The maximum output of a centrifugal....

$$\lambda_w = \frac{u}{a_*} = \frac{\pi Dn}{60 a_*}, \qquad (6)$$

$$\lambda_m = \frac{\lambda_a}{\cos\psi}, \qquad (7)$$

The results of an experimental study of the flow capacity of the inlet section of compressor impellers is then given and it is found that the theoretical flow parameters give much higher outputs than the experimental values. The stage intake could be increased by some 20% if the rest of the impeller could handle it. The throughput can be improved by having an appropriate value of inlet swirl, or for a given output the compressor may be made smaller. A numerical example is then given of determination of optimum flow parameters in the inlet section of an impeller and the relationship between the optimum flow parameters and the relative radius at the inlet to the impeller are plotted in Fig.9. The maximum flow density is obtained by use of stationary guide vanes at inlet to the impeller. A brief discussion of the advantages of a correct inlet

The maximum output of a centrifugal.... swirl is given. There are 9 figures and 6 Soviet references.

SUBMITTED: March 22, 1960

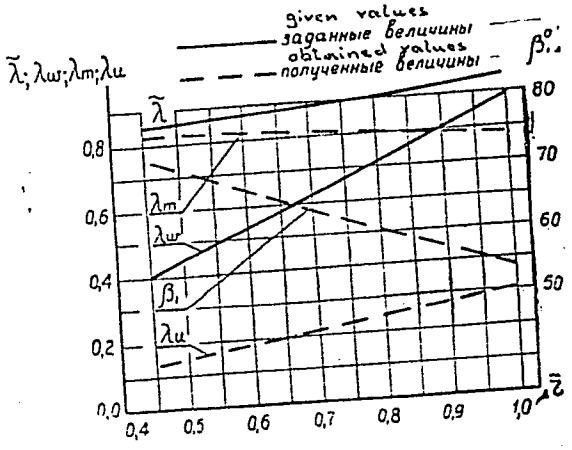

Fig. 9

Card 4/4

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E194/E155

26.2120

AUTHOR: Shpital'nikov, K.F., Candidate of Technical Sciences

TITLE: Selection of the peripheral speed of the runner of a centrifugal compressor stage

PERIODICAL: Teploenergetika, 1961, No.6, pp. 42-47

TEXT: The peripheral speed u_2 of a centrifugal stage runner is usually found by a formula due to B. Ekkert (Ref.1):

$$u_2 = \sqrt{\frac{H_{ад} g}{H_{ад}}} = \sqrt{\frac{\frac{kgRT_{01}}{k-1}\left(\pi_0^{\frac{k-1}{k}} - 1\right)}{H_{ад}}},$$

where $\pi_0 = P_{0\ out}/P_{0\ in}$ is the compression ratio of the stage; $\bar{H}_{ad}$ is the adiabatic head coefficient of the stage; H_{ad} is the adiabatic head of the stage; g is the gravitational constant; R is the gas constant; k is the adiabatic index of the process; T_{01} is the temperature of the adiabatically-retarded flow at inlet to the runner. Provided that data are available for an existing stage which does not differ too much from that being

Card 1/6

Selection of the peripheral speed ...

designed, the adiabatic head coefficient may be selected reliably on the basis of prototype data. The problem is much more difficult if the design stage differs substantially from existing stages in the meridianal section of the flow path and in the type of blades on the runner. In this case correct selection of $\bar{H}_{ad}$ and calculation of u_2 are very difficult. Therefore, the peripheral speed of the runner must be selected on the basis of analysis of the aerodynamics of air flow in the runners of several variants. The relative merits of runners with blades bent forward (in the direction of rotation) which are termed 'active', or bent back, which are termed 'reactive', are then discussed. The problem of the rational selection of peripheral speed of runner in the general case, without allowance for changes in the parameters of the air flow at the inlet to the wheel, was considered in a previous article by the present author in Teploenergetika No.4, 1960 (Ref.3). In the present work the peripheral speed is selected by investigation of changes in the flow parameter both at inlet to and outlet from the runner. For the sake of simplicity the selection of runner speed is illustrated by a numerical worked example, which occupies nearly all of this article.

