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**DEVELOPMENT OF A METHOD FOR TESTING  
HEAVY METAL IONS WITH NITRASONIUM  
REAGENT YELLOW**

**РАЗРАБОТКА МЕТОДА ИСПЫТАНИЯ ИОНОВ  
ТЯЖЕЛЫХ МЕТАЛЛОВ С НИТРАЗОНИЕВЫМ  
РЕАГЕНТОМ ЖЕЛТЫМ**

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*Ключевые слова: иммобилизация, комплекс образование, сорбционная спектроскопия, медь.*

*Abstract. Complex-formation of copperier ions with immobilize nitrazine yellow has been investigated for elaboration of method of solid-phase spectrophotometric determination of ions  $Cu^{2+}$  in natural objects. Optimal conditions of immobilization and complex-formation have been determined.*

*Аннотация. Изучен комплекс образования ионов меди с иммобилизованным нитразиновым желтым для разработки методики твердофазного спектрофотометрического определения меди в искусственных смесях, имитирующих реальные объекты. Найдены оптимальные условия иммобилизации и комплекс образования.*

It is known, that the current level of rapid development of industry and technology, pollution of environmental objects with various substances, including heavy and toxic metals require the development of highly sensitive and expressive analytical methods that allow determining their micro quantities. The accumulation of heavy and toxic metals in living organisms, exceeding the permissible limit (MAC) when passing through water, air, food and other objects, can cause various diseases. In particular, some metals and their compounds are toxic if they exceed the MAC. Therefore, the development of sensitive, economical, selective methods for the determination of trace elements of certain metals in various objects is an urgent task today.

In this work, to implement a new spectrophotometric method that meets modern requirements, we chose the optimal conditions for the formation of a complex of metals, in particular, copper and nickel with 2,4-dinitro-azo-1 disodium salt. -naphthol-3,6-disulfosylate. (nitrazonium yellow) and on its basis to develop methods for determining physical-and-chemical properties of these metals.

The results of the experiment were obtained on an optical spectrophotometer, and the concentration of the reagents was studied on a photo colorimeter (KFK-2). The dependence of the optical density of the complex compound on the acidity of the

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medium, equal to the optimal pH = 3.5-4.5, was studied, and a universal buffer solution was chosen as the optimal buffer solution.

In our work, it was found that the test method gives unique complex compounds by choosing the optimal conditions for creating and carrying out the reaction under optimal conditions. In order to determine the optimal conditions and increase the selectivity of the reactions, we studied the dependence of the optical density on various factors. The results of the reaction of some metal ions with sodium salt reagent (nitrazonium yellow) 2.4-dinitro-azo-1-naphthol-3.6-disulfoxylate are presented in the table.

Table 1 – Results of the reaction of some metal ions with the disodium salt (nitrazonium gel) reagent of 2.4-dinitro-azo-1-naphthol-3.6-disulfoacid

№	Cation	The initial color of the cation solution	The solution of the reagent complex with metal ions in water	pH environment	A solution of the complex formed by the reagent with metal ions in ethyl alcohol	pH environment
1	Zn	colorless	does not change	pH=3	does not change	pH=3
2	Cu	the apostle	light green	pH=2	light inky color	pH=2
3	Cd	colorless	pink raspberry color	pH=7	кызарди	pH=7
4	Co	pink	pale pink precipitate	pH=2	pale pink precipitate	pH=2
5	Hg	colorless	ink-colored precipitate	pH=2	light inky color	pH=2
6	Pb	colorless	does not change	pH=2	light yellow(less sediment)	pH=7
7	Al	colorless	does not change	pH=3	does not change	pH=5
8	Mg	colorless	orange color	pH=10	orange color	pH=9
9	Mn	colorless	light pink color	pH=7	light pink color	pH=7
10	K	colorless	does not change	pH=5	raspberry color	pH=5
11	Sb	colorless	dark white pink precipitate	pH=7	dark white pink precipitate	pH=7
12	Ni	green	red raspberry color	pH=2	red raspberry color	pH=2
13	Ca	colorless	does not change	pH=4	does not change	pH=4

In conclusion, based on the obtained results, the fact that metal ions form a colored complex with the reagent is the basis for creating a test method.

## References

1. Мадатов, Ю. А. Сорбционно-спектроскопическое определение ионов марганца (II) иммобилизованным ализарин-3 -метиламино п, п-диуксусной кислотой / Ю. А. Мадатов, С. Б. Рахимов, Б. Р. Норматов, З. А. Сманова // Узбекский химический журнал. – Ташкент. – 2021. – Т. 2. – С. 70–77.
2. Таджиев, Ж. Н. Разработка спектрофотометрических методов определения ионов меди(II), цинка(II) и ртути(II) новым азореагентом на основе пиридина / Ж. Н. Таджиев // Дисс... на соискание ученой степени доктора философии (PhD) хим. наук. – Ташкент. – 2019. – С. 120.

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## COMPOSITE MATERIALS: TYPES AND PRODUCTION METHODS

## КОМПОЗИЦИОННЫЕ МАТЕРИАЛЫ: ВИДЫ И СПОСОБЫ ПРОИЗВОДСТВА

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*Abstract. In this article the areas of application of composite materials were considered, the types of composite materials depending on the material of the matrix and the type of reinforcing element were shown. Examples of the most popular materials of the matrix and reinforcing element for each type of composite materials are given. The main stages and methods of composite materials production are briefly described.*

*Аннотация. В данной статье были рассмотрены области применения композиционных материалов, показаны виды композиционных материалов в зависимости от материала матрицы и вида армирующего элемента. Приведены примеры наиболее популярных материалов матрицы и армирующего элемента для каждого вида композиционных материалов. Кратко описаны основные этапы и методы производства композиционных материалов.*

Nowadays composite materials are one of the most demanded materials in many industries. They are most widespread in the construction industry, shipbuilding, aircraft construction, automotive industry, as well as in the production of friction and antifriction parts due to the unique combination of properties, possibility of their