

A  
Dissertation Report On  
**Standardization Process of synthesis of metallic iron from mill  
scale**

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of the degree of  
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(PROCESS METALLURGY)

By  
TAYADE SWAPNIL GOKUL  
MIS No.121527001

**Guide:**  
**Dr. N. B. Dhokey**



**Department of Metallurgy and Materials Science,  
COLLEGE OF ENGINEERING, PUNE – 411005  
(AN AUTONOMOUS INSTITUTE OF GOVT.OF MAHARASHTRA)  
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## ABSTRACT

The mill scale is known for its richness in iron content approximately 72%. In present work, mill scale was milled and oxidized to  $\text{Fe}_2\text{O}_3$  in ball milling and tubular furnace to know by hydrogen gas which results in production of reduced iron powder. The reduction was carried out at various temperatures (850-925°C) during different time ranging between 60,120,180 min in an atmosphere of pure  $\text{H}_2$ . The produced iron powder was characterized by chemical analysis, X-ray diffraction and scanning electron microscopy. The maximum iron content (97.1% Fe) in the iron powder was obtained by reduction of  $\text{Fe}_2\text{O}_3$  at 875°C for 180 min. The reduced iron powder was then consolidated at different compacting pressure ranging from 500MPa to 700MPa. These compact were sintered at 1120°C in 90% $\text{N}_2$ +10% $\text{H}_2$  atmosphere.

**Key Word:** Mill scale, Reduction by hydrogen, Iron powder.