Card 2/6

Selection of the peripheral speed ...

The principal formulae derived are the following:

$$\beta_2 = \arccos \frac{w_u D}{w_{1\,cp}} \qquad (19)$$

$$\lambda_2 = \sqrt{\frac{(u_2 + w_u)^2 + \left(\frac{w_{1\,cp}}{D}\right)^2 \left[\sin\left(\arccos \frac{w_u D}{w_{1\,cp}}\right)\right]^2}{\frac{2k}{k+1} gR \left[T_{01} + \frac{k-1}{kR} \frac{u^2}{g} (u_2 + w_u)\right]}} \qquad (23)$$

$$\alpha_2 = \operatorname{arc\,tg} \frac{c_{2m}}{c_{2u}} = \operatorname{arc\,tg} \frac{\frac{w_{1\,cp}}{D} \sin\left(\arccos \frac{w_u D}{w_{1\,cp}}\right)}{u_2 + w_u} \qquad (24)$$

In these expressions the following notation is used: $D = \frac{w_{1\,cp}}{w_2}$:

Card 3/ 6

$w_{1\,cp}$ is the average speed at the mean radius; w_2 is the outlet speed; $w_u = w_2 \cos \beta_2$; β_2 is the discharge angle of flow from the runner; λ is a number commonly used to characterise the condition of the flow, the suffix 1 relating to inlet and the suffix 2 relating to discharge; α_2 is the angle of flow at discharge from the runner in absolute motion.

Fig.6 shows graphs of λ_2, β_2 and α_2 for the particular example worked in the article, constructed by means of equations (19), (23) and (24). From these graphs a number of conclusions are drawn about the influence of different factors in runner design on the performance. On the basis of these considerations the optimum design of the numerical worked example under consideration is recommended. It is concluded that in each particular case selection of the peripheral speed of the runner in designing a compressor stage consists not in simple selection of the head coefficient $\bar{H}_{ad}$ but in investigation of the inlet and discharge aerodynamics of the runner. During this investigation it is usually possible to avoid undesirable effects of supersonic flow within the stage, or at any rate to minimise the negative influence of such effects, and so to make a rational selection of the

 peripheral speed of the runner.

