



## SORPTION-SPECTROSCOPIC DETERMINATION OF $Pb^{2+}$ (II) ION USING IMMOBILIZED AMIDO-BLACK

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Article history:	Abstract:
<b>Received:</b> 6 <sup>th</sup> August 2022	Methods for the qualitative and quantitative determination of these heavy metals using organic reagents immobilized on various fibrous materials have been developed. A standard solution of $1 \times 10^{-5}$ M in a 0.001 M aqueous solution of amido black (AQ) nitrogen-reagent was used.
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Environmental pollution is one of the main problems in modern human society [1]. Environmental pollution with heavy metals threatens living organisms and the environment and is a serious concern [2,3]. Rapidly developing industrialization and urbanization have led to environmental pollution with heavy metals, and their environmental distribution and transport rates have accelerated significantly since the 1940s [4,5]. As a result, heavy metals are constantly distributed in the environment, contaminating food chains and causing various disease problems due to their toxicity. Chronic exposure to heavy metals in the environment is a real danger for living organisms [6]. The concentration of metals above the permissible level affects the microbiological balance of the soil and can reduce their productivity [7]. Bioaccumulation of toxic heavy metals in the biota (flora and fauna) of riparian ecosystems can have adverse effects on animals and humans [8]. Taking into account the development of industrial sectors, the development of sensitive, selective, rapid hybrid methods for the determination of lead and its compounds in waste water from various industrial facilities and food products is considered one of the urgent tasks of today. Qualitative and quantitative determination of these heavy metals using organic reagents immobilized on various fibrous materials is of practical interest, because in many cases they allow to identify the most expensive metals analytically. Activated carbons, synthetic sorbents, industrial waste, inorganic sorbents, including minerals (silica gels, alumogels, clay, zeolites) are widely used as sorbents in the detection of heavy and toxic metals.

The purpose of this work is to study the interaction of lead with azo-reagent on PPA-1, PPD-1 and PPM-1 fibers, and to develop a method for sorption-spectroscopic determination of lead based on this indicator reaction.

Optimum conditions of immobilization of  $Pb^{2+}$  ion were studied using amido black (AQ) organic azo-reagent immobilized on PPA-1, PPD-1 and PPM-1 synthetic polymer fibers synthesized by the scientists of the Department of Chemistry of the Faculty of Chemistry of the National University of Uzbekistan.

The mass of amido black (AQ) azo-reagent was accurately measured on an analytical balance and a standard solution of  $1 \times 10^{-5}$  M was prepared in an aqueous solution of 0.001M. To study the absorption spectra of the complex, our samples were measured in a SPECORD 50 spectrophotometer made in Germany. In order to obtain light reflection spectra, the polymer fiber is activated in 0.1M HCl for 24 hours before immobilization on Amidochlorony polymer sorbent. An organic reagent was immobilized on the activated sorbent, and a complex with metal ions was obtained in the solid phase.

The X-Rite "Eye One Share" mini spectrophotometer was connected to the USB port of the computer, the "Eye One Share" program installed on the computer was launched in Windows, and the device was calibrated against the white substrate included in the standard set. After that, the samples were measured and the obtained data was exported

to Excel as a series of reflectance coefficients for different wavelengths. Reflectance spectra of the reagent and the complex were obtained based on the results exported to the Excel program. Effect of organic reagent immobilized on polymer fiber and  $Pb^{2+}$  ion with different concentration.

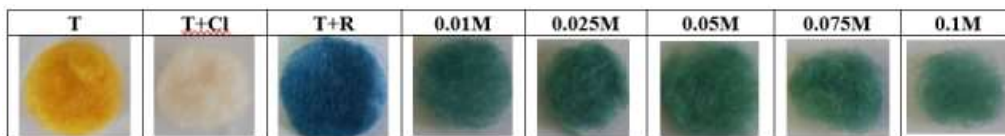


Figure. 1. T-fiber, T+Cl fiber transferred to chlorinated form, T+R – immobilized forms of ACh immobilized on the fiber and different concentrations of lead ion

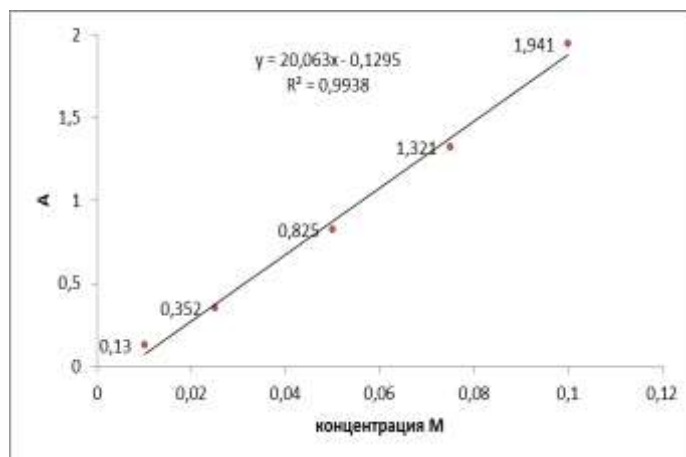


Figure 2. Straight line gradation graph of  $Pb^{2+}$  ion with different concentration

## CONCLUSION

Determination of lead using immobilized amido black on fibrous materials makes it possible to selectively determine the element without elution, which increases the rapidity of the analysis and reduces the detection limit by an order of magnitude.

The stability of the analytical signal for a long time, the stability of the dye immobilized on the fiber layer, the mechanical strength of polymer fiber materials, the ease of immobilization of the dye, the contrast of color change, as well as the linearity of metal concentration in solution allow the use of lead in the studied system for sorption-spectroscopic and visual-photometric detection in aqueous media.

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