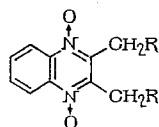


METHOD FOR QUANTITATIVE DETERMINATION OF
QUINOXIDINE AND DIOXIDINE BY TITRATION
IN A NONAQUEOUS MEDIUM

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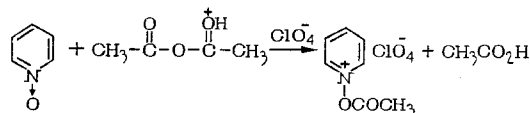
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The aim of the present work was to study a method for the quantitative determination of quinoxidine (I) and dioxidine (II) used for curing suppurative infections [1], and also for the preparation of intermediate products of their synthesis, 2,3-dimethyl- and 2,3-bis-(bromomethyl)quinoxaline di-N-oxides (III and IV).



I: R=OCOCH₃, III: R=H
II: R=OH; IV: R=Br

The method of nonaqueous acidimetric titration in an acetic anhydride solution was chosen for the analysis of these compounds. Although no information is at present available on the titration of aromatic di-N-oxides in a nonaqueous medium, it is known that pyridine and quinoline N-oxides, and N-oxides of certain other heterocyclic compounds can be quantitatively titrated in acetic anhydride solution [2-5]. A study of the titration of pyridine N-oxide [4] showed that the process proceeds in the following way:



Although the structure of the titration products has not been well studied, apparently the di-N-oxides of

TABLE 1. Metrological Characteristic of the Results of the Determination of I-IV

Compound	Number of parallel determinations	Mean results	Dispersion	Standard deviation		The Student criterion at P=95%	Confidence interval of the result of a separate determination	Confidence interval of the mean result
				of result of separate determination	of mean result			
ε	n	\bar{x}	S^2	S_x	$S_{\bar{x}}$	t	ε	$\bar{x} \pm \varepsilon$
I	5	99,73	0,0394	0,20	0,09	2,78	0,56	99,73±0,25
II	10	98,71	0,0998	0,32	0,10	2,26	0,72	98,71±0,23
III	5	100,33	0,1051	0,32	0,14	2,78	0,89	100,33±0,40
IV	9	98,81	0,0700	0,26	0,09	2,31	0,60	98,81±0,20

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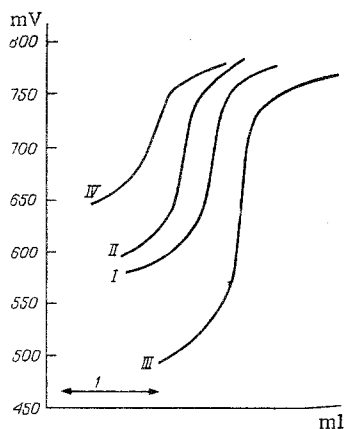


Fig. 1. Potentiometric titration curves of compounds I-IV. Titrant - 0.1 N solution of perchloric acid in acetic acid; medium - acetic anhydride.

the quinoxaline series are also titrated by perchloric acid in an acetic anhydride solution according to the same scheme.

Compounds I-IV were titrated by perchloric acid in acetic anhydride solution with crystalline violet as indicator until a yellow color was obtained. The titration takes place with respect to one N-oxide group. The results were compared with the data on the potentiometric titration of these compounds. It was found that in the case of compounds I-III the transition point of the indicator coincides with the jump on the potentiometric titration curve. However, in the case of IV no such coincidence was observed. For the metrological evaluation of the method, a series of parallel determinations was carried out by potentiometric titration of these compounds. The results are listed in Table 1.

Figure 1, giving the potentiometric titration curves of compounds I-IV, shows that the smallest jump is observed in the case of compound IV.

It is known that in the case of weak bases, the jumps usually observed on the titration curves are less sharp than in the case of strong bases. The difference between the titration curve of compound IV and the titration curves of compounds I-III is probably explained by the appreciably lower basicity of compound IV, because of the strong electron-acceptor influence of bromine.

The results of the statistical treatment (see Table 1) show that this method of analysis can be successfully applied for a quantitative determination of di-N-oxides of the quinoxaline series.

EXPERIMENTAL

The pH-meter pHM-28 with glass and calomel electrodes ("Radiometer", Denmark) was used for the potentiometric titration.

Quantitative determination of Compounds I, II, IV. An accurately weighed sample (~0.006 mole each of I, II* and IV) was dissolved in 50 ml of acetic anhydride, and the solution was titrated by a 0.1 N solution of perchloric acid in glacial acetic acid.

Quantitative Determination of Compound III. An accurately weighed sample (~0.0005 mole) of III was dissolved in 20 ml of acetic anhydride, and the solution was titrated by a 0.1 N solution of perchloric acid in glacial acetic acid.

LITERATURE CITED

1. E. N. Padeiskaya, G. N. Pershin, and K. A. Belozerova, *Farmakol. i Toksikol.*, No. 6, 702 (1966).
2. I. Denesh, *Titration in Nonaqueous Media* [in Russian], Moscow (1971).
3. D. C. Wimer, *Analyt. Chem.*, **34**, 873 (1962).
4. C. W. Muth, R. S. Darlak, W. H. English, et al., *Anal. Chem.*, **34**, 1163 (1962).
5. V. K. Kondratov and E. G. Novikov, *Zh. Anal. Khim.*, **22**, 587 (1967).

*II dissolves during the titration.