Determination of the Optimal Conditions of the Bond of Nickel (II) Ion Complex with Dimethylglyoxime Reagent

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ABSTRACT

This paper describes experimental methods for the separation of nickel ions from the adsorbent using dimethylglyoxime in the regeneration of adsorbents. A universal buffer solution with pH = 8.0 was used to study the dependence of the composition of buffer solutions on the main reaction Ni^{2+} -$R_{reagent}$) components.

Keywords: Ni (II) ions, activated carbon adsorbent, spent MDEA solution, Chugaev's reagent, pH value.

Introduction

Photocolorimetric determinations should be performed under optimal conditions to ensure complete formation of the analytical form in solution and minimum or no deviation from the Buger-Lambert-Behr law. to select the optimal value of pH for light absorption, the pH dependence of the optical density of the solution at a given wavelength was determined when the concentrations of the detectable substance and the reagent remained constant.

The most favourable conditions in coloured solutions are those in which the difference between the analytical form and the absorption in the starting reagents is the largest. When the light absorption is maximal under the most favourable conditions, small changes in pH have virtually no effect on the light absorption of the solution. The pH of the solution under study by photocolorometric reaction is maintained at a constant level using appropriate buffer solutions or sufficient amounts of acid and alkali solutions. The amount of analytical reagent to be added should be sufficient to convert all of the detectable substances into an analytical form within a given concentration range. Adding more reagents does not increase the yield of the reaction product and does not increase the light absorption of the solution. In photocolorometric analysis, the solution should remain in the true solution in the entire range of detectable concentrations. If this condition is not met, lower concentrations should be used or preservatives should be used to prevent solid phase formation.

Selection of the optimal light filter for the complex combination of nickel -Ni (II) ion with dimethylglyoxime reagent. It is known that each substance absorbs light of a certain wavelength by nature, taking into account that the maximum absorption area of a complex of nickel (II) ion with a dimethylglyoxime reagent was determined as follows:

Detection method: Add 5 ml of buffer solution, 0.01%, 1.0 ml of reagent solution and 1.0 ml of 50 μg/ml nickel (II) solution to the 25 ml volumetric flask and makeup to the mark with distilled water. The optical density of the resulting complex was measured on a KFK-2 photocolometer and in a cuvette with a light absorption thickness l = 1.0 cm on a different light filter relative to the specific solution.

All components except the metal ion, which was determined as the reference solution, were added to the solution. The measurement results are shown in Table 1, Figure 1.

Table 1. Results of determination of the maximum absorption area of the complex of nickel (II) ion with dimethylglyoxime reagent

λнм	310	370	410	450	490	550	610	670	720
A	0.110	0.205	0.260	0.340	0.450	0.470	0.455	0.410	0.380