SHPITAL'NIKOV, K.F., kand.tekhn.nauk

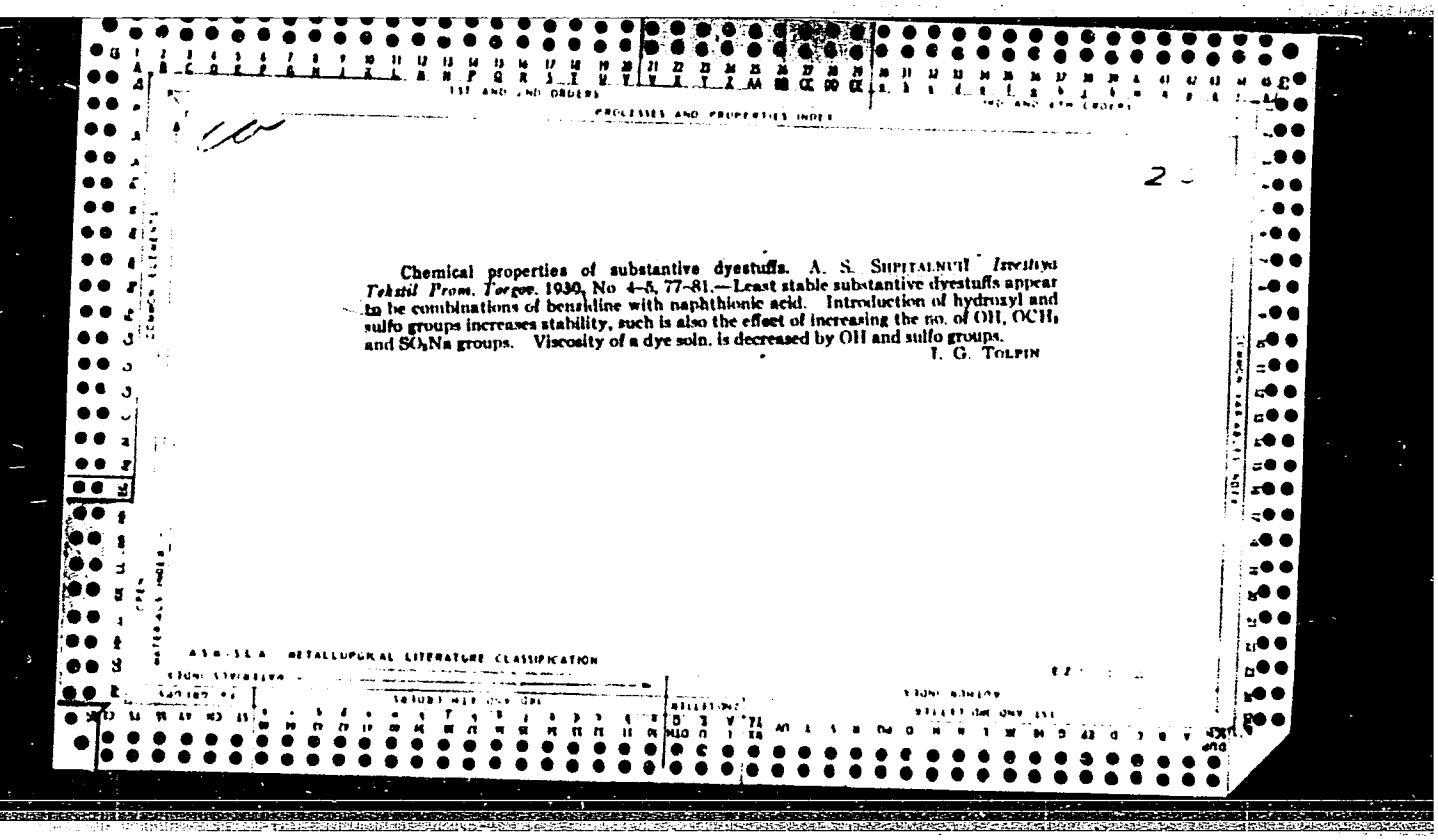
Carrying capacity of the input cross section of a centrifugal compressor stage. Energomashinostroenie 7 no.6:23-24 Je '61. (MIRA 14:7)

(Compressors)

SHPITAL'NYY, A.A.

