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# INVESTIGATION OF ELECTROCONDUCTIVITY OF SALT SOLUTIONS, COMPLEXES AND SULPHATED AMIDES OF OLEIC ACID

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Na, K, $NH_4$ salts, ethanolamine complexes, and also sulphated derivatives of N-alkyl amides of oleic acid have been synthesized. 1% solutions of these compounds in 30% aqueous solution of isopropyl alcohol have been prepared and specific electroconductivity of these solutions has been measured

**Key words:** *corrosion inhibitors, organic acids, unsaturated organic acids, oleic acid, salts and complexes of oleic acid, electroconductivity*

In our institute there have been previously synthesized the inhibitors of $CO_2$ corrosion on the basis of fatty acids.

Recently in the petrochemical synthesis the organic acids of vegetable origin are widely used [1-3]. The acids prepared from vegetable oils are the mixture of saturated and unsaturated acids [4]. Mainly, they contain oleic, linoleic, palmitic and stearic acids. Unsaturated acids are contained in hydrocarbon radical with double bonds and therefore are the most valuable raw materials for petrochemical synthesis. At the Institute of Petrochemical Processes of ANAS there have been previously synthesized the inhibitors of $CO_2$ corrosion on the basis of mixture of fatty acids isolated from vegetable oils.

However, it is advisable a use of individual acids, for ex., oleic acid in the synthesis of high-efficient ecologically safe corrosion inhibitors (IC). In this case more exact results of the repeated measurements well agreed with each other are prepared.

We have synthesized the mono-, di- and triethanolamine complexes of oleic acid and studied the dependence of degree of protection of IC from electroconductivity of their aqueous solutions. 1,2,3,4 and 5% solutions of these complexes in the distilled water have been made. It has been measured the specific electroconductivity of these solutions on apparatus ANION 4120. The prepared results are presented in Table 1. As follows from Table the solution of monoethanolamine complex of oleic acid possesses higher electroconductivity than solutions of di- and triethanolamine complexes of oleic acid.

**Table 1.** Electroconductivity of solutions in the distilled water of mono-, di- and triethanolamine complexes of oleic acid

| Solutions of ethanolamine complexes of oleic acid | Concentration of solutions, % | Specific electroconductivity of solutions, $10^{-6}$ Sm/cm |
|---|---|---|
| monoethanolamine complex | 1 | 233.8 |
| | 2 | 431.0 |
| | 3 | 730.0 |
| | 4 | 969.0 |
| | 5 | 1405.0 |
| diethanolamine complex | 1 | 148 |
| | 2 | 281.5 |
| | 3 | 409 |
| | 4 | 600 |
| | 5 | 881 |
| triethanolamine complex | 1 | 102.2 |
| | 2 | 137.2 |
| | 3 | 179.7 |
| | 4 | 196.5 |
| | 5 | 251.5 |

As follows from data of Table, the specific electroconductivity of 5% solution of monoethanolamine complex of oleic acid is larger than 5% solution of diethanolamine complex in 1.995 and 5.59 times, respectively.

The various N-alkyl amides of oleic acid have been synthesized:

The synthesized amides have been sulphated and then on their basis their salts and ethanolamine complexes have been prepared:

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1% solutions of the synthesized salts and complexes in 30% aqueous solution of isopropyl alcohol have been made. The made solutions coded as follows:

1. Na - salt of sulphated dimethylamide of oleic acid.
2. K - salt of sulphated n-dimethylamide of oleic acid.
3. $NH_4$ - salt of sulphated n-dimethylamide of oleic acid.
4. Na - salt of sulphated n-dimethylamide of oleic acid.
5. K - salt of sulphated n-dimethylamide of oleic acid.
6. $NH_4$ - salt of sulphated n-dimethylamide of oleic acid.
7. MEA - complex of sulphated n-diethylamide of oleic acid.
8. DEA - complex of sulphated n-diethylamide of oleic acid.
9. TEA - complex of sulphated n-diethylamide of oleic acid.
10. Na - salt of sulphated n-cyclohexyl amide of oleic acid.
11. K - salt of sulphated n-cyclohexyl amide of oleic acid.
12. $NH_4$ - salt of sulphated n-cyclohexyl amide of oleic acid.
13. MEA complex of sulphated n- cyclohexyl amide of oleic acid.
14. DEA complex of sulphated n- cyclohexyl amide of oleic acid
15. TEA complex of sulphated n- cyclohexyl amide of oleic acid.
16. MEA complex of sulphated n-dimethylamide of oleic acid.
17. DEA complex of sulphated n-dimethylamide of oleic acid.

18. TEA complex of sulphated n-dimethylamide of oleic acid.

By means of ANION – 4120 the electroconductivity of the made solutions has been studied. The prepared results are presented in Table 2.

**Table 2.** Specific electroconductivity of 1% salt solutions, complexes of sulphated derivatives of N-alkyl amides of oleic acid

| Code numbers of solutions | Specific electroconductivity of solutions, $10^{-6}$ Sm/cm |
|---|---|
| 1 | 613.0 |
| 2 | 594.0 |
| 3 | 515.0 |
| 4 | 637.0 |
| 5 | 600.0 |
| 6 | 899.0 |
| 7 | 425.0 |
| 8 | 423.0 |
| 9 | 327.0 |
| 10 | 574.0 |
| 11 | 566.0 |
| 12 | 689.0 |
| 13 | 416,0 |
| 14 | 281,0 |
| 15 | 207.3 |
| 16 | 410.0 |
| 17 | 428.0 |
| 18 | 232.5 |
| Water+isopropanol | 18.17 |

As follows from data of Table 2, the specific electroconductivity of 1% solutions of various salts and complexes of the same sulphate-derivative are differed. A solution of sodium salt has a larger specific electroconductivity ($613 \cdot 10^{-6}$ Sм/cм), and a solution of triethanolamine – lesser electroconductivity ($235.5 \cdot 10^{-6}$ Sm/cm). Comparing data of Table1 and 2 one can see that the specific electroconductivity of 1 % solutions of complexes of oleic acid is much less than 1% salt solutions and complexes of sulphate-derivatives N-alkyl amides of oleic acid.

## CONCLUSIONS

1. The specific electroconductivity of 1 % solutions of ethanolamine complexes of oleic acid is decreased on the following sequence: MEA-complex  DEA-complex  TEA-complex.
2. The solutions of Na, K, ammonium salts and mono-, di-, triethanolamine complexes of sulphate-derivatives of N-alkyl amides of oleic acid possess larger specific electroconductivity than salt solutions and complexes of oleic acid at the same concentration.
3. 1% solutions of Na, K, ammonium salts of sulphate-derivatives of the same amide of oleic acid possess larger specific electroconductivity than solutions of ethanolamine complexes of the same sulphate-derivative one.

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