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SYNTHESIS AND STUDY OF INFLUENCE OF INHIBITOR PROPERTIES OF SALTS AND COMPLEXES OF NITROGEN DERIVATIVES OF THE MIXED ESTERS OF ETHYLENE GLYCOL WITH VINYL OIL ACID ON KINETICS CO_2CORROSION STEEL

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Vinyl esters of oil acid have been synthesized which was subjected to nitration reaction and 20% solution of salts andnitroproduct complexes in 50% water solution of isopropyl alcohol havebeen prepared.Influence of inhibitor properties of salts and complexes of nitro derivatives ofmixed estersof ethylene glycol with oil acid on kinetics CO_2 corrosion have beenresearched

Keywords: *vinyl ester, epichlorhudrine, esterification, inhibitor of corrosion, nitroproduct, kinetics of corrosion*

Field use of unsaturated esters of oil acids extremely extensive and diverse. These compounds are the valuable oil chemical raw material and are use in different brunch as inhibitor of acid corrosion, surface active substances, preservation liquids, plastificizers, additives to fuels and oils, antibacterial means etc. [1]. It is necessary to note, that one of the actual problem in oil-gas industry is protection of metal equipment from corrosion. There are different methods protection of equipment from corrosion, but one of the most effective method is use of inhibitors [2].

In given world information by synthesis of oil acid vinyl ester have been presented [3, 4]. As an initial compounds the monoester of natural oil acid (NOA) have been used, which was received by interaction of oil acids with ethylenechlorhydrine. Esterification of NOA with ethylenechlorhydrine have been conducted in presence of 40% alkaline solution by 80-100 ^{0}C temperature during 5-8 hours. y that two layers are formed: upper layer - ester, lower mixture, consisting from water and salt. Reaction mass have been neutralized and was distillated under vacuum by temperature 150-250/2 mm mercury column. Yield of ester made up 85-90 % mas. Reaction is proceed the following scheme:

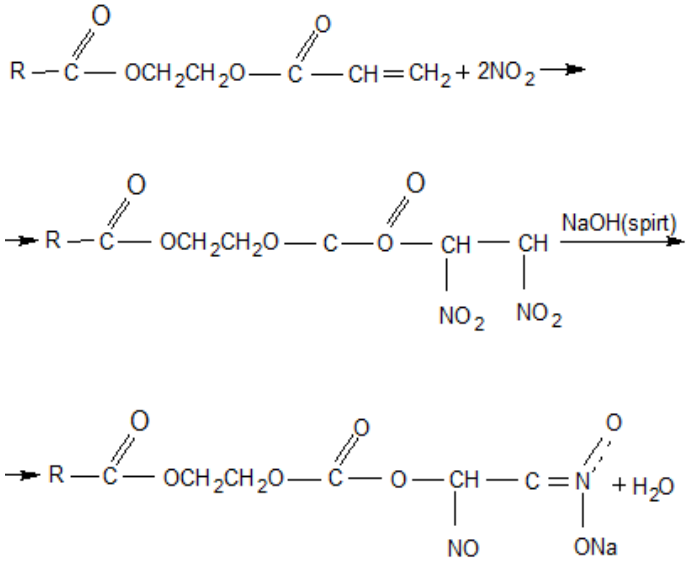
$$RCOOH + CH_2ClCH_2OH \xrightarrow{40\ \%\ KOH} RC\ OOCH_2CH_2OH + HCl$$

Received monoester (β-etoxynaphtenate) reacts with acryl acid by 90 ^{0}C temperature during 9-10 hours in presence of catalyst ZnO, 2 % hydroquinone and as a solvent benzene. Reaction was conducted by scheme:

$$RCOOCH_2CH_2OH + CH_2 = CHCOOH \longrightarrow RCOOCH_2CH_2OCOCH = CH_2$$

Reaction mass was neutralized, washed and benzene was distillated. Ester have been distillated under vacuum. Indices of ester the following: Boiling point 100-280 ^{0}C/5 mm mercury column, γ_{40}=14.65; d_4^{20} =0.9120; η_D^{20} =1.4750, yield up to 90 % mass.

