



An Experimental Study of the Corrosion Process of Metals in Virtue of Crude Oils and the Characteristics

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ARTICLE INFO

Article history:

Received 20 April 2019

Received in revised form 17 May 2019

Accepted 22 May 2019

Available online 22 May 2019

Keywords:

Crude oils

Corrosive composites

Ferrous metals

Decay

Weight loss

Corrosion

ABSTRACT

Crude oils are dominant earth resources since composed with large number of hydrocarbons and some of trace compounds especially with corrosive compounds such as sulfur compounds, naphthenic acids and salts. In the current research the major scope was the investigations of the impact of such corrosive compounds on the corrosion of seven different types of ferrous metals in both qualitatively and quantitatively. According to the methodology such corrosive properties of two different types of selected crude oils were analyzed and the chemical compositions of seven different types of selected ferrous metals were detected by the standard methodologies and recommended instruments. The corrosion rates of such metals were determined by the relative weight loss method after certain immersion time periods in both crude oil samples while analyzing the corroded metal surfaces through a microscope. In addition that the decays of metallic elements from metals into crude oil samples were measured and the variations of the initial hardness of metals after the corrosion were measured by Vicker's hardness tester. Basically there were observed the lower corrosion rates from stainless steels mainly with at least 12% of chromium and sufficient amount of nickel, higher progress of salts on the metallic corrosion at the normal temperatures while comparing with other corrosive compounds, formations of FeS, Fe₂O₃, corrosion cracks and cavities on the metal surfaces, decay of ferrous and copper from most metals while the immersion into crude oils and small and some insignificantly deductions of the initial hardness of metals due to the effects of the corrosion.

1. Introduction

Crude oils are some essential resources for the various industrial applications mostly composed large amounts of hydrocarbons and some amount of trace compounds since the occurrences in the interior part of the earth. Among the trace compounds of the crude oils corrosive properties may have much significance because the corrosion is a severe impact on the metals. According to the working schedules of the crude oils refining plants the major devices and the essential units have been manufactured by the various types of metals because of the much suitability and the aided properties to fulfill the required tasks in the crude oil refining units. In the material engineering explanations of the term of corrosion it is possible to be happened through either

chemical or electrochemical process between the metal and the corrosive aided surrounding environment which is composed either strong oxidizing agent or some combination of both water and oxygen [1-6].

Basically the nature of corrosion process depends upon the exposed oxidizing agent and conditions of the surrounded environment of the relevant metals. According to the classifications of the types of corrosion mainly there were categorized as general corrosion, pitting corrosion, thermal corrosion and galvanic corrosion also the relevant features and the chemical compositions of such corrosion compounds may be differ with each other [4,5,6].

In the case of the chemistry of crude oils that predominantly composed with large amounts of

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