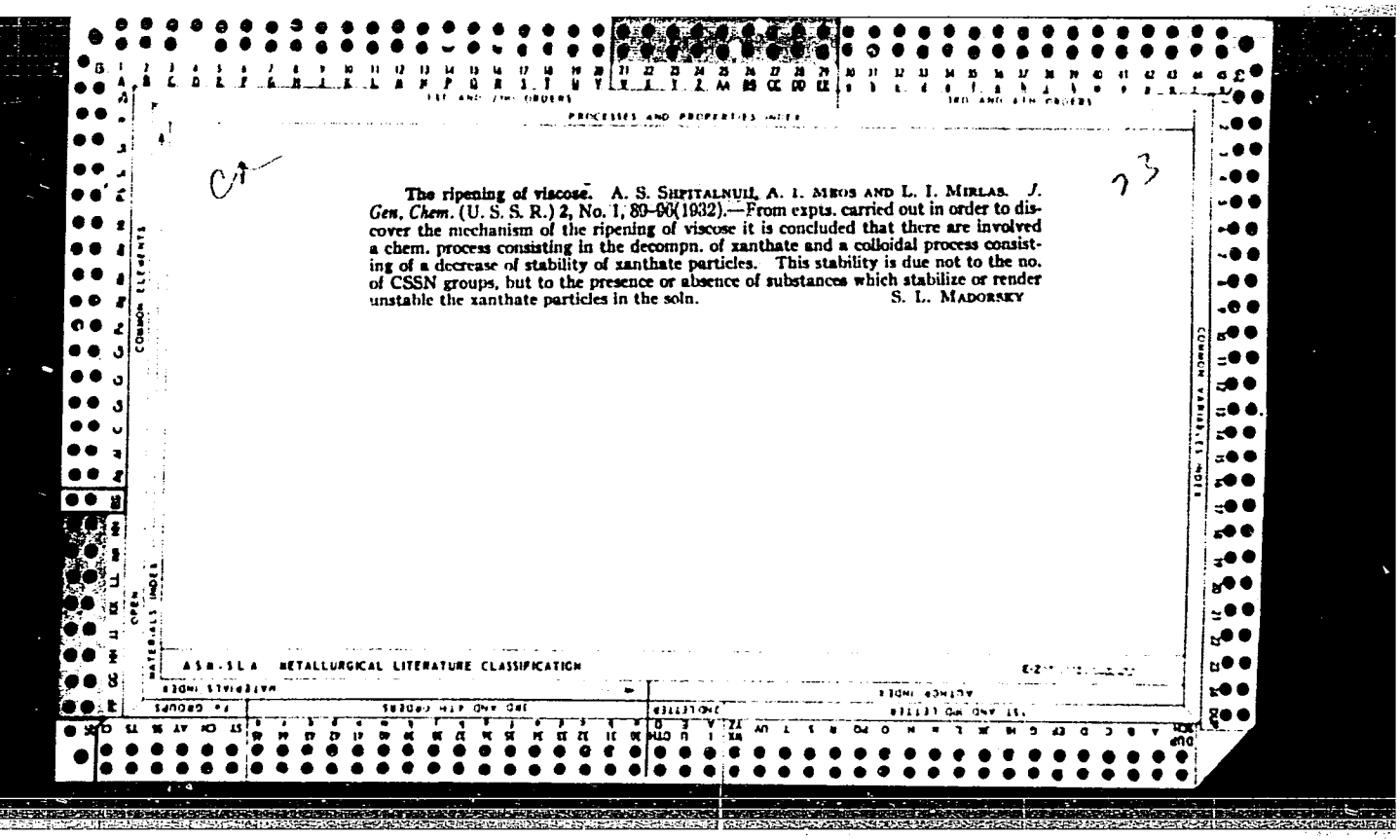
Formation of polyamide resins. Part 5. Participation of polymerization and polycondensation in the conversion of ε-caprolactam into polymer. Zhur.ob.khim. 26 no.2:530-534 F '56. (MLRA 9:8)