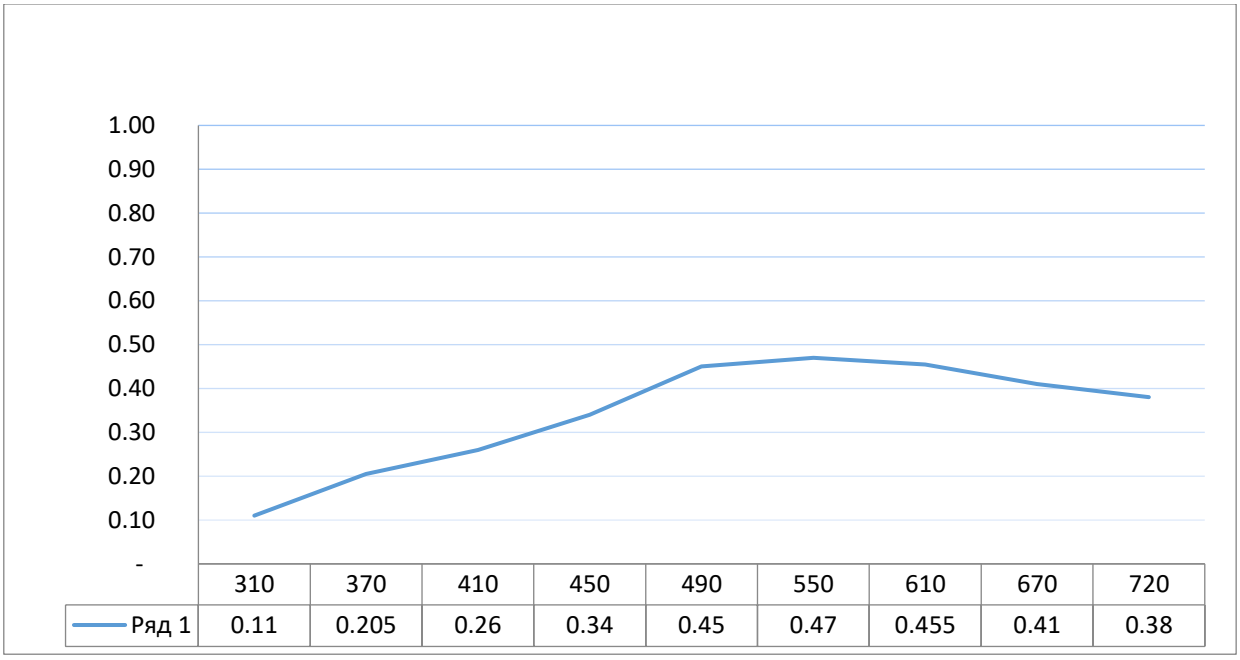

Figure 1. The dependence of the optical density of a complex compound (Ni^{2+}- $R_{reagent}$) on a light filter.

The results show that the complex compound 6-light filter exhibits a high optical density at λ_{max} =550 nm. Further work is carried out at λ_{max} =550 nm.

The value of the optical density of the complex combination of nickel (ion II with dimethylglyoxime reagent) depends on the solution medium (pH). universal buffer solutions with different pH are selected to select the optimal conditions for the complex compound.

Method of determination: to do this, pour into a 25 ml volumetric flask 5.0 ml of buffer solution, 10 ml of a universal buffer solution with pH 3 to 12, 0.01% dimethylglyoxime solution, 5 grams of used and purified activated carbon residue (containing 20 nickel ions), pour distilled water to the mark of the flask, and pour the mixture into the cuvette: the thickness was measured in a cuvette with *l* = 1.0 cm. The results obtained are shown in Table 2, and Figure 2.

Table 2. Dependence of the value of the optical density of a complex compound of nickel II ion with dimethylglyoxime reagent on the solution medium (pH)

pH	3	4	5	6	7	*8*	9	10	11	12
A	0.03	0.110	0.250	0/370	0.430	0.480	0.370	0.280	0.200	0.150

