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The Influence of the Amount of 4,4-METHYLENDIPHENYL DIISOCYANATE Used in the Processing of POLYURETHANE Waste on the Physical and Mechanical Properties

Shodiyev Asliddin, Uktam Temirov , Shokhruh Jurayev , Jurabek Shodikulov

Navoi State University of Mining and Technology, PhD , associate professor of the Department of Agronomy.
Navoi State University of Mining and Technology, Doctor of Technical Sciences, Professor of the Department of Agronomy.
Navoi State University of Mining and Technology, PhD , Head of the Department of Agronomy.
Navoi State University of Mining and Technology, PhD , associate professor of the Department of Agronomy.

ABSTRACT: In this article, the influence of the addition of 4,4-methylenediphenyl diisocyanate to the waste polyurethane fluid used for the processing of MDI-containing thermosetting polyurethane waste on the physical and mechanical properties of the recycled polyurethane materials is studied. Polyurethane secondary material was prepared by polycondensation by mixing 4,4-methylenediphenyl diisocyanate liquid in amounts of 10%, 13%, 16%, 19% during processing of polyurethane waste. The physical and mechanical properties of the obtained polyurethane samples were studied.

KEY WORDS: Polymer, consistency, polyurethane, viscosity, thermosetting, 4,4-methylenediphenyldiisocyanate, expansion, degree of hardness, glycol, polycondensate , exothermic.

I.INTRODUCTION

The development of the economy in the world directly depends on the production capacity of industrial enterprises. Polyurethanes are one of the most demanded polymers in the industry. They are widely used in industry, construction, furniture industry, textile and shoe production, medicine, automotive industry and other fields. It is important to achieve high efficiency by using the materials obtained as a result of polyurethane compound processing to increase the service life of industrial samples used in sieving, transporting, and separating gold-bearing ores[1,2].

Today, the role of polymer materials in all production sectors is incomparable. Yes this to class incoming traditional method thermosetting polyurethanes were first synthesized in 1947 by polycondensation of glycols with diisocyanates. Polyurethanes are synthetic polymers that are widely used in industry due to their various properties. They are resistant to high temperatures and are widely used in heavy-duty belt conveyors and as metal substitutes [3,4]. Polyurethanes are heterochain polymers whose macromolecule contains an unmodified urethane group –N(R)–C(O)O–. Polyurethane macromolecules contain simple and complex functional groups, urea, amide groups. Polyurethanes are synthesized by polycondensation using isocyanate compounds containing polyfunctional groups. Studying the physical and mechanical properties of 4,4-methylenediphenyldiisocyanate, which is of great importance in the traditional method of obtaining thermoset polyurethane belonging to this class, gives the opportunity to extend the service life of spare parts made of this polymer.

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II.ANALYSIS OF LITERATURE ON THE TOPIC.

Polyurethane material with MDI content is widely used due to its viscosity, high deformation, resistance to cracking and resistance to solvents. At the same time, polyurethanes tend to oxidize in the temperature range from -40 to +80^{0}C [5,6]. Foamed polyurethanes are resistant to plasticizers and most solvents, weak solutions of gasoline, diesel fuel, acids and alkalis, as well as high temperature. Polyurethane foam is a lightweight material for heat and sound insulation widely used [7]. Polyurethanes based on TDI are thermally stable being 200°C. from high urethane groups break down at temperature starts This is ethylene glycol to carbon directly depends on the mobility of brican hydrogen atom [8,10] .

III.RESEARCH METHODOLOGY.

Waste polyurethanes Samples were reprocessed on the basis of 4,4-methylenediphenyldiisocyanate. The effect of changing the amount of 4,4-methylenediphenyldiisocyanate on the physico-mechanical properties of these samples, such as abrasion resistance, hardness, and tensile strength, is considered.

IV.ANALYSIS AND RESULTS

In the synthesis of thermosetting polyurethane material containing MDI in the ratio of 100 parts by weight of 4,4-methylenediphenyl diisocyanate to 50 parts by weight of polyester (complex ester of adipic acid with glycols) and 4.8 parts by weight of 1,4-butenediol mixed, poured into the necessary molds under a pressure of 0.8 MPa and baked at a temperature of 100-110 $^{0\,C}$ for 18-24 hours . 4,4-methylenediphenyldiisocyanate was mixed in the quantities shown in Table 1 after liquefaction for processing polyurethane waste.

