Development Of Sorption-Spectroscopic Methods For The Determination Of Iron (Iii) Ion With New 2,4,6-Tri(2-Pyridyl)-S-Triazine Derivatives Immobilized

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ABSTRACT

A new corrosion-spectophotometric method of iron (III) ion determination was created. and the method of immobilization of the obtained reagent on the fiber was developed. Optimal conditions for immobilization of the reagent on the fiber were selected. The dependence of the degree of immobilization on the wavelength and pH of the environment, as well as the effect of the acidity of the environment, was studied. The structure of the complex formed by the immobilized 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent with iron (III) ion is shown.

Keywords: Iron, corrosion - spectrophotometric method, immobilization, 2,4,6-tri(2-pyridyl)-1,3,5-triazine

Introduction: Currently, environmental pollution and the need for clean drinking water are among the global problems. In recent years, the use of sorbents in photometric analysis has gained practical importance. This makes it possible to create a new, highly sensitive, selective sorption-spectroscopic method. This method of analysis also uses organic reagents known in spectroscopic analysis. Sensitivity and accuracy of sorption-spectroscopic methods are higher than test methods. As a result of the combined use of these two methods, it is necessary to determine the amount of toxic substances by the test method, and to measure the exact amount by the sorption-spectroscopic method. The established test methods are mainly determined by the level of permissible limit value (PDK).

Immobilization is derived from the Latin word "to bind" and means "to strengthen", that is, it is understood to be an environment that is forcibly created for the purpose of protecting an injured limb for a certain period of time. There are basically two ways to form groups on the surface of sorbents that allow complex compounds to be obtained.

One is the modification of the sorbent with a functional group, and the other is the immobilization of the organic reagent into the matrix as a result of intermolecular interaction. Although the sorbent created in the first way has some advantages, there are some difficulties in its preparation and synthesis of necessary substances. According to the second method, usually only the selection of the necessary reagent for immobilization is required.

Immobilization increases the resistance of organic reagent layers to leaching and eliminates photochemical degradation. A standard method for preparing such immobilized substances is to achieve absorption at the matrix level of a reagent chosen according to the objective being observed. Ion-exchange fibrous sorbents have

an advantage over other granular sorbents due to their large surface area.

The nature of such a bond is greatly affected by slight changes in pH, ionic strength, temperature, and solvent nature of the solution during the analysis. Ignoring these effects can lead to desorption of the reagent from the fiber.

The main part. Selection of fiber carrier Ready fibers were placed separately in a solution of 2,4,6-tri(2-pyridyl)-1,3,5-triazine with a known concentration, and optical densities of the reagent before and after immobilization were measured. The results are presented in Table 1. 2,4,6-tri(2-pyridyl)-1,3,5-triazine was washed with HCl before immobilization of the reagent on the fiber and transferred to the anion exchange Cl^- form, followed by washing with distilled water (repeating 2–3 times). Ready fiber for immobilization is stored in a wet state. Immobilization method: 10 ml of 0.1% 2,4,6-tri(2-pyridyl)-1,3,5-triazine and 0.2000 g of fiber were added to 50.0 ml measuring cups and a glass rod was added for 5-8 minutes. mixed using Then the fiber was washed with distilled water and the amount of reagent deposited on the fiber was measured, according to the results obtained in Table 1, SMA-1 fiber was selected.

Preparation of solutions

1. To prepare a 0.1% working solution of 2,4,6-tri (2-pyridyl)-1,3,5-triazine, 0.1000 g was weighed on an analytical balance, placed in a 100 ml volumetric flask, and brought to the mark with distilled water. . The prepared solution was diluted and used for further work.
2. To prepare a standard 1mg/ml solution of Fe^{+3} ion, take 0.732 g of $(NH_4)_2SO_4$ *$Fe(SO_4)_3 \cdot 6H_2O$ salt, put it in a 100 ml flask and bring it up to the mark with distilled water. This solution was used in subsequent work.
3. Concentrated sulfuric acid was diluted in preparation of 0.1 M sulfuric acid solution.
4. A 0.04 M (H_2BO_4, H_3PO_4, CH_3COOH) 0.2 M NaOH solution was added to the universal buffer mixture with different pH (1–12).
5. To prepare fibers, 0.1 g was taken from the fibers synthesized by Uz MU at the Department of Polymer Chemistry. The fibers were converted to chlorine form by placing them in 0.1 M hydrochloric acid. Washed with distilled water until neutral. It was kept moist in a Petri dish.
6. The rN of the solutions was measured using the universal ionomer EV-130 and the pH-meter rN/mV/TEMR Meter P25 EcoMet developed in Korea.
7. Absorption and reflection spectra of solutions were used spectrocolorimeter called "UV-Vis Specord M-40".
8. The light absorption spectrum of aqueous solutions of the reagent and the complex was measured in spectrophotometer-46, KFK-2 and KFK-3.

Selection of optimal conditions for immobilization of 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagents to fiber

To prepare immobilized carriers, 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent was immobilized onto the fibrous sorbent SMA-1. To immobilize the 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent on the fiber, the fiber is prepared before use. For this, 0.2000 g of fiber carrier was washed with 50.0 ml of 0.1 M NSI and transferred to anion exchange-CI-form, then washed with distilled water (repeated 2-3 times). The ready-made fiber for immobilization was stored in a moist state.

