Studying the Synthesis of Modified Formaldehyde Resins from Vat Residue

Kodirova Dilshodkhon Tulanovna	Associate Professor, Fergana Polytechnic Institute, Fergana, Uzbekistan
Abidova Mamuraxon Alisherovna	Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan E-mail: mamurahonabidova@gmail.com
Solijonov Sherzodbek Hoshimjon o'g'li	Student, Fergana Polytechnic Institute Fergana, Uzbekistan
Ne'matova Sarvinozxon Avazjon qizi	Student, Fergana Polytechnic Institute, Fergana, Uzbekistan

ABSTRACT

This article addresses the issue of the chemical industry there are a number of organic wastes that can replace synthetic polymers. After processing this waste, it becomes an adhesive binder with good adhesion properties. In connection with this, it becomes necessary to study this problem, the solution of which is devoted to the article. The main purpose of the work is to substantiate and develop technologies for the production of polycondensates based on liquid distillation residues. In accordance with the above main goal of the study, the following tasks were formed and solved: Studied the condensation of the VAT residue of monoethanolamine. The chemical, physico-mechanical properties of the resin, their application in various sectors of the national economy have been studied.

Keywords: formaldehyde resin, adhesive compositions, high molecular weight substances

Introduction

Modern adhesive compositions based on various polymers are widely used in all leading industries. The area of use of adhesives is mainly the bonding of wood, paper, leather, rubber, porcelain, glass, cellulose and some other materials. In the production of plywood, furniture, musical instruments, in bookbinding and stationery, in the shoe industry, as well as in everyday life for the repair of household items, adhesives based on substances of natural origin were used - bone, albumin, casein and natural rubber adhesives. [1,2]. Considering the relationship between the chemical structure and structure of polymers and 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 polymeric compounds.

The main part

Of course, the polymer is the basis of the adhesive, and the choice of polymer is the first and decisive step in creating an adhesive. To date, for the production of plywood of the FK grade, mainly urea-formaldehyde resin (UFR) adhesives are used, an important component of which are fillers. Traditionally, it is customary to isolate mineral and natural fillers [2], such as kaolin, shungite, silicon oxide, as well as wheat, wood or soy flour. Their use makes it possible to reduce shrinkage of the glue, prevent the penetration of resin into wood capillaries, etc. However, almost all currently used fillers are inert with respect to FSC components [3]