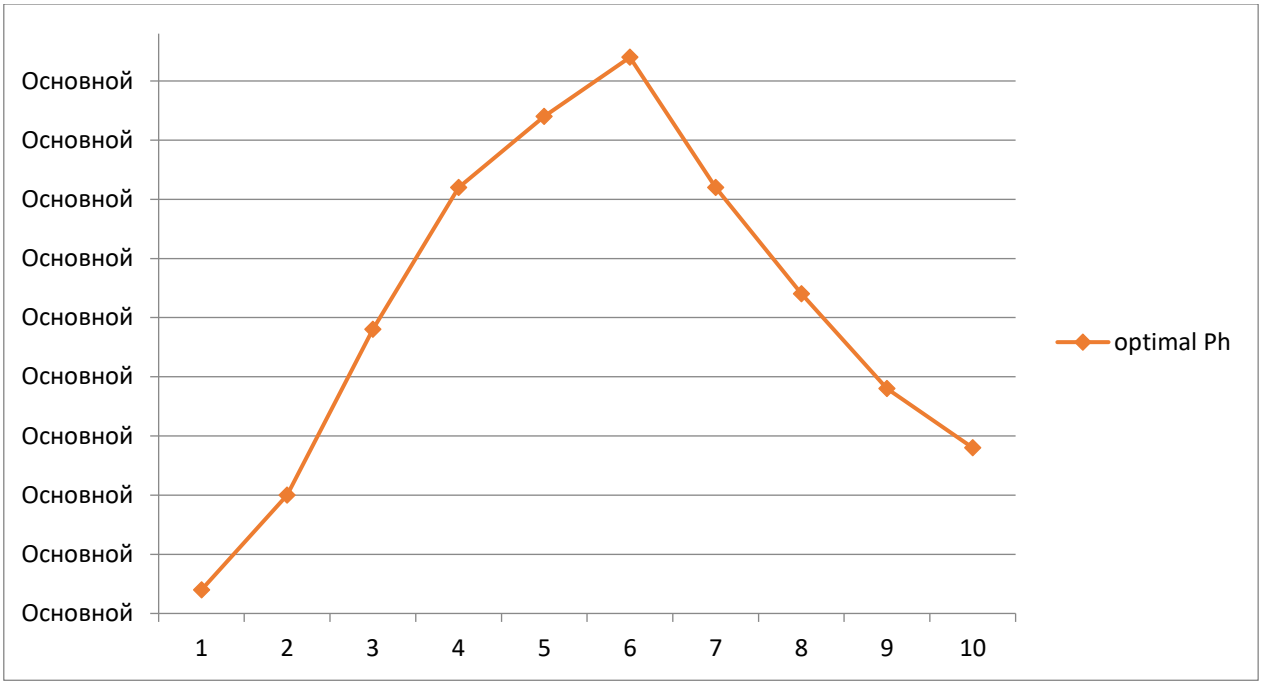

Figure 2. Graph of the dependence of the optical density of a complex compound (Ni^{2+} -$R_{reagent}$) on the environment of the solution medium (pH).

From the results obtained, it was observed that the maximum optical density of the complex compound was highest at pH = 8.0 and pH = 8.0 was chosen as the optimal medium because the optical density in this solution medium has the maximum analytical signal. In subsequent studies, a buffer solution with a pH of 8.0 was used.

The dependence of the optical density of a complex compound of a nickel (II) ion with a dimethylglyoxime reagent on the composition of a buffer solution. A universal buffer solution with pH = 8.0 was used to study the dependence of the composition of buffer sites on the components of the main reaction Ni^{2+}-Reagent).

Detection method: For the preparation of photometric solutions, as shown in the previous work, 5.0 ml of solution with pH = 8.0, 1.0 ml of 0.01% solution of pyridyl-2-naphthol-2 reagent, 1.0 ml of nickel (II) solution of 50 µg / ml and diluted with distilled water to the mark of the flask. The optical densities of the prepared analytical mixture were measured with a photocolometer in a cuvette with l = 1.0 cm relative to the specific solution. The results are presented in Table 3.

Table 3. The dependence of the optical density of a complex compound of a nickel (II) ion

Buffer solution name	The composition of the buffer solution	pH	Ā average
Universal	Phosphoric acid, acetic acid, boric acid and alkali	8.0	0.480
Farmed	Formic acid and sodium pharmaceuticals	8.0	0.405

The results of the experiments obtained show that when a universal buffer solution was used, the complex compound solution had the maximum optical density. In subsequent studies, a universal buffer solution with pH = 8.0 was used.

