by 47% of coal.;Due to lack of knowledge and capability to develop new technology for reduction of ferromanganese metal, the number of imported ferromanganese are also increasing in Indonesia. This present study will carried out new perspective to produce ferromanganese metal from Indonesian local manganese ore itself to maintain the demand of ferromanganese product for local industries. The experiment will based on medium grade manganese ore from Jember, East Java ? Indonesia and using mini submerged arc furnace (SAF) as its technology to reduce manganese ore into ferromanganese metal. Influence of various number of coal as its reductor agent have been ninvestigated. The optimized parameter has been established to obtain maximum yield. The experiments with 30 kg of manganese ore, 12 kg of limestone, and various number of coal ranging from 40.33%, 47%, 53.67%, and 60.33% have been carried out. The efforts have also been made to reduce the electrical consumption and the cost of production by using coal instead of cokes.

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