



New Sintanyl Phosphonates for Protection of Oil and Gas Pipelines from Steel Corrosion

E.N. Nikitin ^{a*}, G. G. Shumatbaev ^a, D. A. Terenzhev ^a, K. O. Sinyashin ^a,
E. K. Rastegaev ^a

^a *Arbuzov Institute of Organic and Physical Chemistry, FRC Kazan Scientific Center, Russian Academy of Sciences, Kazan, 420088, Russia.*

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Abstract

Many corrosion inhibitors are economically disadvantageous or toxic to the environment. Additionally, there are certain requirements for corrosion inhibitors. Therefore, the development of new corrosion inhibitors is one of the important problems in the oil-producing and oil-refining industry. The purpose of this work is the synthesis of new corrosion inhibitors with high inhibitory activity, the establishment of the structure of the compounds obtained and the determination of the anti-corrosion effect with respect to aggressive media. This paper presents the results of research on the development of new iron corrosion inhibitors. New α -aminophosphonates were synthesized based on the Kabachnik-Fields reaction. Formalin, morpholine, phosphite containing residues of industrial non-ionic surfactants - syntanols as radicals were used as a raw material. The compounds obtained were isolated in high yield. The structure of the compounds obtained is established by modern methods of physico-chemical analysis. The protective effect of the compounds obtained was studied by a gravimetric method for 6, 24, 72 hour exposure and an inhibitor concentration of 10, 25, 50, 100 ppm. As an aggressive medium, a highly mineralized medium containing CO₂ and H₂S was used in simulated formation water. The dynamics of changes in the protective effect of the resulting aminophosphonate from time to time, at dosages of 2.5-100 ppm, were studied using electrochemical analysis methods. The protective effect of syntanyl-O-ethyl- (N-morpholinyl) methylphosphonate obtained at 25 ppm and a shutter speed of 6 hours is 73-82%. The article shows that with increasing concentration, an increase in the protective effect is observed. The greatest protective (89.6) effect showed O-2- [2- [2- [2- [2- [2- [2- [2- (dodecyloxy) ethoxy] ethoxy] ethoxy] ethoxy] ethoxy] ethoxy] ethoxy] ethyl-O-ethyl- (N-morpholinyl) methylphosphone at a dosage of 100 ppm.

Keywords: Green Building Rating Tools; Life Cycle Cost Analysis; Sustainable Development.

1. Introduction

Corrosion is a common problem in the oil and gas industry. Oil and gas pipelines, refineries and petrochemical plants have serious problems with corrosion. Corrosion in the oil and gas industry is often caused by water, carbon dioxide (CO₂) and hydrogen sulfide (H₂S), and can also be enhanced by microbiological activity [1]. The fight against corrosion in the oil and gas industry is of paramount importance, since the economic losses in these industries due to corrosion are extremely high [2]. The use of a corrosion inhibitor is one of the best and most cost-effective methods among various methods of dealing with corrosion in the oil and gas industry [3, 4].

Inhibitors used in oil fields are mainly composed of compounds containing quaternized nitrogen atoms, amides, amines, imidazolines, long-chain carboxylic acids, ethoxylates, multifunctional low molecular weight polymers,

* Corresponding author: berkutru@mail.ru

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