THE PRODUCTS OF SO$_2$ INTERACTION WITH AQUEOUS SOLUTIONS OF METHYLAMINE, BENZYLAMINES, 1,2-DIAMINES AND MORPHOLINE

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The new method of preparation of sulphur oxoanions “onium” salts via interaction in the SO$_2$–L–H$_2$O–O$_2$ systems (L is methylamine, benzylamines, 1,2-diamines, and morpholine) has been developed. “Onium” sulfates have been obtained from methylamine, benzylamine, α-phenylethylamine, N,N-dimethylbenzylamine, dibenzylamine, 1,2-ethylenediamine, morpholine, N,N,N′,N′-tetramethylthelylenediamine; sulphites monohydrates – from piperazine and N-(hydroxyethyl)ethylenediamine; dithionate – from piperazine and N,N,N′,N′-tetramethylthelylenediamine. The compounds were characterized by elemental analysis, X-ray diffraction, IR, Raman spectroscopy, mass spectrometry, and differential thermal analysis.

The crystal structures of new salts methylammonium sulphate (I), α-phenylethylammonium sulfate (II), piperazinium sulphite monohydrate (III) and dithionate (IV), morpholinium sulphate monohydrate (V) have been determined by X-ray diffraction. The structures I–V are stabilized by numerous H-bonds NH···O, OH···O.

New examples of stabilization of sulfate anion in the form of alkylammonium salts prepared in the SO$_2$–L–H$_2$O–O$_2$ systems (L were amines) have been demonstrated. The formation of “onium” sulfates is the result of interaction following the formal scheme:

$$2\text{SO}_2 + 4\text{R}_n\text{NH}_3\cdot\text{n} + 2\text{H}_2\text{O} + \text{O}_2 \rightarrow 2(\text{R}_n\text{NH}_4\cdot\text{n})\text{SO}_4.$$ 

The fact the structurally studied organic sulfites are exhausted by tetramethylguanidinium hydrosulfite (I) [1] and aminoguanidinium sulfite monohydrate (II), N-(2-hydroxyethyl)ethylenediammonium sulfite monohydrate [3] seems to be due to the ease for the sulfites to convert into dithionates and sulfates as a result of “autooxidation” [4].