American Journal of Technology and Applied Sciences
ISSN (E): 2832-1766| Volume 12, | May, 2023

STUDIES OF PHYSICO-CHEMICAL METHODS OF ANALYSIS IN THE PRODUCTION OF ADHESIVE MATERIALS

D. T. Kodirova
Fergana Polytechnic Institute, Uzbekistan
E-mail: dilshodxon9@mail.ru

A B S T R A C T	K E Y W O R D S
In the article, the physicochemical methods of analysis for the production of adhesive materials are studied.	formaldehyde resin, adhesive compositions, high molecular weight substances.

Introduction

At present, the chemical industry has several organic waste products that can replace synthetic polymers. After processing this waste, it becomes an adhesive binder with good adhesive properties. In this regard, there is a need to study this problem, the solution of which is devoted to the article.
The area of use of adhesives is mainly the bonding of wood, paper, leather, rubber, porcelain, glass, cellulose and some other materials. Before that, adhesives based on substances of natural origin, bone, albumin, casein and natural rubber adhesives were used in the production of plywood, furniture, musical instruments, bookbinding and stationery, in the shoe industry, as well as in everyday life for the repair of household items [1,2,3].

Materials and Methods

In some cases, adhesive structures should provide strength at uneven separations up to 50-80 kg/cm, and adhesive joints of non-metallic materials should have strength close to the strength of the materials being glued.
Considering the relationship of the chemical structure and structure of polymers with their bonding properties, one is convinced of the confirmation of the influence of the nature of functional groups on the adhesive and cohesive properties of monomeric and polymer compounds. The composition of the adhesive composition, in addition to the polymer, includes fillers and stabilizers, plasticizers and thickeners, and other components [4,5,6,7].
When creating an adhesive, it is necessary to clearly understand how these substances will affect the properties of the adhesive and the strength of the adhesive joint, what chemical reactions will occur between the components of the adhesive system, as well as between the adhesive and the substrate.
In the chemical industry, several organic waste products can replace synthetic glue. After their processing, these wastes become an adhesive binder with good adhesive properties.

The structural adhesive has high adhesion to a variety of materials, has high resistance to tearing and continuous loads, is resistant to various chemicals, and withstands temperature changes [8,9].

Currently, much attention is paid in the world to the creation of fire protection equipment based on modern technologies and their use to increase the fire resistance of building structures and materials. In this area, in particular, several studies are being conducted on the creation of fire protection devices that ensure the fire resistance of building structures and materials based on local raw materials, fire extinguishing methods and improving the quality of technical means.

Their application in many areas allows us to obtain materials with unique operational properties, combining high physical and mechanical characteristics, resistant to adverse atmospheric factors and exhibiting high-temperature resistance. However, it should be noted that most polymers and polymer compositions currently used in industry do not meet the requirements listed above, since under the influence of adverse factors they undergo destructive processes leading to a decrease in strength [10-12].

This article describes the methods of obtaining glue from the condensation of the cubic residue of MEA A.O. "Nitrogen". To begin with, the possibilities of condensation of the cubic residue were studied based on experimental data, possible areas of their application, and their physicochemical properties were determined. The practical significance of the research carried out is that the optimal technological parameters (pH of the medium, temperature, time, component ratios), the norms of the technological regime have been established, and the basic technological schemes for obtaining MEA-formaldehyde resin have been developed. The result of the study is the technological and physicochemical basis for the production of MEA-formaldehyde resin based on the above substances.

Urea-formaldehyde resins, which are part of the glue we obtained, are obtained by the interaction of urea and formaldehyde by a polycondensation reaction under certain conditions. For agriculture, these substances are of interest as an additional source of nitrogen, and formaldehyde, which is part of them, acts as a stabilizing factor in the utilization of ammonia by microorganisms of the ruminant rumen.

The process of tanning with methyl derivatives of urea is divided into three stages. In the first stage, methylene compounds. In the second stage of tanning, these compounds condense to form resin-like products. It has been experimentally established that the semi-finished product dried after this stage remains porous and very soft. In the third stage of tanning, further condensation of the resin occurs and the formation of three-dimensional structures, as a result of which the semi-finished product becomes rigid after drying. Based on this separation of the tanning process, it should be recognized that tanning should end at the second stage, otherwise called the “useful zone". To achieve this, it is necessary to take into account the pH and temperature of the processing solution, as well as the nature of the catalyst for the polycondentsia reaction. Often, methylene compounds are obtained first, followed by tanning using the resulting product. There is no need to obtain methyl compounds in advance. Adhesives based on synthetic polymers and natural compounds have found wide application in almost all sectors of the national economy [14,15].

