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STUDY OF IODINE DISTRIBUTION FORM IN AN ABSORBENT

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ABSTRACT

The article examined the contents and forms of occurrence of iodine in the absorbent by the method of potentiometric titration. Also, the optimal conditions for the deposition of elemental iodine.

Keywords: absorbent, oxidant, iodide, ions, titration.

INTRODUCTION

In Surkhandarya artesian basin were identified and investigated six fields iodinated strong sulfurous waters, the formation of which is also associated with oil deposits and oil-bearing rocks: Uchkyzyl, Haudag, Kakayty, Lyalmikor, Djayranhana and Old Termez [1].

Therefore, removal of iodine and its compounds remains relevant theoretical and practical problems. The work was performed in collaboration with the Tashkent branch UzNIIME, under the theme of Termez State University, Institute of General and Inorganic Chemistry, Academy of Sciences of the Republic of Uzbekistan "Study the oxidation-restoration processes and mechanism of formation of various forms of iodine compounds with alkali metals", "Development of technology and scientific and technical documentation to obtain pure crystalline iodine from iodine-raw and potassium iodide under the contract number I-8-2 KNTP-1998. "and the contracts I-8-1 "Substantiation of industrial production of iodine from underground water deposits "Haudag" from 1997 to 2001.

The authors of [2] to obtain iodine from underground water by air-stripping process. The purpose of this paper is to examine the completeness of iodine from the absorbent, as well as evaluating finding.

MATERIALS AND METHODS

To determine the mode of occurrence used absorbents Haudag field. Study forms and iodine content in the absorbent solution was performed using a chemical method for determining the iodine and its compounds, potentiometric titration (using potentiometers or eu- 74,11-307 pH 340). Absorbent here - is saturated with iodine 10% NaOH solution.

To establish a form of iodine used laboratory finding potentiometer type pH 340 or EV-74. The working electrode was a platinum electrode point - EVL-1 M3 filled with a saturated solution of KCl and silver chloride reference electrode.

For the experiments, a solution of hydrazine sulfate. The solution was prepared by dissolving 0.3250 g of accurately weighed salts hydrazine sulfate in 1 liter of distilled water.

0.01 N solution of potassium or sodium hypochlorite are prepared by diluting the appropriate solution more robust.

Sulfuric acid, a solution of 1: 1

Potassium bromide, a 1% solution.

Progress determination. The titration vessel is metered graduated cylinder with 100 ml of water being analyzed, it is dipped in the electrodes, the test solution was stirred and measure potential. If it is below 590 mV, the assay was initiated with a definition of iodide (I⁻), which is titrated with 0.01N. potassium hypochlorite solution to achieve the capacity of 590 mV. If the initial potential of 595 mV above, the analysis starts with the definition of iodine chloride.

To this solution was added a few drops of sulfuric acid and 1-2 ml of a 1% solution of potassium bromide. In the presence of iodate ions formed during the acidification of iodine chloride and hydrazine sulfate titrated to the potential of 595 mV. Then the solution is determined total iodine content. To do this, the water contained in the analyzed iodine (in the form of free iodine) is oxidized with potassium hypochlorite until the potential drop in the 630-635 mV in discharge water or 650-660mV in acidified water, and titrate the NaCl 0.01 N iodine. hydrazine sulfate solution to a potential 595 mV.

The content of iodide and chloride, iodine, as well as the total concentration of iodine is calculated by the following formula:

$$X_1 = \frac{1,27 \times 1000}{100} \times V_1$$

where

X_1 - defined forms of iodine concentration in mg / l, 1.27 - iodine, corresponding exactly 1 ml of 0.01 n. titrant solution (potassium hypochlorite or hydrazine sulfate), mg; V_1 - volume of titrant, ml.

Iodate concentration is calculated as follows:

$$X_{IO_3^-} = \frac{0,254 \times 1000}{100} \times V_1$$

where the concentration of iodate, molecular iodine 0,254- amount corresponding to 1 ml of exactly 0.01 and hydrazine sulfate solution, the amount of 0.01 mg V_1 - n. sulfate solution of hydrazine consumed for the titration of the iodine chloride is isolated after further oxidation [3].

RESULTS AND DISCUSSION

Using the potentiometric titration method, we studied the contents and forms of occurrence of iodine absorbent. Experiments were carried out after deposition of elemental iodine from the absorbent at a concentration of 0.354 g of iodine / l [1, 2].

The concentration of free iodine was calculated from the difference between the total concentration and the concentration and bound forms of [3]

$$X_{I_2} = X_{gen} - X_{I^-} - X_{IO_3^-} - X_{I^+}$$

The experimental data to determine the contents and location of iodine from mother liquors are given in Table 1 and Figs 1-4.

The contents of different forms of iodine after deposition elemental iodine from the absorbent

Table 1

№	Forms	Average number of iodine content of different forms of iodine (in%)
1	Molecular iodine (I ₂)	85.0
2	Iodide (I ⁻)	3.2
3	iodate (IO ₃ ⁻)	9.1
4	iodine chloride (I ⁺)	2.1

As the data in Table 1 and Fig. 1-4 iodine investigated mother liquors at pH = 3,5 mainly found in the form of molecular iodine of 85.6%, 3.2% iodide ion, iodate and chloride 9.1% Iodine 2.1%, respectively.