Received ester have been subjected to nitriding, which was conducted by 80 ^{0}C temperature during 11 hours in presence of $NaNO_2$ initiator and nitric acid. Received nitroproduct by dark brown color process by the following physical-chemical properties: M_{weidht}=335; d_4^{20} =1.0320; η_D^{20} =1.4707; iodine number = 0.06.



By use of KOH, monoetanolamine and dietanolamine the alcohol solutions corresponding salts and complexes are formed.

The 20 % solution of salt and nitroproduct complexes in 50 % water solution of isopropyl alcohol have been prepared. Influence of solution of these compounds on kinetics of corrosion process by known method [5] have been studied.

Kinetics of corrosion speed of the under taken synthesized compounds have been studied:

1) solution of Na salt of nitropoduct of oil acid in isopropyl alcohol;
2) solution of K salt of nitropoduct of oil acid in isopropyl alcohol;
3) solution of monoetanolamine (MEA) complex of nitropoduct of oil acid in isopropyl alcohol;
4) solution of dietanolamine (DEA) complex of nitropoduct of oil acid in isopropyl alcohol.

On illustration 1-4 influence of salts and complexes of nitropoduct of oil acid in 50 % water solution of isopropyl alcohol on kinetics CO_2 corrosion in 1 % water NaCl solution, saturated by CO_2 have been showen.

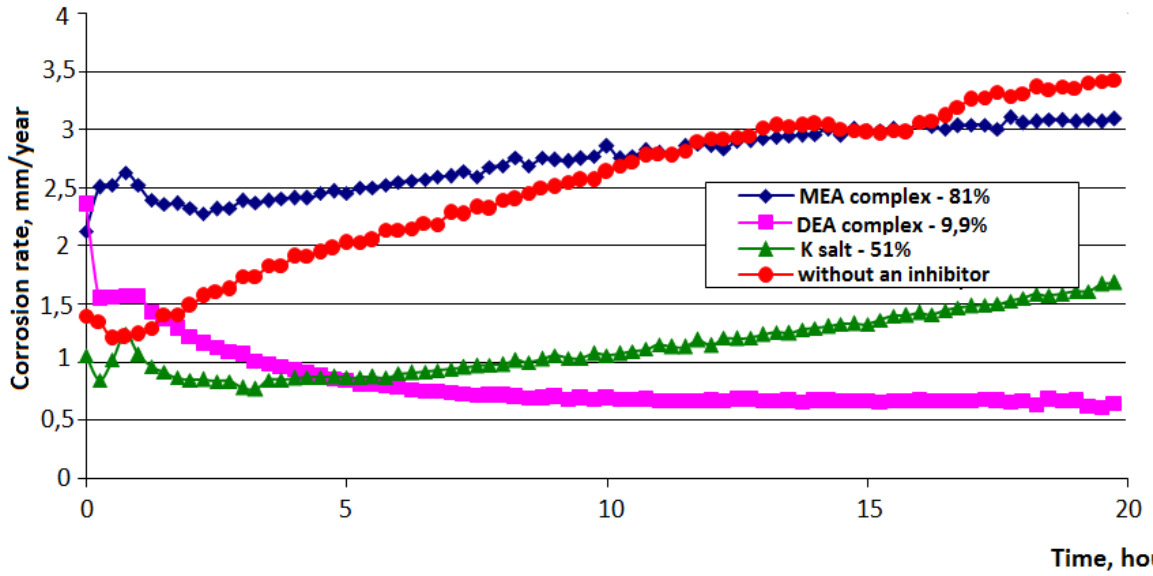


Fig 1. Influence of 20 % solution of potassium salt, monoetanolamine and dietanolamine complexes of nitroproduct of oil acid on kinetics of CO_2 corrosion in 1 % water solution of NaCl, saturated by CO_2. Solution as added in medium in amount 100 ppm