The ability to combine the most heterogeneous materials - metals, plastics, wood, rubber, glass, fabric, paper, cardboard, leather, silicate, ceramic and other materials - allows the use of modern adhesives in mechanical engineering, construction machinery, light, chemical, woodworking, electrical, printing industry, medicine and in everyday life. Bonding of metals in many cases has significant advantages over traditional methods of joints - welding, riveting, soldering, bolted, and screw connections - as it makes it possible to manufacture reliable, durable structures and reduce the cost of manufacturing products.

Currently, the domestic industry produces a large number of adhesive materials for various purposes, and the publication of this collection should help to familiarize a wide range of people working in the fields related to their application with adhesives.

The collection includes technical specifications for adhesives produced in the system of the Ministries of Chemical, Oil Refining and Petrochemical Industry and other ministries and departments - as of January 1, 1974.

The adhesives described in the collection are divided into two large groups: synthetic and natural. The first of these groups includes adhesives based on thermosetting and thermoplastic polymers.

The section "Adhesives based on thermosetting polymers" contains technical specifications for phenolic, epoxy, urea-formaldehyde, polyester and organosilicon adhesives, which in most cases are compositions of structural purpose for joining metals and non-metallic materials mainly in mechanical engineering, woodworking and construction industries.

The section "Adhesives based on thermoplastic polymers" consists mainly of technical specifications for materials based on polymers and copolymers of vinyl chloride, vinyl acetate, acrylic acid derivatives, and polyamides.

Subsections related to rubber adhesives and adhesive tapes are also included here. The main purpose of these materials is the bonding of various non-metallic materials mainly in the light industry, as well as in everyday life, medicine, etc. Small subsections are devoted to adhesives based on cellulose derivatives and various adhesives (for tape and film tapes).

The main purpose of natural adhesives (both animal and vegetable) is the glueing of wallpaper, as well as the glueing of paper and cardboard when performing office, bookbinding and photographic works.

The appendix contains extracts from GOST standards and standards for adhesives, as well as describes methods for testing the physical, physicochemical and chemical properties of adhesives and mechanical properties of adhesive compounds.

The necessary clarifications of the wording have been made to the technical conditions placed in the collection, a uniform arrangement of the material has been adopted, if possible, and some editorial changes have been made to facilitate the use of the book. The collection is provided with an index of glue brands. The relative viscosity of the polymer solution is measured with a viscometer. To determine the specific viscosity of the polymer solution, the rate of outflow of pure solvent through the capillaries of the viscometer is preliminarily determined. Thus, the expiration rate of a solution of various concentrations (from - to 0.1%) is determined. The relative viscosity is determined by the following formula

$$\eta_{н} = w_1 / w_0 \quad (1)$$

w1 and w0 are the expiration rate of the solution and solvent in seconds.

After the dissolution of the polymer, the increase in the viscosity of the solution is determined by the following formula.

$$\eta_{уд} = \eta_{отн} - 1 = z_1 - w_1 / w_0 o \quad (2)$$

Determination of the amount of MEA in the cubic remainder. This method is polygraphic and electrodes, currents of constant frequency, due to their redox properties on the electrodes.

This method is widely used in scientific research and in factory laboratories.

The voltage in the solution is gradually increased. With an increase in the voltage on the device, changes in the current strength are observed. Based on the results obtained, a polygraphic curve is constructed. To determine the number of substances, a polybriosavan curve is constructed based on standard substances of different concentrations. Here we take the wave height h as the basis of concentration - C, in the substance we find the height of the polarographic wave h of a substance of unknown concentration and calculate 20 corresponding concentrations for the concentration indicated in the polybriated curve. If there are impurities (various salts) in the composition of the substance then it is impossible to determine the exact concentration by this method [39].

The determination of formaldehyde 1g polymer is placed in a test tube and heated over an open fire. As a result, the polymer decomposes and passes into a soluble state. The presence of formaldehyde is determined by the formed solution.

A) 1 ml of 1% pyrogallol solution is poured into a test tube, and 1-2 drops of a polymer solution and hydrochloric acid are added. In the presence of formaldehyde, a white precipitate forms after a few minutes. The sediment will first turn reddish, then turn purple.

B) A piece of chromotropic acid (1,8 dioxynaphthalene, 3,6 disulfonic acids) is placed in a test tube, and 1-2 ml of 72% sulfuric acid solution is poured and intensively mixed. The test tube is heated in a water tank at a temperature of 60-70° with for 10 min. At the same time, a control analysis is carried out without polymer.

