MATHEMATICAL DESCRIPTION OF TECHNOLOGICAL PROCESSES AND DEVICES

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ABSTRACT

The article presents a mathematical calculation of the synthesis of N1N1 - Hexamethylene bis [(cyclohexanol) carbamate]. Today, in the 21st century, the development of technology for new derivative generations of bis-carbamates is an urgent task of modern organic chemistry.

Keywords: *N1N1 - hexamethylene bis [(cyclohexanoloyl) carbamate], hexane - 1,6 - diisocyanate, C - N1N1 - hexamethylene bis [(cyclohexanoloyl) carbamate], cyclohexanol.*

АННОТАЦИЯ

В статье представлен математический расчет синтеза N1N1 - гексаметиленбис[(циклогексанол)карбамата]. Сегодня, в XXI веке, разработка технологии получения новых поколений производных бискарбаматов является актуальной задачей современной органической химии.

Ключевые слова: *N1N1-гексаметилен-бис[(циклогексаноил)карбамат], гексан-1,6-диизоцианат, C-N1N1-гексаметилен-бис [(циклогексаноил) карбамат], циклогексанол.*

INTRODUCTION

The search for highly effective low-toxic biologically active compounds based on them is constantly ongoing, as can be judged by a large number of publications in the world scientific and patent literature. Syntheses of new compounds based on derivatives of substituted cyclic, aromatic saturated and unsaturated alcohols, as well as ferrocene-containing phenols and isocyanates, as well as their practical application, have broad prospects in solving the priority tasks of development, primarily in the chemical, pharmaceutical industries for the production of biological products, agriculture, and as well as the entire national economy and the growth of the well-being of the people of the Republic of Uzbekistan.

Experimental methods. The synthesis of N1N1 - hexamethylene bis [(cyclohexanoloyl) carbamate] is carried out in a batch apparatus. The duration of the operation, i.e. the time from the beginning of the loading of the initial substances of

the previous operation to the beginning of the loading of the initial substances of the subsequent operation, is the sum of the durations of the individual stages.

these operations are as follows:

preparation of raw materials:

Loading cyclohexanol, hexane - 1,6 - diisocyanate, catalyst and solvent

Mixing, chemical conversion of raw materials, removal of reaction heat =

- ✓ preparation of the reaction mixture and isolation of the product:
- ✓ reaction mass cooling
- ✓ reaction mass unloading
- ✓ drying, crushing and screening

Operation duration:

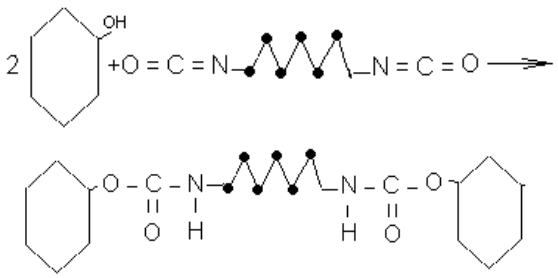
The duration of the reaction apparatus during the operation is less than the total duration of the operation.

Research results. The degree (factor) of using the reactor for its intended purpose is expressed by the ratio:

$$\eta = \frac{\tau_1}{\tau_{on}} = \angle I$$

For the reaction space, the formation of N1N1 - hexamethylene bis [(cyclohexanoloyl) carbamate] by the interaction of hexane - 1,6 - diisocyanate with cyclohexanol is generally described by the equation:

$$\eta = \frac{\tau_p}{\tau_{on}} = \frac{\tau_p}{1+\tau_p} \quad \text{где} \prec + \quad \tau_1 = \tau_{III}$$



or in symbols A+B→C where A – hexane – 1,6 – diisocyanate; B - cyclohexanol, C - N1N1 - hexamethylene bis [(cyclohexanoloyl) carbamate].

The reaction rate of the formation of N1N1 - hexamethylene bis [(cyclohexanoloyl) carbamate] is expressed by the equation:

V = K [A] [B] (1)

Equation (1) shows that the rate of formation of N1N1 - hexamethylene bis [(cyclohexanoloyl) carbamate] is directly proportional to the concentrations of cyclohexanol and hexane - 1,6 - diisocyanate.

DISCUSSION AND RESULTS.

The research results are shown in the table.

Table 1.

Costing of N1N1 – hexamethylene bis [(cyclohexanoloyl) carbamate]

	Article title	unit of measurement	Consumption rate, kg/kg	The price of raw materials in USD, USA	Amount per 1kg USD, USA
	Raw materials and main materials:				
	Hexane - 1,6 - diisocyanate	kg	0,451	144	64,94
	cyclohexanol	kg	0,526	0,51	3,06
	catalyst	kg	0,022	0,2	0,4
	solvent		3,0	0,2	1,0
	Total:	kg			69,4
	Fuel and energy per technology:	t/kv	0,4	4,0	45
	a) electricity	t/m^3	0,01	6,0	1,6
	b) return water	g/kal	1,2	1,0	0,6
	c) steam	t/m^3	0,002	3,0	1,2
	d) instrumentation air and l	t/m^3	0,002	12,0	0,006
	e) nitrogen				

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