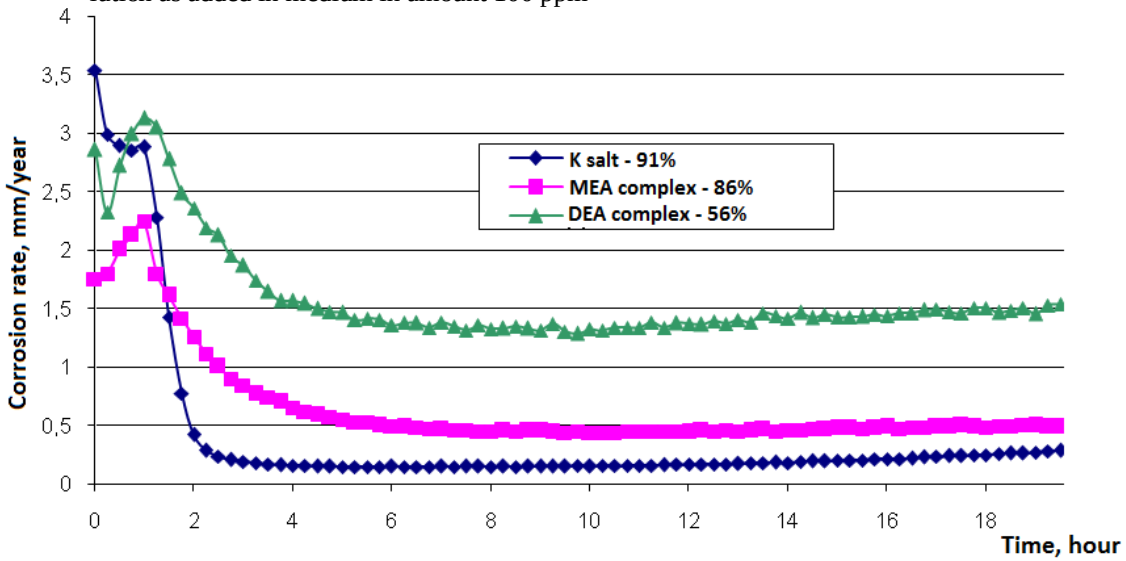


Fig 2. Influence of 20% solution of potassium salt, monoetanolamine and dietanolamine complexes of nitroproduct of oil acid on kinetics of CO_2 corrosion in 1% water solution of NaCl, saturated by CO_2. Solution as added in medium in amount 200 ppm

As is evident illustration 1 and 2 potassium salt exercise the most influence on kinetics CO_2 corrosion in 1 % water solution of NaCl, saturated by CO_2 (100 ppm - 51 %, 200 ppm - 91%). The very low indices have been revealed at dietanolamine (DEA), which have been replaced by Na salt with purpose rise of influence effect on kinetics of CO_2 corrosion.