References

1. О.Файзуллаев, Н.Туробов, Э.Розиев, А.Куватов, Н.Мухаммадиев. (2006). Аналитическая химия. Лабораторные занятия. *Новое поколение-НММ*.
2. Аллен Х. Э., Майнер Р. (1982). Ионы металлов. В: Исследование воды для борьбы с загрязнением - физико-химическое и радиологическое исследование. *Оксфорд*. 2, 41.
3. Жумабоев, А. Г., & Содиков, У. Х. (2020). Разработка схемы использования поглотителя при нейтрализации «кислых газов», образующихся при сжигании кокса в катализаторе блока каталитического риформинга. *Universum: технические науки*, (10-2 (79)), 73-76.
4. Жумабоев, А. Г., & Содиқов, У. Х. (2020). Технологический процесс получения углеводородных фракций из возобновляемых сырьевых материалов. *Universum: технические науки*, (1 (70)).
5. Нумонов, М. А. У., & Содиқов, У. Х. (2020). Извлечение донаксина из растения Arundo donax. L и синтез его производных на основе донаксина. *Universum: технические науки*, (8-3 (77)), 39-42.
6. Жумабоев, А. Г., & Содиков, У. Х. (2021). Очистка дымовых газов от диоксида углерода из промышленных выбросов и его утилизация. *Universum: химия и биология*, (10-1 (88)), 17-19.
7. Содиқов, У. Х., & Полвонов, Х. М. (2020). Ўқитишнинг замонавий усуллари. *International Journal Of Discourse On Innovation, Integration And Education*, *1*(5), 205-207.
8. Жумабоев, А. Г., & Содиков, У. Х. (2021). Усовершенствовани Переработки Газового Конденсата И Производства Импортозамещающей Продукции. *Central Asian Journal Of Theoretical & Applied Sciences*, *2*(12), 369-373.
9. Ортикова, С. С., Хокимов, А. Э. У., & Нурматова, З. Н. К. (2019). Изучение химического состава аммофосфата, полученного на основе фосфорнокислотной переработки забалансовой фосфоритной руды Центральных Кызылкумов. *Universum: химия и биология*, (12 (66)).
10. Eminov, S. O., & Xokimov, A. E. (2021). Composite polymer materials for use in working bodies of cotton processing machines and mechanisms. *ISJ Theoretical & Applied Science, 11 (103)*, 922-924.
11. Солижонов, Х. С. У., & Каримова, М. И. К. (2022). Изучение основных видов научных исследований. *Scientific progress*, *3*(1), 857-861.
12. Umarovna, H. M. (2021). The vermiculite lightweight concretes and prospects for their use in energy-efficient buildings. *Asian Journal Of Multidimensional Research*, *10*(7), 37-44.
13. Tojiev, R. R., Mirzakulov, H. C., & Boboqulova, O. S. (2020). Processing lake karaumbet's brushes in magnesium and sodium chloride with the past production of calcium sulphate and carbonate. *Scientific-technical journal*, *24*(2), 74-79.
14. Собирова, Д. Т., & Каримова, М. И. (2021). Проектирование Коррозиестойких Защитных Слоев Легкобетонных Стеновых Конструкций. *Central Asian journal of theoretical & applied sciences*, *2*(12), 298-300.
15. Tojiev, R. R., & Mirzakulov, K. C. (2020). Physico-chemical study of the process of the reception of the oxides magnesium on base of the processing of the mixed salts lake karaumbet. *Scientific Bulletin of Namangan State University*, *2*(3), 118-125.
16. Mirzakulov, X. R. C., & Tojiev, R. R. (2019). Processing brine of salt lakes of karakalpakstan in products of economic

purpose. *Theoretical & Applied Science*, (12), 235-243.
17. Рахматов, К. Р., Саидов, К. К., & Ибрагимов, А. И. (2019). Малоинвазивные методы лечения болевых синдромов при дегенеративных заболеваниях позвоночника. *Новый день в медицине*, (4), 272-274.
18. Salomov, U. R., Moydinov, D. A., & Odilov, O. Z. (2021). The Development of a Mathematical Model to Optimize the Concentration of the Components of the Forming Adhesive Composition. *Development*, *8*(9).
19. Рахматов, К. Р. (2020). Результаты вертебропластики при лечении больных с патологическими переломами и гемангиомами позвонков. *Новый день в медицине*, (1), 345-346.
20. Kosimova, S. (2022). Formation And Principles of Landscape Architecture of the Ancient City of Samarkand. *Journal of Architectural Design*, *5*, 17-21.
21. Хомидов, Б. Н., & кизи Убайдуллаева, С. Б. (2021). Исследование активного углерода, используемого для очистки метилдиетаноламина до никел (II) иона. *Academic research in educational sciences*, *2*(4), 1502-1505.
22. Кент Р.Л. (1976). Лучшие данные для обработки амином. *Углеводородный процесс.* 55(2). С. 87.
23. Содиков, У. Х., & Жумабоев, А. Г. (2019). Получение оксигенатно-углеводородной смеси целевым назначением. *Universum: технические науки*, (11-2 (68)), 65-68.
24. Намазов, Ш. С., Ташпулатов, Ш. Ш., Ортыкова, С. С., & Эминов, Ш. О. (2021). Химическая активация минерализованной массы с помощью нитрата аммония и нитрата цинка. *Universum: технические науки*, (6-3 (87)), 62-64.
25. Eminov, S. O., & Xokimov, A. E. (2021). Composite polymer materials for use in working bodies of cotton processing machines and mechanisms. *ISJ Theoretical & Applied Science, 11 (103)*, 922-924.