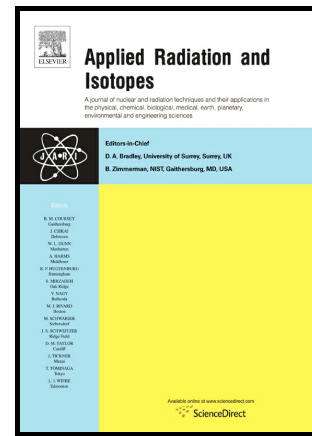


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Application of thin layer activation technique for monitoring corrosion of carbon steel in hydrocarbon processing environment

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ABSTRACT

Acidic crude oil transportation and processing in petroleum refining and petrochemical operations cause corrosion in the pipelines and associated components. Corrosion monitoring is invariably required to test and prove operational reliability. Thin Layer Activation (TLA) technique is a nuclear technique used for measurement of corrosion and erosion of materials. The technique involves irradiation of material with high energy ion beam from an accelerator and measurement of loss of radioactivity after the material is subjected to corrosive environment. In the present study, TLA technique has been used to monitor corrosion of carbon steel (CS) in crude oil environment at high temperature. Different CS coupons were irradiated with a 13 MeV proton beam to produce Cobalt-56 radioisotope on the surface of the coupons. The corrosion studies were carried out by subjecting the irradiated coupons to a corrosive environment, i.e, uninhibited straight run gas oil (SRGO) containing known amount of naphthenic acid (NA) at high temperature. The effects of different parameters, such as, concentration of NA, temperature and fluid velocity (rpm) on corrosion behavior of CS were studied.

Key words: Thin layer activation technique, Crude oil, Naphthenic acid, Corrosion monitoring, Carbon steel, Cobalt-56

1. Introduction

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