1. Leningradskiy tekstil'nyy institut.
(Polymers and polymerization) (Hyxamethylenimine)

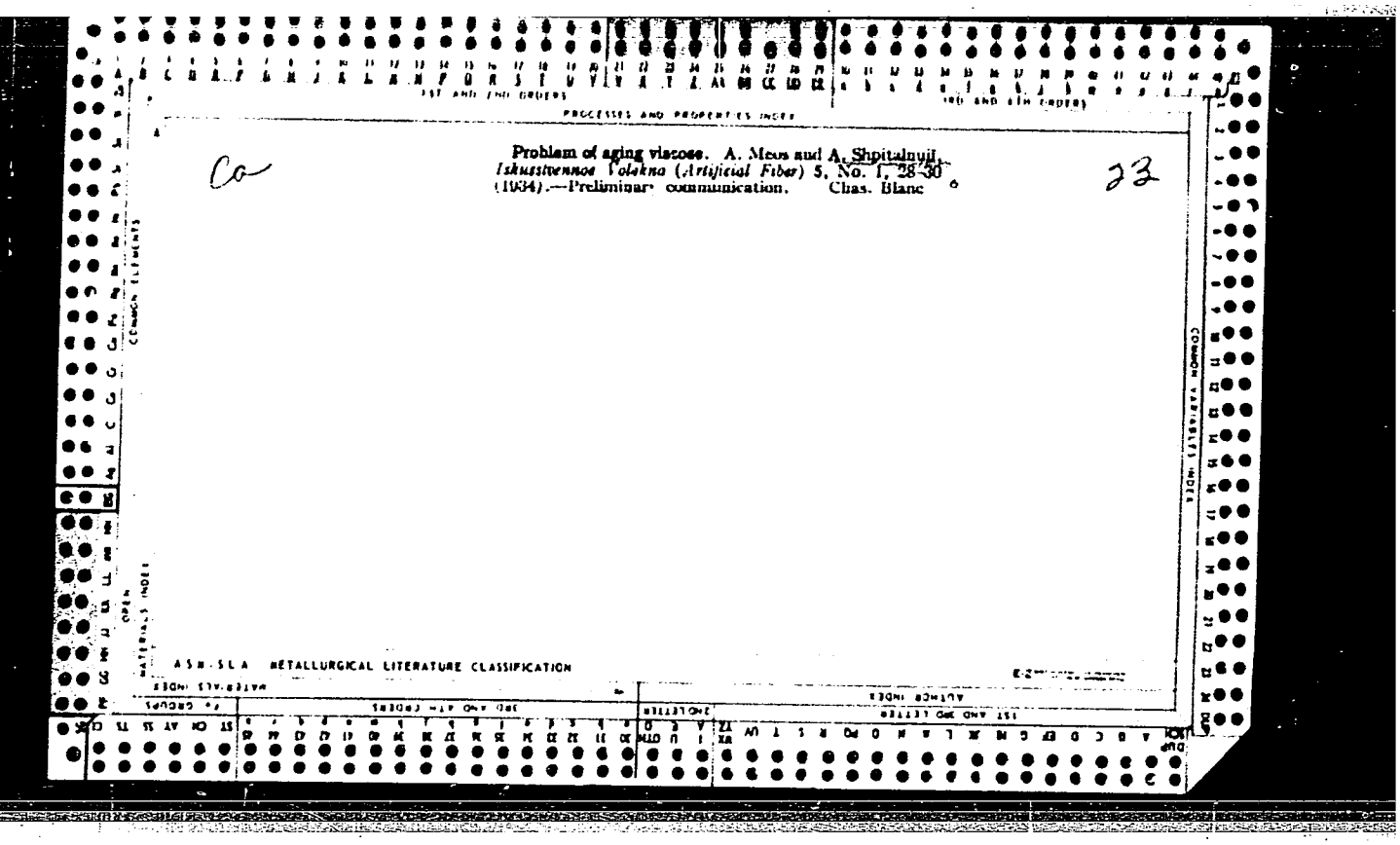


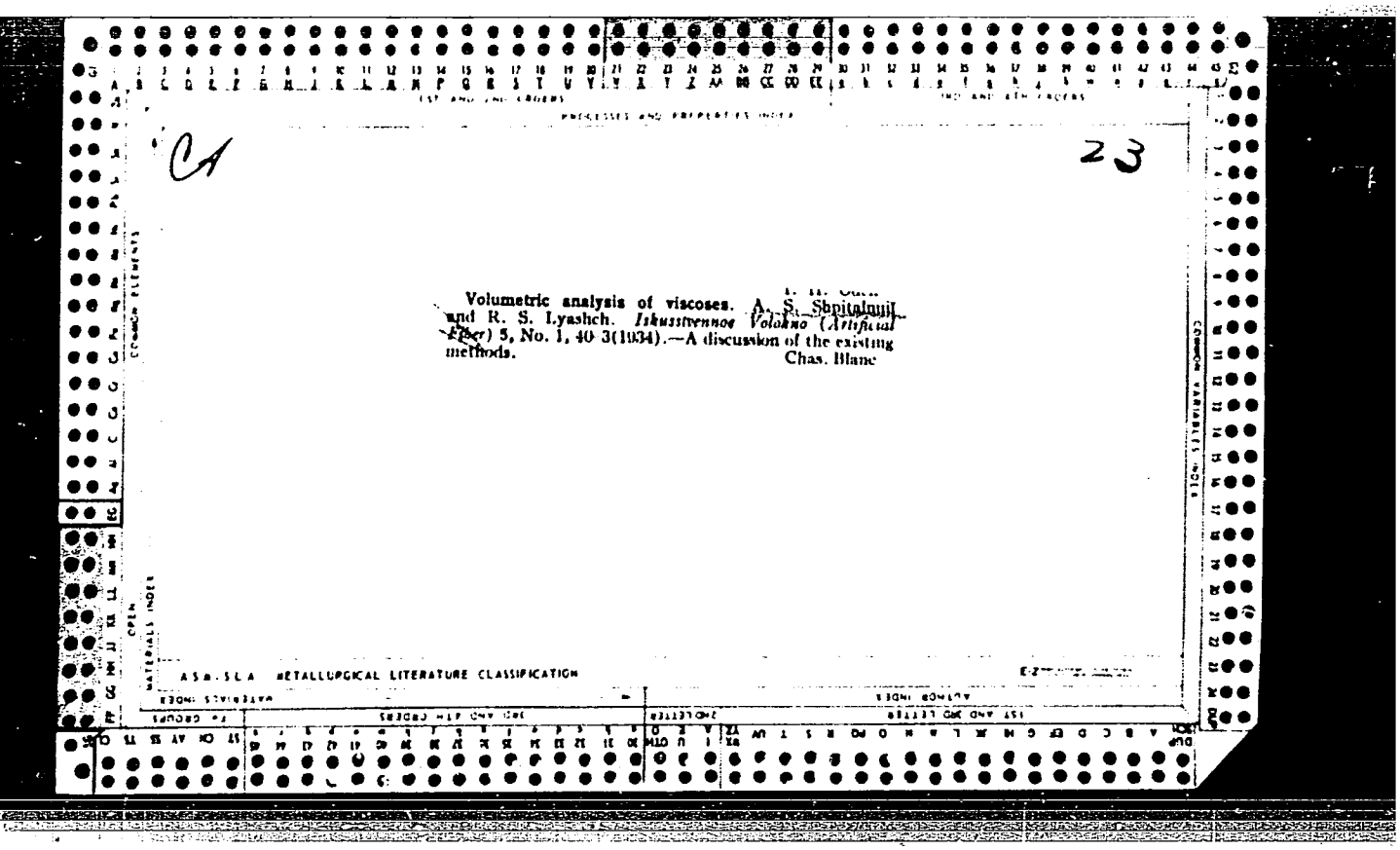
Chemical properties of substantive dyestuffs. A. S. Shpitalnyĭ. *Izvestiya Tekstil. Prom. Torgov.* 1930, No 4–5, 77–81.—Least stable substantive dyestuffs appear to be combinations of benzidine with naphthionic acid. Introduction of hydroxyl and sulfo groups increases stability, such is also the effect of increasing the no. of OH, OCH_3 and SO_3Na groups. Viscosity of a dye soln. is decreased by OH and sulfo groups.

I. G. Tolpin



The ripening of viscose. A. S. SHPITALNUII, A. I. MIKOS AND L. I. MIRLAS. *J. Gen. Chem.* (U. S. S. R.) 2, No. 1, 89–90(1932).—From expts. carried out in order to discover the mechanism of the ripening of viscose it is concluded that there are involved a chem. process consisting in the decompn. of xanthate and a colloidal process consisting of a decrease of stability of xanthate particles. This stability is due not to the no. of CSSN groups, but to the presence or absence of substances which stabilize or render unstable the xanthate particles in the soln. S. L. MADORSKY





