



**27th INTERNATIONAL
CHUGAEV CONFERENCE
ON
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**Nizhny
Novgorod
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**27th International
Chugaev Conference
on Coordination
Chemistry**

and

**4th Young Conference School
“Physicochemical Methods
in the Chemistry
of Coordination Compounds”**

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The Conference celebrates the 80th birthday
of Academician Gleb A. Abakumov

BOOK OF ABSTRACTS

Nizhny Novgorod

**PRODUCTS OF INTERACTION OF SULFUR DIOXIDE WITH AMINES IN
AQUEOUS SOLUTIONS. EFFECT OF AMINES BASICITY AND LIPOPHILICITY
ON THE COMPOUNDS COMPOSITION**

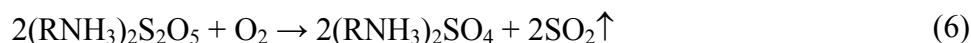
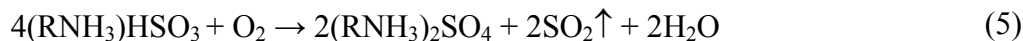
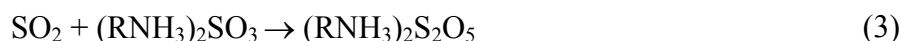
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Reaction products have been isolated from SO₂ – L – H₂O – O₂ systems (L = alkylamines, benzylamines, ethanolamines, aniline, 2,2'-bipyridine and their derivatives). The prepared compounds have been characterized by elemental analysis, X-ray diffraction analysis, X-ray powder diffraction, IR, Raman spectroscopy, ¹H, ¹³C NMR, and mass spectrometry, thermogravimetry.

The reaction of SO₂ with aqueous solution of aniline (pK_a = 4.63) and highly basic ethanolamines (7.76 ≤ pK_a ≤ 9.85), aminoguanidine (pK_a = 11.04), benzylamines, and alkylamines (10.60 ≤ pK_a ≤ 10.77) results "onium" salts of sulfur-containing oxyanions according to the equations (1) – (7).



Van der Waals clathrates (bipy)₃·(SO₂)·(H₂O), (bipy)₂·(SO₂)·(H₂O)₂ and (Bz₃N)₃·(SO₂) were obtained with relatively weakly basic 2,2'-bipyridine (pK_a = 4.34) and tribenzylamine (pK_a = 3.64). Thus, we can conclude salt formation to occur when pK_a ≥ 4.63 for amine.

"Onium" hydrodisulphates were obtained for alkylmonoamines with the number of C atoms, two or more in the case of 13.24 ≤ (pK_a + logP_{ow}) in the SO₂ – L – H₂O – O₂ reaction system (L – *n*-heptylamine, and *n*-octylamine); 10.42 ≤ (pK_a + logP_{ow}) ≤ 11.63 (L – *n*-butylamine, *t*-butylamine, *n*-propylamine, benzylamine, α-phenylethylamine, N,N-dimethylbenzylamine, or dibenzylamine) – sulphates; 5.81 ≤ (pK_a + logP_{ow}) ≤ 10.21 (L – ethanolamines except for TRIS) – sulphites and hydrosulphites, they have been isolated due to sulphooxidation inhibition. It was found dissociation thermodynamic functions to depend on bases logP_{ow} for monoethanolammonium, diethanolammonium, and their N-methyl and N-ethyl derivatives. Acid-base dissociation of TRIS and triethanolamine "onium" cations does not correspond to said relationship because TRIS (primary amine), TEA (tertiary amine) act differently on aqueous solutions of SO₂. TRIS having in its molecule the largest number of H- donors and acceptors as compared with other ethanolamines is characterized by the lowest value (pK_a + logP_{ow}) = 5.76 and promotes sulphooxidation of S(IV) → S(VI).

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