

STUDY ON THE EFFECT OF HEAT-TREATMENT ON MICROSTRUCTURE AND CORROSION RESISTANCE OF 0.6% CARBON STEEL

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ABSTRACT

The effect of different heat treatment such as annealing, normalizing, and quenching on microstructural characterization and corrosion resistance have been investigated. Heating of the samples were done at 910°C in a muffle furnace for 2 hr. After that samples were cooled in the same furnace (annealing), air (normalizing) and water (Quenching). Followed by a detailed microstructural characterization was done using optical microscopy and XRD techniques. The corrosion properties in terms of corrosion rate was analyzed by weight loss method 3.5 wt.% NaCl solution. Microstructure analysis shows the presence of ferrite and pearlite grain in as received, annealed and normalized 0.6% C steel, whereas martensite grains are observed in quenched samples. Phase analysis shows the ferrite and carbide phase in as received, annealed and normalized samples, whereas only ferrite phase is present in quenched samples. There is a significant improvement in corrosion resistance from 4.91×10^{-5} mm/year for as received samples to 3.12×10^{-5} – 2.23×10^{-5} mm/year for heat treated samples, whereas improvement is more in quenched sample (2.23×10^{-5} mm/year) as compared to annealed (3.12×10^{-5} mm/year) and normalized sample (3.12×10^{-5} mm/year).

Keywords: 0.6% C steel, optical microscopy, , XRD, Corrosion