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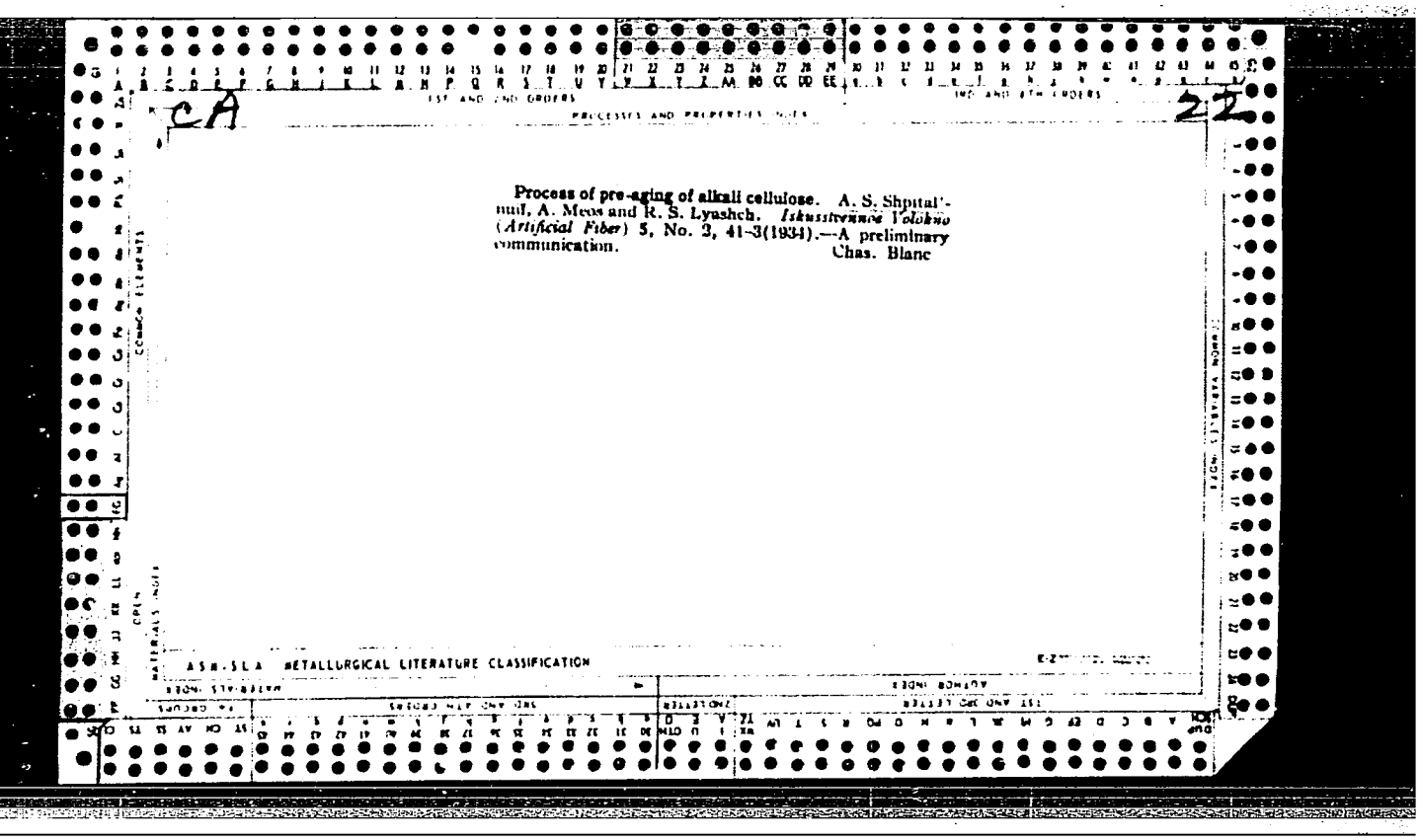
23

Volumetric analysis of viscoses. A. S. Shpitalnuĭ and R. S. Lyashich. *Iskusstvennoe Volokno (Artificial Fiber)* 5, No. 1, 40-3(1934).—A discussion of the existing methods.
Chas. Blanc