Traditionally, natural fillers are considered to be reactive with respect to the components of synthetic resins [4, 5], however, the variability of the chemical composition and the low availability of active sites complicate their interaction with KF oligomers. It is possible to increase the chemical activity of some natural fillers by preliminary physicochemical treatment [6, 7], but this is associated with additional energy costs. Very effective reactive fillers are macromolecular compounds that can either dissolve in water or form a stable dispersion system with FSC. There are a number of organic wastes in the chemical industry that can replace synthetic adhesives. After processing these wastes, it becomes an adhesive binder with good adhesive properties. For example, the condensation of aqueous solutions of Na-salt of carboxymethylcellulose, acetone solution of diacetylcellulose, liquid distillation residues of monoethanolamine of distillation residues of acetic acid regeneration and others with formaldehyde [8]. The bases of adhesive resins are substances obtained by polymerization and polycondensation based on active bifunctional compounds. Polymers are formed from many simple molecules (monomers) by polymerization, i.e. connection of molecules without the simultaneous detachment of any of its particles. If the connection of monomer molecules into a macromolecule is accompanied by the release of water, ammonia or other substances, then this method of obtaining macromolecular substances is called polycondensation. The first group of polymers includes polyethylene, polystyrene, polymethyl methacrylate, polyvinyl chloride, polybutadiene, polyvinyl acetate, polytetrafluoroethylene, polyisabutylene, polychloroprene nitrile butadiene, butadiene-sterile rubber, etc. The second group includes urea - formaldehyde, furfural-acetone, phenol-formaldehyde, polyamine, polyester, polyamide , When heated, thermosetting high-molecular compounds irreversibly change their properties; they are usually divided into infusible and insoluble ones (for example: resols, anilino and urea-formaldehyde /1,2/ epoxy, polyester resins, etc.). On the basis of these high molecular weight substances, ordinary glue, glue, melt, structural glue are obtained, used in many sectors of the national economy for gluing materials, non-metallic materials (wood, plastics, rubber, leather, glass, etc.) [10-14]. Solvent-based adhesives take a long time to cure. When epoxy resins were first synthesized, the amazing adhesive properties of these products caused a sensation even outside the limited circle of specialists. New possibilities of use were immediately revealed in particular areas of aircraft, automotive industry, namely, minimum weight and maximum strength in vibration conditions. In the future, in addition to epoxy resins, other synthetic materials were developed, used mainly as adhesives, which are included in the supporting structure and are called structural adhesives for this. Structural adhesive has high adhesion to a wide variety of materials, has high resistance to tearing and continuous loads, resistance to various chemicals, Structural adhesive is divided into: structural adhesive, ambient temperature curing and is two-component, one of the components acts as a curing catalyst), thermoset adhesive is one-component. With the help of the latter, joints are obtained, the strength of which sometimes exceeds the strength of the materials being joined [15-20]. For the production of urea-formaldehyde oligomers, urea and formaldehyde in the form of its aqueous solution, formalin, are used as raw materials. Urea in its pure form is a colorless long prismatic crystals. The experiment was carried out in a three-necked round-bottom flask equipped with a thermometer, a reflux condenser, and a Dean-Starks trap. To separate water from the reaction zone, a vacuum pump was installed to the reflux condenser. An electric stove was used to evenly raise the temperature. All devices are assembled on the table. In a three-necked flask equipped with a dropping funnel, 60 ml (1 mol) of carbamide, 30 g (1 mol) of formaldehyde are loaded with a reflux condenser with a thermometer and mix with a magnetic stirrer. 10-15 minutes for complete dissolution of carbamide and keep at this temperature for 60 minutes. After 60 minutes, the pH of the concentrated solution is determined, which should be in the range of 6.5-7.5 units. pH. Mix continuously and add 4 ml of 4% sulfuric acid and adjust the pH of the reaction mass to 5.2-0.2.

After that, add 183g of MEA vat residue and continue mixing. Exposure at a temperature of 90 + 5 is carried out for 50 minutes. The resulting resin is cooled to 20-30 °C and the viscosity is measured using a viscometer. During the process, the effects of temperature, time, concentration on the condensation process were studied

Table 1.

№	Ratio IEA reagents: Formalin, mol	Actions Time T, min	Actions Temperatures ^{0}C	Dynamic Viscosity, μ	Number of MEA Passing In resin, %
1	1:1	twenty 40 60	twenty 60 100	0.701 0.780 0.912	23 38 61
2	2:1	twenty 40 60	- 60 100	- 0.640 0.780	- 36 56
3	3:1	40 60	60 100	0.630 0.803	41 66
4	1:2	40 60	60 100	0.719 0.790	46 64
5	1:3	40 60	60 100	0.695 0.810	47 68

Carrying out of the condensation process is regulated by two indicators:

- the amount of MEA converted into formaldehyde resin of the reaction mixture;
- observation of changes in dynamic viscosity in the reaction mixture.

In chemical technology, raw materials and materials must be cheap, not scarce, and have a high degree of yield into finished products. This is determined by the amount of product consumed before the reaction and the amount of product obtained after the reaction. When used as an MEA raw material, the amount of raw material is determined by a polygraphic method:

- converted into formaldehyde resin reaction mixture;
- observation of changes in dynamic viscosity in the reaction mixture.

In chemical technology, raw materials and materials must be cheap, not scarce, and have a high degree of yield into finished products. This is determined by the amount of product consumed before the reaction and the amount of product obtained after the reaction. When used as an MEA raw material, the amount of raw material is determined by a polygraphic method:

- converted into formaldehyde resin reaction mixture;
- observation of changes in dynamic viscosity in the reaction mixture.

In chemical technology, raw materials and materials must be cheap, not scarce, and have a high degree of yield into finished products. This is determined by the amount of product consumed before the reaction and the amount of product obtained after the reaction. When used as an MEA raw material, the amount of raw material is determined by a polygraphic method:

$$X = \frac{Cmeai * Cmeaf}{Cmeai} * 100$$

Where: Cmeai- the initial amount of MEA in the reaction mixture,

Cmeaf - the final amount of MEA in the reaction mixture,

X is the degree of conversion of MEA into resins.