Table 1

Again processed polyurethane waste composition

№	Samples	Measurement unit	Samples fruit doer components	
			4,4-Methylenediphenyl diisocyanate	Waste liquefaction
1	№1	Weight part	10	100
2	№2	Weight part	13	100
3	№3	Weight part	16	100
4	№4	Weight part	19	100

Based on Table 1 different quantitative samples for 72 hours steamy in ovens crystallized prepared

Table 2

Again processed polyurethane of the material physical mechanic properties

№	Test methods	unit	№1	№2	№3	№4
1	Feeding	mm ^{3}	25	23	2 1	17
2	Hardness level (Shore) on	mm	40	45	51	58
3	In disconnection consistency	MPa	16	20	27	35

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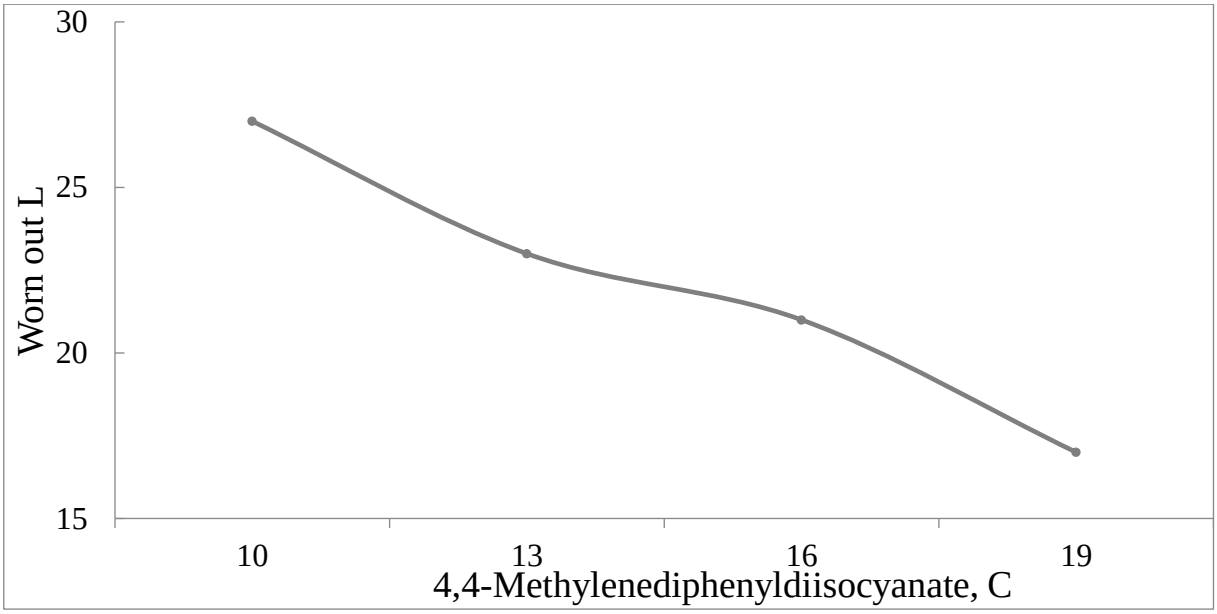
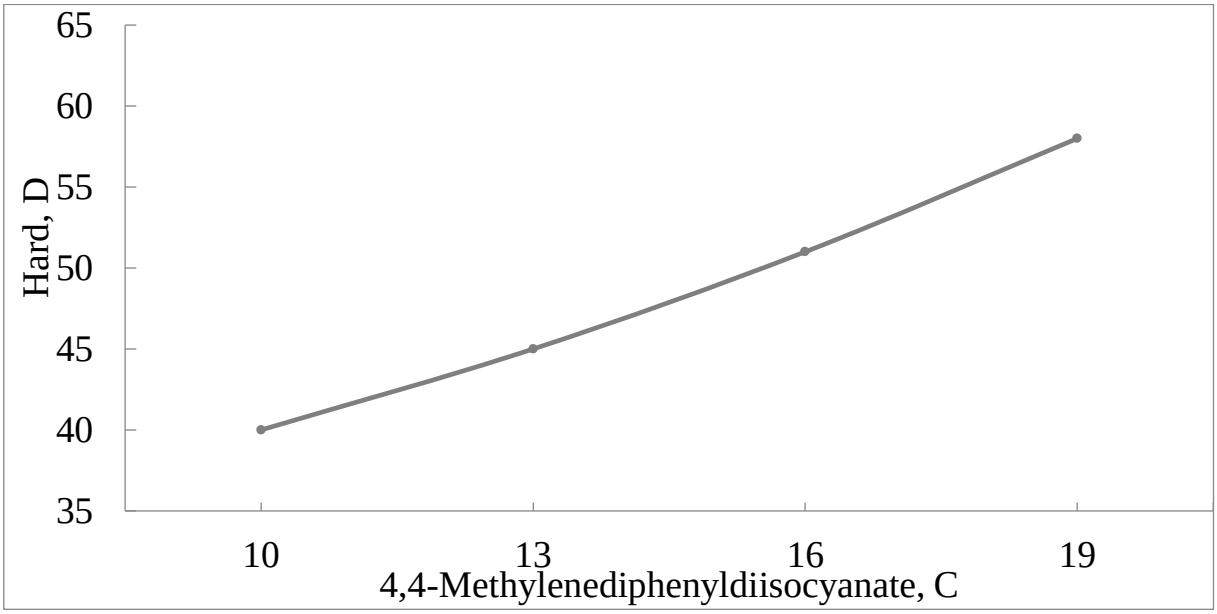
Rubbing of recycled polyurethane waste elongation, degree of hardness , breaking values obtained from mechanical tests such as strength given . This values through graphics was built .