Keeping the solution at the same time all forms of iodine is only possible in an alkaline medium, dramatically reducing the oxidative properties iodates. These data are important in the purification of iodine paste various physicochemical methods.

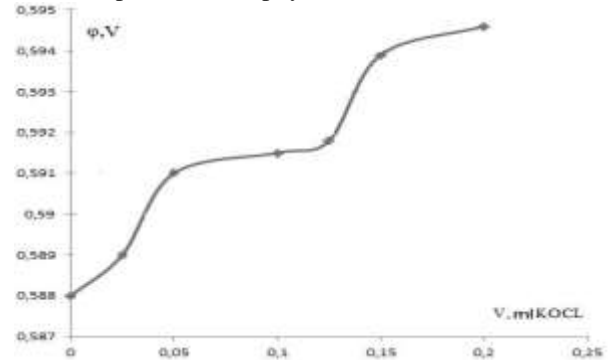


Figure 1. These potentiometric titration absorbent solution with 0.01 N potassium hypochlorite solution

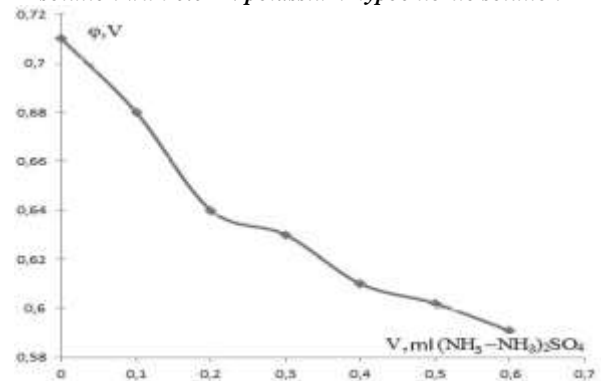


Figure 2. Data potentiometric titration absorbent solution 0.01 N. hydrazine sulfate solution

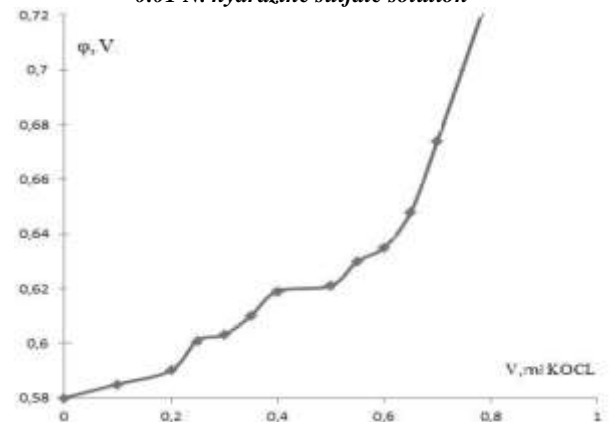


Figure 3. Data potentiometric titration of the total content of iodine in a solution of 0.01 N absorbent. potassium hypochlorite solution

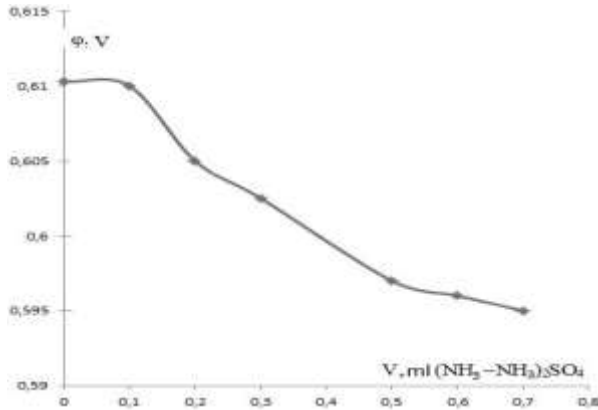


Figure 4. These potentiometric titration absorbent solution 0.01 N. hydrazine sulfate solution

The process of oxidation of iodine in alkaline absorbent. Various forms of iodine are set depending on the pH and the type and content of the oxidant. It found that the rate of oxidation of the iodide ions are much higher than the rate of oxidation of the molecular iodine, which allows for the desorption process with high (up to 94%) yield.

CONCLUSION

Thus, it was found that at potentials higher and 0.250 at pH 5-3 and at least a selection begins elemental iodine. The form of iodine was studied in the absorbent after the separation of iodine "with the concentration of 0.354 g / l. It has been found that at pH 3.5, is generally in the form of molecular iodine of 85.6%, iodide ion is 3.2%, 9.1% iodide, iodine chloride and 2.1%, respectively. Established forms of iodine ratio depends on the application for deposition of iodine oxidant and pH. Our experimental data to determine the content and modes of occurrence of iodine from the absorbent was used for development of the technology of deposition of iodine in the mold.

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