The adhesive properties of products obtained empirically have been studied. As a result of the experience, the adhesive product has good adhesive and adhesive properties. This product glues not only paper, but also wood chip manufactory materials.

References

1. Слонимский, Г. Л. (1967). Краткие очерки по физико-химии полимеров. *М.: Химия,-1967.–231с.*

2. Аноров, Р. А., Абидова, М. А. (2019). Изучение физико-химических свойств водорастворимых ПАВ полученных из жирных кислот хлопкового соапстока, Universum: химия и биология, ст 66
3. Иванов, Д. В., Бака, К. Э., & Конарейкина, Д. А. (2022). Измельченные бумажно-смоляные пленки как реакционно-способные наполнители карбамидоформальдегидных смол. *Лесной журнал*, (3), 153-166.
4. Волков А.В., Кондратьев В.П., Орлов А.Т., Редькина Т.П., Шевандо Т.В., Шорникова Н.Ю., Варыгин В.С., Филиппова Е.О., Соколова Е.Г. Справочник фанерщика / под ред. А.В. Волкова, А.Т. Орлова. СПб.: Политехн. ун-т, 2010. 486 с.
5. Volkov A.V., Kondrat'yev V.P., Orlov A.T., Red'kina T.P., Shevando T.V., Shornikova N.Yu., Varygin V.S., Filippova E.O., Sokolova E.G. Handbook of Plywood Producer. Saint Petersburg, SPbPU Publ., 2010. 486 p. (In Russ.).
6. Kondrat'ev, V. P., & Doronin, I. G. (1988). *Водостойкие клеи в деревообработке*. Лесная промышл..
7. Cui, H. W., & Du, G. B. (2013). Development of a novel polyvinyl acetate type emulsion curing agent for urea formaldehyde resin. *Wood science and technology*, *47*(1), 105-119.
8. Dziurka, D., & Mirski, R. (2014). Properties of Liquid and Polycondensed UF Resin Modified with pMDI. *Wood Industry/Drvna Industrija*, *65*(2).
9. Кардашов, Д. А. (1964). *Синтетические клеи*. Рипол Классик.
10. Кодирова, Д. Т., & Абидова, М. А. (2021). Получение МЭА формальдегидных смол из кубового остатка. *Universum: технические науки*, (6-3 (87)), 43-45.
11. Способы укрепления згунтов ГКНТИ Рес. Узбекистана, Ташкент 1996 г.
12. Отчет ВНИЦ 6. Способ подготовки листа под опору ЛЭН в сыпучих группах. Опублик. 15.09.93 г. 7. Ихтиролар. Расмий ахборотнома 1955 г. № 1 с. 69.
13. Ubaydullayeva, S. B. Q. (2022). Kompleks tarkibini izomolyar seriyalar metodi yordamida aniqlash. *Oriental renaissance: Innovative, educational, natural and social sciences*, *2*(5), 578-582.
14. Omonova, M.S., Ibragimova, G.O. (2020). The rate of a chemical reaction and factors affecting it, EPRA International Journal of Research and Development.
15. Adilhodzhaev, A., Igamberdiev, B., Kodirova, D., Davlyatov, S., Marufjonov, A., & Shaumarov, S. (2020). The study of the interaction of adhesive with the substrate surface in a new composite material based on modified gypsum and treated rice straw. *European Journal of Molecular & Clinical Medicine*, *7*(2), 683-689.
16. Tulanovna, K. D., Saydakhral, T., & Ugli, N. A. A. (2019). Solubility in the system sodium chlorate-rhodanide ammonium-water. *Проблемы современной науки и образования*, (3 (136)), 26-30.
17. Adilhodzhaev, A., Igamberdiev, B., Kodirova, D., Rakhmonov, O., & Marufjonov, A. (2020). Assessment of the potential of composite gypsum binder bricks as an alternative to traditional wall materials in Uzbekistan. *European Journal of Molecular & Clinical Medicine*, *7*(2), 1884-1889.
18. 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.
19. 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.
20. Кодирова, Д. Т., & Абидова, М. А. (2019). Исследование системы хлорат магния-фосфат триэтаноламмония-вода. *Universum: технические науки*, (11-2 (68)), 23-27.