Immobilization method: 10 ml of 0.1% 2-nitroso-5-methoxy phenol reagent was added to 50.0 ml measuring cups, 0.2000 g of fiber was added and mixed with a glass rod for 5-8 minutes. The fiber was then washed with distilled water and the amount of reagent deposited on the fiber was measured, the results are given in Table 1 and Figure 1. The immobilization of 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent to fiber is represented by the following formula.

$$P\text{-}NH_2 + HCI \rightarrow P\text{-}^{+}NH_3CI^{-}$$

$$P\text{-}^{+}NH_3CI^{-} + OCH_3R \rightarrow P\text{-}^{+}NH_3OCH_3R$$

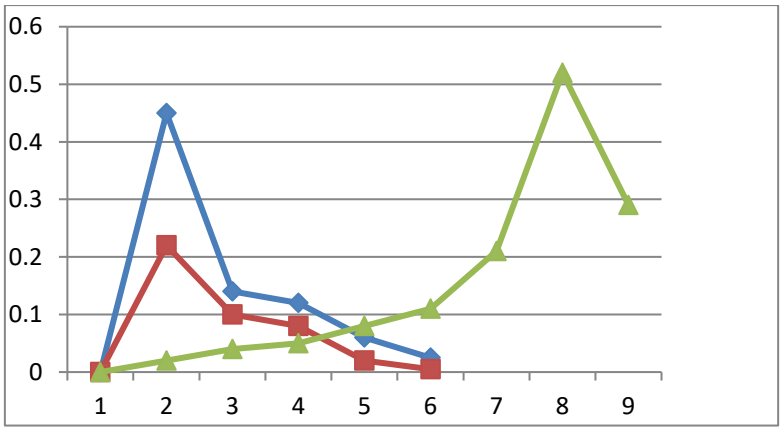
In this case, R-NH_2-polymer is the carrier

R- 2,4,6-tri(2-pyridyl)-1,3,5-triazine

Table 1

Wavelength dependence of immobilization degree of 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent

λ, nm	A reagent	A immobilized reagent	A complex
315	-	-	-
364	0,45	0,22	0,02
400	0,14	0,1	0,04
440	0,12	0,08	0,05
490	0,06	0,02	0,08
540	0,025	0,005	0,11
590	-	-	0,21
670	-	-	0,52
750	-	-	0,29



1- picture. 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent immobilization dependence on λ_{max}

So, for the 2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent, λ_{max} = 364 nm represents the maximum wavelength for the immobilized complex at λ_{max} = 670 nm, and these wavelengths are used in further work.

Effect of environmental acidity on immobilization

2,4,6-tri(2-pyridyl)-1,3,5-triazine reagent immobilized corresponding SMA-1 fibers were added to 50.0 ml beakers with 10 ml of universal buffer solution at different pH, Fe^{3+} solution 10 After adding μg/cm3, it was left to immobilize for 6 minutes. R% was calculated by measuring optical densities. The results are presented in Table 2, Figure 2 (C_{Fe3+}=10 μg/sm^3, m_{cop}=0,2000 r, $\lambda_{нм}$=-670)

Effects of pH on immobilization

Table 2

Buffer solution	pH	1	2	3	4	5	6	7	8	9	10	11	12
Universal	Re+Fe	27	41	66	78	78	67	49	30	21	18	-	-

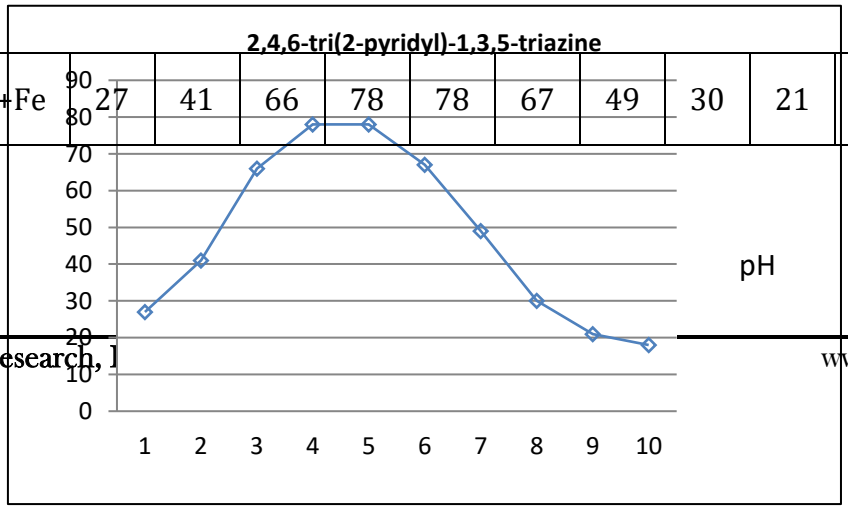


Figure 2. 2,4,6-tri(2-pyridyl)-1,3,5-triazine-reagent pH dependence graph

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