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ANALYTICAL CHEMISTRY AND CHEMICAL ANALYSIS (AC&CA-05)

devoted to 100 anniversary of Anatoly BABKO

BOOK OF ABSTRACTS

Kyiv Ukraine
September 12-18, 2005

РЕПОЗИТОРИЙ БГПУ

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РЕПОЗИТОРИЙ БГПУ

PHOTOMETRIC DETERMINATION OF ACIDIC IMPURITIES IN OILS AND ORGANIC LIQUIDS WITH THE USE OF THE ION PAIR OF TRINONYLOCTADECYLAMMONIUM AND BROMOTHYMOL BLUE AS THE COLORED REAGENT

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The concentration of acid impurities is an important indication of the quality of petroleum products and the purity of organic solvents, plasticizers, mineral oils, food fats, and polymers. Methods are used to detect organic acids in such compounds have many disadvantages: the alkalimetry - low sensitivity, especially in the determination of weak acids, the extraction-photometric method is laborious, instrumental methods are expensive. In addition, most of methods are commonly unsuitable for direct analysis.

In this work we studied the interaction of the ion pair Bromothymol Blue (BTB-trinonyloctadecylammonium (TNODA) with organic acids in toluene and its mixtures with different solvents and proposed the method for determination of carboxylic acids in solvents, oils, and other chemicals.

Bromothymol Blue (sulfophthalein dye) is a dibasic acid and can form ion pairs with a quaternary ammonium base at two groups: the sulfo group and the hydroxy group. It is known that in the systems of this kind the stability of ion pairs formed at the sulfo group is rather high, and they virtually are not decomposed by carboxylic and even alkylphosphoric acids. However, the attachment of the second quaternary ammonium base cation (at the phenol hydroxyl group) is characterized by the relatively small formation constant of the ion pair. As a result, in the presence of acids the disubstituted ion pair of trinonyloctadecyl-ammonium and Bromothymol Blue is partially decomposed and the monosubstituted ion pair is formed according to Eq.:

$$(TNODA^+)_2\ldots BTB^{2-} + RCOOH \leftrightarrow TNODA^+\ldots HBTB^- + TNODA^+\ldots RCOO^-$$

The spectra of these ion pairs are largely different, which forms the basis of the determination method for the spectrophotometric determination of acidic impurities.

This method is highly sensitive (detection limit achieves $5 \cdot 10^{-7}$ M), reproducible and simple in implementation. The accuracy of the results was verified by the added—found and dilution methods.

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