Short Communication

Corrosion Behaviour of Low-Alloy Steel with Titanium Addition Exposed to Seawater Environment

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Immersion experiment was performed to study the early seawater corrosion behaviour of pipeline steel with titanium addition by analysing microstructure characteristics of designed steel, corrosion kinetics, corrosion phases and surface morphology. The experimental results demonstrate that the microstructure of designed steel is tempered martensite and the Ti-rich particles and Cr-rich particles are observed. The corrosion rate of early seawater corrosion decreases in the exponential format. The corrosion behaviour of designed steel is divided into two stages. The Cr-rich compounds are mainly formed at the first stage and the ferrous corrosion products deposit on the coupon surface at the second stage. The main corrosion phases are goethite and lepidocrocite, and Cr-substituted goethite is also found. The titanium element accelerates the formation of the compact and dense corrosion products free of pores, which is beneficial for corrosion resistance.

Keywords: corrosion behaviour; seawater; pipeline steel; titanium; precipitation particles

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