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Conservative liquids based on synthetic petroleum acids salts and aliphatic nitro-compounds.

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Abstract

Synthetic oil acids (SOA) salts and nitroderivatives of high olefins C_{14} as oil-soluble corrosion inhibitors for mild steel in various mediums was synthesized. On the bases of turbine oil T-30 was prepared composition of conservative liquid and investigated their properties. The best result for the conservation liquids were obtained with Co-salt of SOA and nitroderivatives of α-olefins of C_{14}. Protection period in sea water was 103 days, in hydrocamber was 206 days.

Keywords

Corrosion inhibitor; conservative liquid; petroleum acid; aliphatic hydrocarbon; nitroderivatives of high olefin; atmospheric corrosion; turbine oil; polyamine

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Introduction

With the intensive development of various areas of industry, environmental pollution increases [1]. Atmospheric pollution, especially pollution with sulfur oxides accelerates destruction of equipment, devices, technique, transport vehicles etc., from atmospheric corrosion, reduces their exploitation duration, increases accident hazards [2]. Therefore, protection of the metal constructions and other equipment from atmospheric corrosion becoming increasingly difficult problem and must be resolved [3]. The one of the favorable protection methods from atmospheric corrosion is the application of conservation liquids [4-6].

In this work,on the basis of experimental part mixed Baku oils diesel distillate we have obtained Co, Zn, Ni, Ca and Cu synthetic oil acids (SOA) salts. At the same time, we synthesized nitro-compounds of C_{14} α-olefins and amidoamines of natural petroleum acids with polyamines.We take of turbine oil T-30 minerals oils as a base component for preparing conservation liquids.

On the bases of T-30 oil and the above-mentioned substances various compositions have been prepared and protection effects of their samples are made of steel grade St-3 from corrosion have been tested in hydro-chamber (Q-4), in sea water (Caspian sea water) and in H_2SO_4 solution of 0,001%. The results are given in Table 1 .

In Table 1 are described the results of conservation liquids tests prepared by adding 10% SOA salts. As seen from table, the highest result in hydro-chamber has been obtained from conservation liquids prepared with Co salt of SOA.

Conservation liquids prepared on the basic of Cu salt of SOA has also good results, but in sea water and sulfate acid solution its effect was lower than Co salt.

Table 1. The results of conservation liquids tests prepared by adding Co, Ni, Zn, Ca and Cu salts of SOA to T-30 oil.

Name of samples	Period of protection from atmospheric corrosion, days		
	Hydrochamber H-4	In sea water	In 0,001% H_2SO_4 solution
On the base of Co salt of SOA	192	54	55
On the base of Zn salt of SOA	170	44	47
On the base of Ni salt of SOA	172	49	52
On the base of Ca salt of SOA	165	25	33
On the base of Cu salt of SOA	181	40	47
Turbine oil T-30	30	9	15

For comparison we also synthesized Co, Ca, Zn salts on the basis of natural petroleum acids NPA separated from Baku oils and tested in same condition.

In hydro-chamber (H-4), in sea water and in sulfate acid solution of 0,001% the results of experiments are as follows in sequential order:

Co salt of NPA 10%+T-30 (90%) – 80, 47 and 23 days

Co salt of NPA 10%+T-30 (90%) – 40, 25 and 15 days

Co salt of NPA 10%+T-30 (90%) – 51, 34 and 18 days

As seen protection period of conservation liquids obtained from Co salt of SOA 10%+T-30 (90%) in hydro-chamber is 2.4 times more than conservation liquids obtained on the base of Co salt of NPA.

To preparing composition C_{14} α-olefins nitrated with nitrate acids of 57-63% and 1-nitro-2-hydroxsitetradecan, 1,2-dinitrotetradecan and 1-nitro-2-nitratetetradecan mixture were obtained.

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Various compositions have been prepared on the bases of T-30 mineral oils and amidoamines which have been synthesized on the basis of Co and Ni salts of SOA, C_{14} nitro-compound and TPA.

Tests results of compositions are given in Table 2.

Conservation liquid prepares by adding 10% amidoamine of TPA have the lowest protection ability in hydro-chamber (Q-4), in sea water and in H_2SO_4 solution of 0,001% seem in table 2.

Table 2

The results of conservation liquids tests prepared by adding Co, Ni salts of SOA, amidoamines and C_{14} nitro-compounds to T-30 oil.

Name of samples	Period of protection from atmospheric corrosion, days		
	Hydrochamber H-4	In sea water	In 0,001% H_2SO_4 solution
T-30(90%) +Co salt of SOA (10%)	192	54	55
T-30(90%) + amidoamin of NPA (10%)	15	11	12
T-30(90%) + C_{14} nitro-compound (10%)	108	75	45
T-30(90%) + Co salt of SOA (5%) + C_{14} nitro-compound (10%)	206	103	104
T-30(90%) + Ni salt of SOA (5%) + C_{14} nitro-compound (5%)	102	90	92
T-30(90%) + Co salt of SOA (3,33%) + amidoamin (3,33%) + C_{14} nitro-compound (3,33%)	163	69	70
T-30(90%) + Ni salt of SOA (3,33%) + amidoamin (3,33%) + C_{14} nitro-compound (3,33%)	129	83	83

Compositions by adding each three components have lower protection properties in hydro-chamber than Co salt of SPA although they have higher protection period in sea water and in sulfate acid solution.

The best results have been obtained in conservation liquids prepared by adding 5% Co salt of SPA and 5% C_{14} nitro-compound. Thus protection period was 206, 103 and 104 day in sea water and sulfate acid of 0,001%. Protection period was 1,073, 1.91, 1.37, and 2.31 times more compared to 10% C_{14} nitro-compound.

Results of researches is indicated that conservation liquids prepared on the basis of T-30 mineral oil, Co salt of SPA and C_{14} nitro-compound can be used to protect equipment from atmospheric corrosion.

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