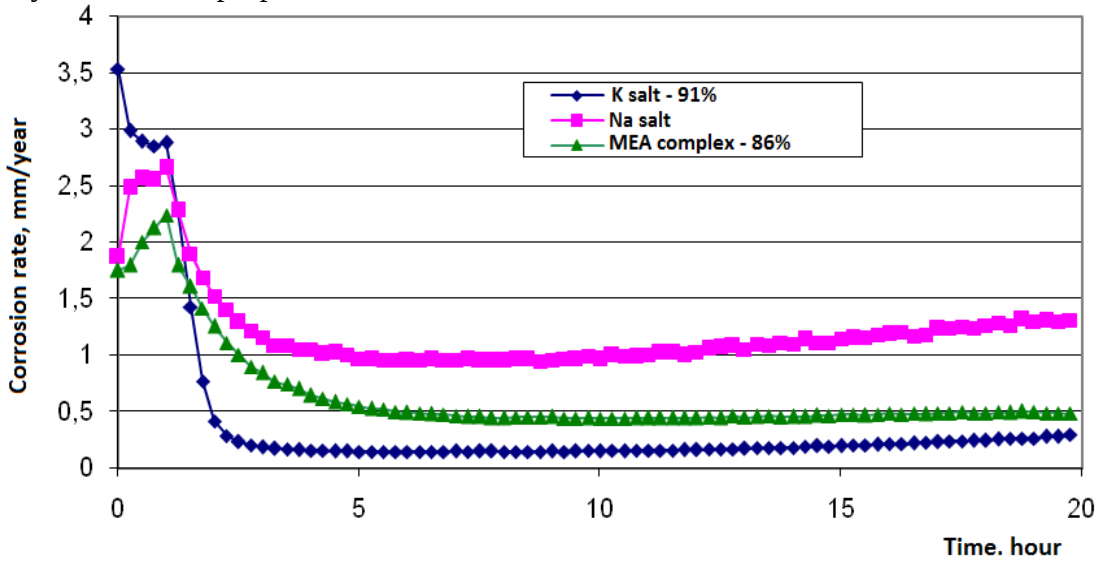


Fig 3. Influence of 20% solution of sodium, potassium salts, and monoetanolamine complex of nitroproduct of oil acid on kinetics of CO_2 corrosion in 1% water solution of NaCl, saturated by CO_2. Solution as added in medium in amount 200 ppm

As is evident illustration 3, potassium salt exercise the best influence on kinetics corrosion of CO_2 1 % water solution of NaCl, saturated by CO_2 in comparison with sodium salt and MEA complex.

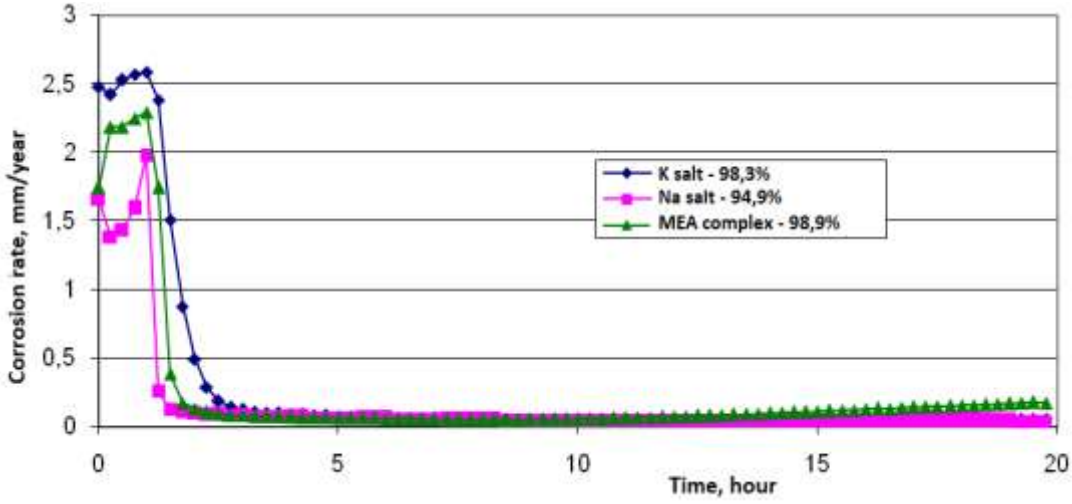


Fig 4. Influence of 20% solution of sodium, potassium salts, and monoetanolamine complex of nitroproduct of oil acid on kinetics of CO_2 corrosion in 1% water solution of NaCl, saturated by CO_2. Solution as added in medium in amount 300 ppm

At the same time corrosion speed of steel C 1018 without inhibitor addition have been studied, which makes up 3.43 mm years. The more effective amount salt solution and complexes are monoetanolamine complex and potassium salt. So, by concentration equal 300 ppm defense degree makes up 98.3 and 98.9 %. Defense degree decrease by the following sequence:

Monoetanolamine complex → Potassium salt → Sodium salt

This as the investigation are shown monoetanolamine complex by concentration 300 ppm gives the greatest effect defense from corrosion according to demnds of NACE. Sodium salt and monoetanolamine complex answer the requirements by concentration 300 ppm. By results of conducted research these compounds may be offered as inhibitor of CO_2 corrosion.

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