In the presence of formaldehyde, a light purple colour will appear after 1 hour. This colour should not appear in the control analysis [17].

Determination of urea. a) 1 gr. sodium nitrate is placed in a test tube; 5 ml. hydrochloric acid is poured and the mixture is heated. As a result, the urea link nitrogen and carboxylic acids are released. Nitrogen and carboxylic acids are usually determined by qualitative analysis.

b) The polymer is placed in a test tube and heated until the thermal destruction of the polymer. Then they are dissolved in water and filtered. Sodium hydroxide is added to the filtrate, forming an alkaline medium. When 1-2 drops of copper sulfate solution are added to the solution, the solution acquires a red-purple colour, this shows the presence of urea in the solution.

References

1. Саранчина, Е. Ф., & Кургузкин, В. Н. (2011). Мочевино-формальдегидная смола (МФС) в комбикормах для молодняка крупного рогатого скота при откорме. Вестник российских университетов. Математика, 16(2), 672-673.
2. Паноев, Н. Ш., Ахмедов, В. Н., & Тиллаева, Д. М. (2020). Получение и свойства термостойких кремнийорганических олигомеров на основе мочевиноформальдегидной смолы и тетраэтоксилана. Universum: химия и биология, (5 (71)), 50-53.
3. Абдикерим, А., Кайранбеков, Г. Д., & Акилов, Т. К. (2018). Исследование возможности применения мочевино-формальдегидных смол в производстве кожи. Вестник науки Южного Казахстана, (4), 3-8.
4. Tulanovna, K. D., Alisherovna, A. M., & Hoshimjon o'g'li, S. S. (2022). Studying the Synthesis of Modified Formaldehyde Resins from Vat Residue. Eurasian Research Bulletin, 9, 47-50.
5. Кодирова, Д. Т., Омонова, М. С., Тожимаматова, М. Ё., & Убайдуллаева, С. Б. (2022). Физико-химические процессы при получение магнезиальных вяжущих из доломитов

шорсу. Oriental renaissance: Innovative, educational, natural and social sciences, 2(5), 1243-1247.

6. Кодирова, Д. Т., & Абидова, М. А. (2021). Получение МЭА формальдегидных смол из кубового остатка. Universum: технические науки, (6-3 (87)), 43-45.
7. Кодирова, Д. Т., Мирсалимова, С. Р., Умаралиева, М. Ж., Абидова, М. А., & Нурматова, З. Н. К. (2020). Изучение процесса получения азотно-фосфорных удобрений разложением кызылкумских фосфоритов азотной кислотой. Universum: технические науки, (3-2 (72)), 57-59.
8. Кодирова, Д. Т., & Абидова, М. А. (2019). Исследование системы хлорат магния-фосфат триэтаноламмония-вода. Universum: технические науки, (11-2 (68)), 23-27.
9. Tulanovna, K. D., & Kizi, A. S. D. (2021). Physicochemical studies of the production of defoliant based on magnesium chlorate and ammonium thiocyanate. Asian journal of multidimensional research, 10(4), 95-100.
10. Кодирова, Д. Т., Абидова, М. А., Хокимов, А. Э. У., & Мухаммаджанов, У. У. У. (2022). Модификация модиформальдегидной смолы раствором мэа, используемой в абсорбционной колонне производства аммиака. Universum: технические науки, (7-3 (100)), 9-12.
11. Tulanovna, K. D., & Saydakhral, T. (2019). Solubility in the system sodium chlorate-rhodanide sodium-water. Проблемы современной науки и образования, (6 (139)), 17-19.
12. Кодирова, Д. Т. (2005). Физико-химические основы и технология получения дефолиантов на основе хлоратов, роданидов и фосфатов этаноламинов (Doctoral dissertation, Ин-т общей и неорган. химии АН Республики Узбекистан).
13. Кодирова, Д. Т. (2022). Изучение технологии получения моноэтаноламин формальдегидных смол. Universum: технические науки, (5-7 (98)), 54-56.
14. Qodirova, D., Abdullayev, A., & Mirzabuvayev, M. (2022). Ishlab chiqarish korxonalarida hosil bo'ladigan chiqindi suvlarni tozalash va qayta ishlash usullarini o'rganish. Science and innovation, 1(A4), 240-247.
15. Кодирова, Д. Т., & Ахмедова, С. Д. К. (2022). Исследование диаграмм водных систем хлората кальция и фосфата диэтаноламмония. Universum: технические науки, (5-7 (98)), 57-62.