

Synthesis and Characterization of Iron Produced from Iron Mill Scale

Abstract

In this project, iron mill scale has been used to produce iron powder that can be used within the Powder Metallurgy process. To achieve this objective, the iron mill scale needs to be refined. This involves the work of grinding the iron mill scale to an effective particle size, which is 300 μ m. Later, the grounded iron mill scale will undergo the magnetic separation process. The purpose of this process is to remove any non-magnetic material. Then the following process is to fully oxidize and reduce the iron mill scale to form pure iron powder. From this step an optimum value for maximum heating temperature, heating rate and heating cycle was determined. Then in order to determine whether the oxidation and the reduction process have completely achieved their objective, the iron oxide and the iron powder that have been produced from both processes, was characterized using X-Ray Diffraction Analysis (XRD) and X-Ray Fluorescent Analysis (XRF) technique. From the oxidation process, it is obvious that sample C gave higher oxidation percentage, which is 11.22%. While Reduction 2 shows the desirable result, which is 29.51% of reduction, involving a low cost compared to other reduction processes.

Keywords; By-Product, Iron Mill Scale, Iron Oxide, Oxidation Process, Powder Metallurgy, Reduction Process