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ANTICORROSIVE COMPOSITE MATERIALS BASED ON ORGANOMINERAL INGREDIENTS FOR THE PROTECTION OF WHOLESALE CORROSION OF METAL PRODUCTS

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Abstract. An anticorrosive composite material based on gossypol resin and amino alcohols has been developed to protect metal equipment from aggressive environments. The interaction of amines with fatty acids contained in gossypol resin can give a range of different substances, both due to interaction with the main product and with each other, so it is difficult to isolate the reaction product in its pure form. Substances of this group were studied as a corrosion inhibitor.

Keywords: gossypol resin, monoethanolamine, diethanolamine, inhibitor, corrosion, degree of protection, corrosion rate, hydrochloric acid medium.

Introduction. The problem of corrosion protection of equipment and pipelines during gas production and transportation is very relevant, since the safety of their operating conditions and service life largely depend on the timely application and quality of the anti-corrosion measures carried out. The most affordable method of protecting equipment for gas production and transportation from hydrogen sulfide and carbon dioxide corrosion and acid treatments is to inhibit their surface. Unfortunately, the country's need for inhibitors is currently

being met by imported inhibitors, which has caused the need to search for domestic inhibitors based on available, local raw materials.

The object and methodology of the study were selected gossypol resin, which is a waste of fat and oil production, liquid ammonia, amino alcohols – mono ethanolamine (H_2NCH_2CHOH), diethanolamine ($HN(CH_2CH_2OH)_3$), trieth anolamine ($N(CH_2CH_2OH))_3$, β(N,N-diethy lenaminolethanolamine) ($(C_2H)_2NCH_2CH_2OH$).

The process of obtaining amidated gossypol resin was carried out as follows: 100 g of gossypol resin was heated to a temperature of 80-100^{0}C with stirring in a laboratory stirrer and the calculated amount of modifier was added. The fatty acids that are part of the gossypol resin react by condensation with a modifier to form a modified gossypol resin.

The amount of amino alcohol in the ratio was gradually introduced into the modified gossypol resin according to a certain calculation 2:1, 4:1, 10:1 then they were heated for an hour while stirring with laboratory agitators, as a result of which a thick amidated gossypol resin was formed.

The results of the study and their analysis in the laboratory "Mechano chemical technology of composite materials" OUE "Fan va tarakkiet" TSTU together with LLC "KOMPOZIT NANOTEXNOLOGIYASI" on the basis of the waste of gossypol resin selected at the Yangiyul oil and fat combine, a composite preparation corrosion inhibitor was obtained. As it was shown above, gossypol resin is formed in large quantities at fat-and-oil plants as a secondary raw material.

As a polyatomic phenol, gossypol is able to give a number of derivatives due to hydroxyls. When processing gossypol with soluble alkalis, water-soluble gossypolates (sodium, potassium, ammonium) are formed, which are destroyed with the release of free gossypol under the action of mineral acids [1].

Gossypol resin-is a black, thick, viscous and sticky mass, specific gravity 0.90-0.91 g/cm3, humidity is not higher than 0.3%.

The physic-chemical characteristics of gossypol resin are given in Table 1.

№	Fractions	Exit, %	T $_{пл,}$	Colour	The

		by weight of gossypol	C^0		composition of the fraction
1	Non-saponified part	21-24		Dark brown	Hydrocarbons C_{27}, C_{28}, C_{29}, C_{30}, C_{31}, C_{32}
2	The fatty-acid part	52-57		Black, oil-shaped in-in	Alcohols and cyto sterol Fatty acidsC_{16}- C_{18}
3	The phenolic part	22-24	180-181	From brown to dark brown	Phenols

Table 1 shows that the resin contains about 60% of fatty acids, a significant part of which are unsaturated high-molecular acids, namely oleic and lanoline acids.

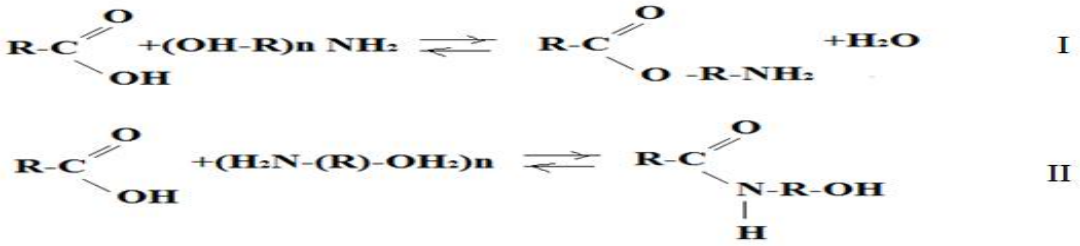
As the second component for the preparation of composite corrosion inhibitors, amino alcohols (mono and diethanolamine) were used, the production of which has been mastered by the domestic industry and is not in short supply [3].

