

# "Nanocomposites and nanomaterials"

## The new silica based nanocomposite for the determination of heavy metals in environmental objects

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Organic-inorganic hybrid silica-based nanocomposites became increasingly popular for heavy metal's traces determination in environmental objects. They combine in single material properties of an inorganic framework (rigidity, three-dimensional structure, mechanical stability) and specific chemical reactivity of an organic component. Recently [1] sorbents modified with heterocyclic azo dyes (R), 1-(2-pyridylazo)-2-naphthol (PAN) and 1-(2-thiazolylazo)-2-naphthol (TAN), particularly, were used for development of hyphenated sorption-spectrophotometric (SS) and visual-test (VT) determination of copper, nickel, cobalt and zinc ions (M) traces. These methods were based on the interface reaction with complex (ratio M : R adsorbed = 1:1) obtaining. From the other hand, higher stability and molar extinction coefficient of surface complex with ratio M : R = 1:2 allowed to develop ten time more sensitive and selective methods of SS and VT determination of Hg<sup>2+</sup>.

Present work is devoted to elaboration of nanomaterials for SS, SL and VT determination of Ni(II), Co(II) and Co(II) on the base of modified silica gel with the optimal for MR<sub>2</sub> obtaining PAN and TAN molecules surface's disposition.

The optimal reagents disposition was obtained by Zn(TAN)<sub>2</sub> and Zn(PAN)<sub>2</sub> adsorption onto silica surface and further acid destruction of complexes. The time, pH, V/m and surface reagent` concentration dependences of M adsorption as well as interference of foreign ions were studied. As the result, methods of SS and VT determination of Ni(II), Cu(II) and Co(II) at 0.1, 0.15 and 0.15 MAC natural water level were worked out. The contents of Ni(II) and Co(II) mobile (available for plants) forms in soil and aqua-ions of Ni(II), Cu(II) and Co(II) in tap and ground water were determined by use the methods proposed. The data obtained show that the methods worked out gives reproducible and reliable results, the detected value of metals mobile form agreed with their average content in environmental objects.

1. *Zaporozhets O.A., Gaver J.M., Sukhan V.V. Immobilization of analytical reagents onto the sorbents surface // Usp Khim.-1997.-66.-P. 702-714.*