1 - drawing. Feeding of samples to the indicator Dependence of the amount of 4,4-methylenediphenyldiisocyanate

Polymer materials are known under the influence of an environment , external and drink i to be fed occurs . This samples external The feed grain was studied using R-320 brand sanding paper .



2 - drawing. Hardness of samples level Dependence of the amount of 4,4- methylenediphenyldiisocyanate

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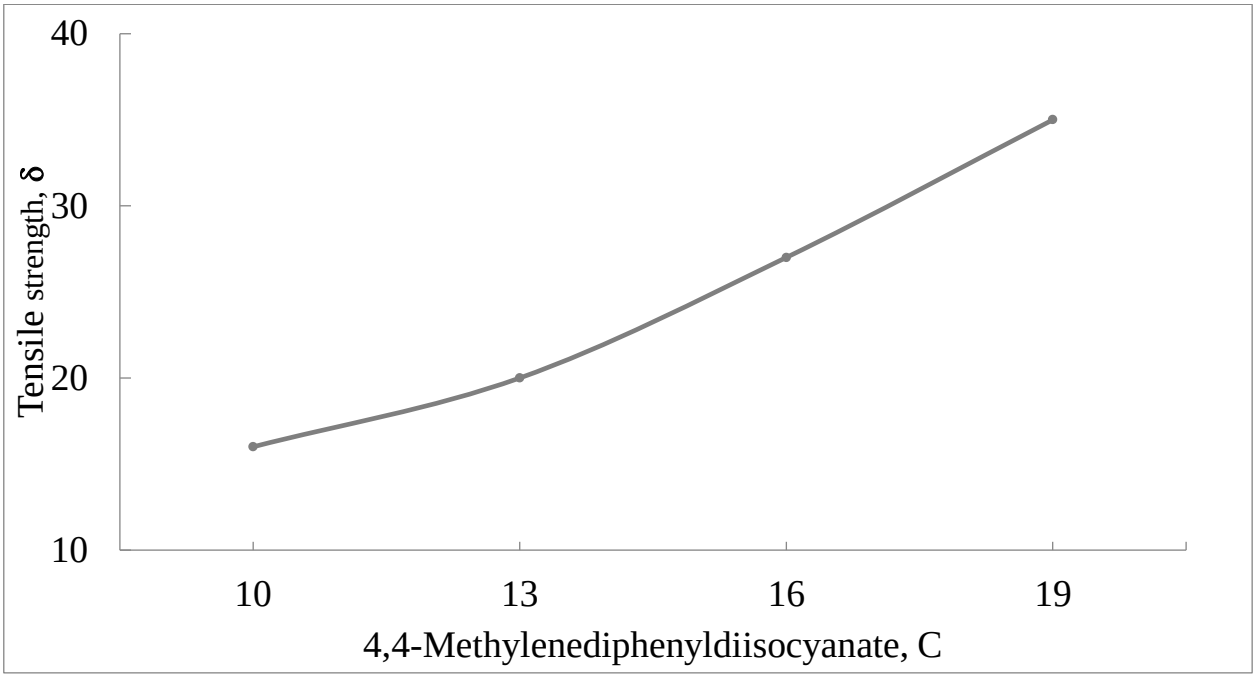
Materials hard level in determining different kind of measure structures and units there is being they are determined using methods such as Brinell, Vickers, Rockwell and Shore . Shore (rebound) method for polymer materials , plastics, rubber and their vulcanization products is used . of samples hardness level GOST 263-75 based on was measured and values received.



3 - drawing. Samples are out of stock resilience to the indicator Dependence of the amount of 4,4-methylenediphenyldiisocyanate

The breaking strength index of the studied samples is rubber, plastics for intended R-0.5 (razrivnaya machine) test using an electromechanical device works take went and values was determined .

V.CONCLUSION

The above test methods through determined as it can be seen from the results, with the increase in the amount of 4,4-methylenediphenyldiisocyanate, there is a decrease in the creep index and the level of hardness , it was found that it leads to an increase in durability . The main reason for this is the increase of hydroxyl groups forming polyurethane and diisocyanate groups in 4,4-methylenediphenyldiisocyanate by forming mutual bonds .

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