The amino alcohols used to produce a corrosion inhibitor are a thick, oily liquid, mixed in all proportions with water and alcohols [4]. The main physical and chemical characteristics of amino alcohols are given in Table 2.

Table 2. Physico-chemical characteristics of amino alcohols

Amino alcohols	Specific gravity, g / sm^3	Boiling point, C^0	Solubility
Monoethanolamine	1,017	170,5	They are soluble in water and alcohols
Diethanolamine	1,0966	269,0	They are soluble in water and alcohols

The second component of the compositions - amino alcohols are be functional compounds, when they interact with the above acids, two different reactions can occur:



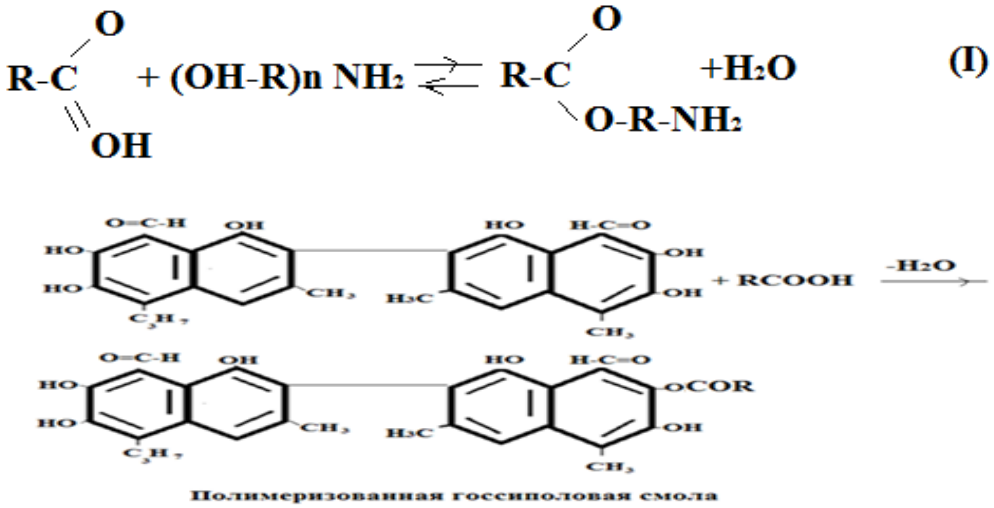
where R-C_2H_5 n-1, 2, 3

The composition and properties of gossypol resin depend on the quality of the feedstock, compliance with the technological modes of fat decomposition, the depth of distillation of the obtained fatty acids and other factors.

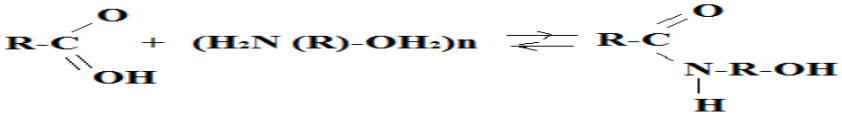
The synthesis process for obtaining amidated gossypol resin was carried out as follows: 100 g of dehydrated gossypol resin was heated to a temperature of 160-2000C with stirring in a laboratory stirrer and the calculated amount of modifier was added. The fatty acids that are part of the gossypol resin react by condensation with a modifier to form a modified gossypol resin.

When the modified gossypol resin interacts with mono ethanolamine, an amino-containing modified polymerized gossypol resin is formed according to the scheme:

1-stage:



2-stage:



Amino-containing polymerized gossypol resins are conventionally called PGS (polymerized gossypol resin).

The preparation was delivered in the form of a 20% solution in an organic solvent (purified gas condensate from the Shurtan deposit) and is a dark mobile liquid with a characteristic solvent smell.

In a more specific form, the interaction of higher carboxylic acid esters that are part of the gossypol resin with amino pyres (mono ethanolamine) proceeds according to the following schemes [5]:

$R\text{-}COOR+H_2N\text{-}CH_2\text{-}CH_2\text{-}OH \rightarrow R\text{-}COHN\text{-}CH_2\text{-}CH_2OH+R\text{-}OH$

As can be seen from the above formula, it follows that the interaction of amines with fatty acids contained in gossypol resin can give a range of different substances, both due to interaction with the main product and with each other, so it is difficult to isolate the reaction product in its pure form. Substances of this group were studied as a corrosion inhibitor.

Conclusion: Thus, on the basis of gossypol resin and amino alcohols, it is possible to develop anticorrosive composite materials to protect metal equipment from aggressive environment**.**

References:

1. Brief chemical encyclopedia. Publishing house "Soviet Encyclopedia" Moscow, 1961. Volume 5., p. 1026.

2. Markman A. L. Rzhekhin V. P. Gossypol and its derivatives. Pishchprom., M., 1965g.

3. Brief chemical encyclopedia. Publishing house "Soviet Encyclopedia" Moscow, 1961. Volume 1., page 709.