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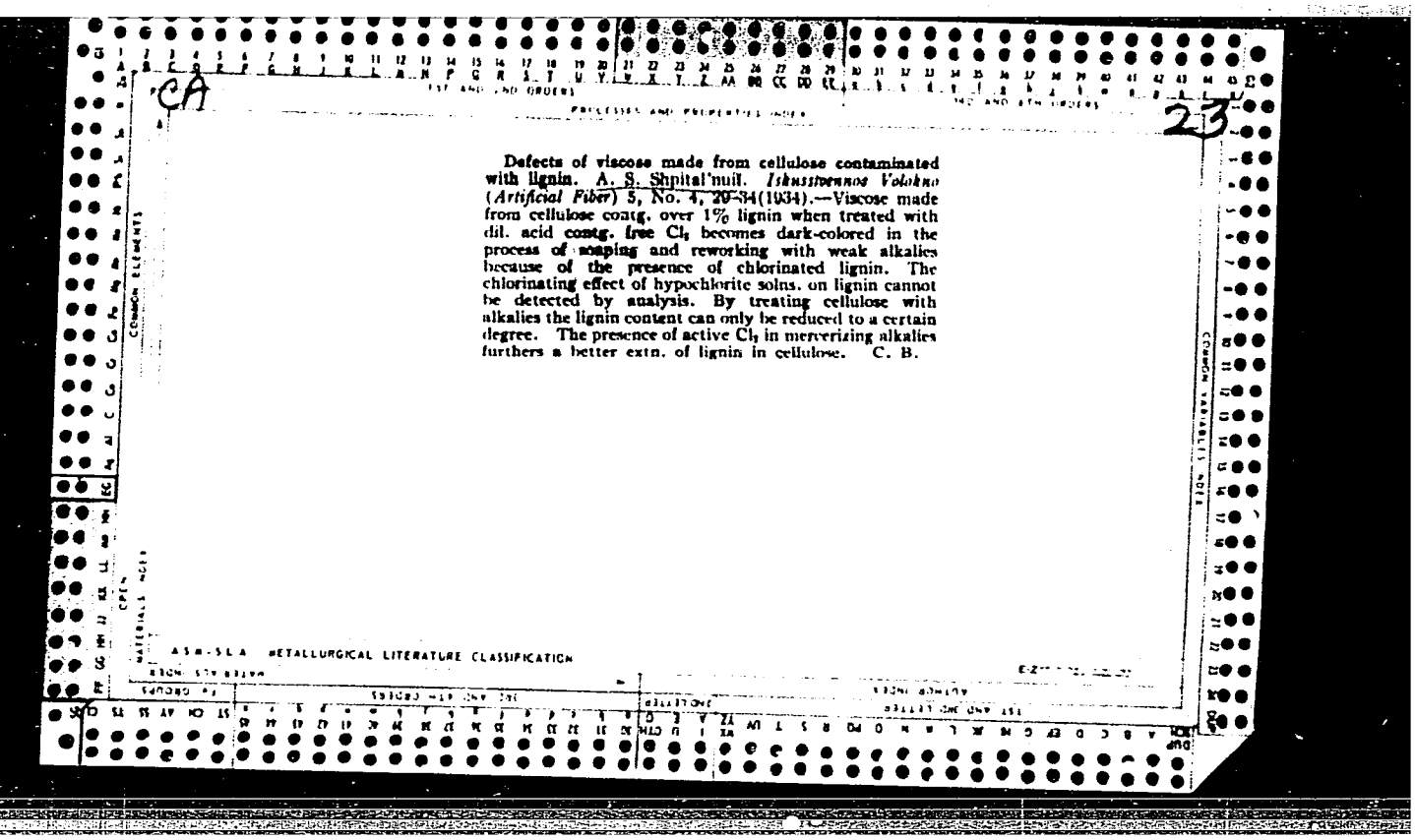
22

Process of pre-aging of alkali cellulose. A. S. Shpital'-nuif, A. Meos and R. S. Lyashch. *Iskusstvennoe Volokno* (*Artificial Fiber*) 5, No. 2, 41-3(1934).—A preliminary communication. Chas. Blanc



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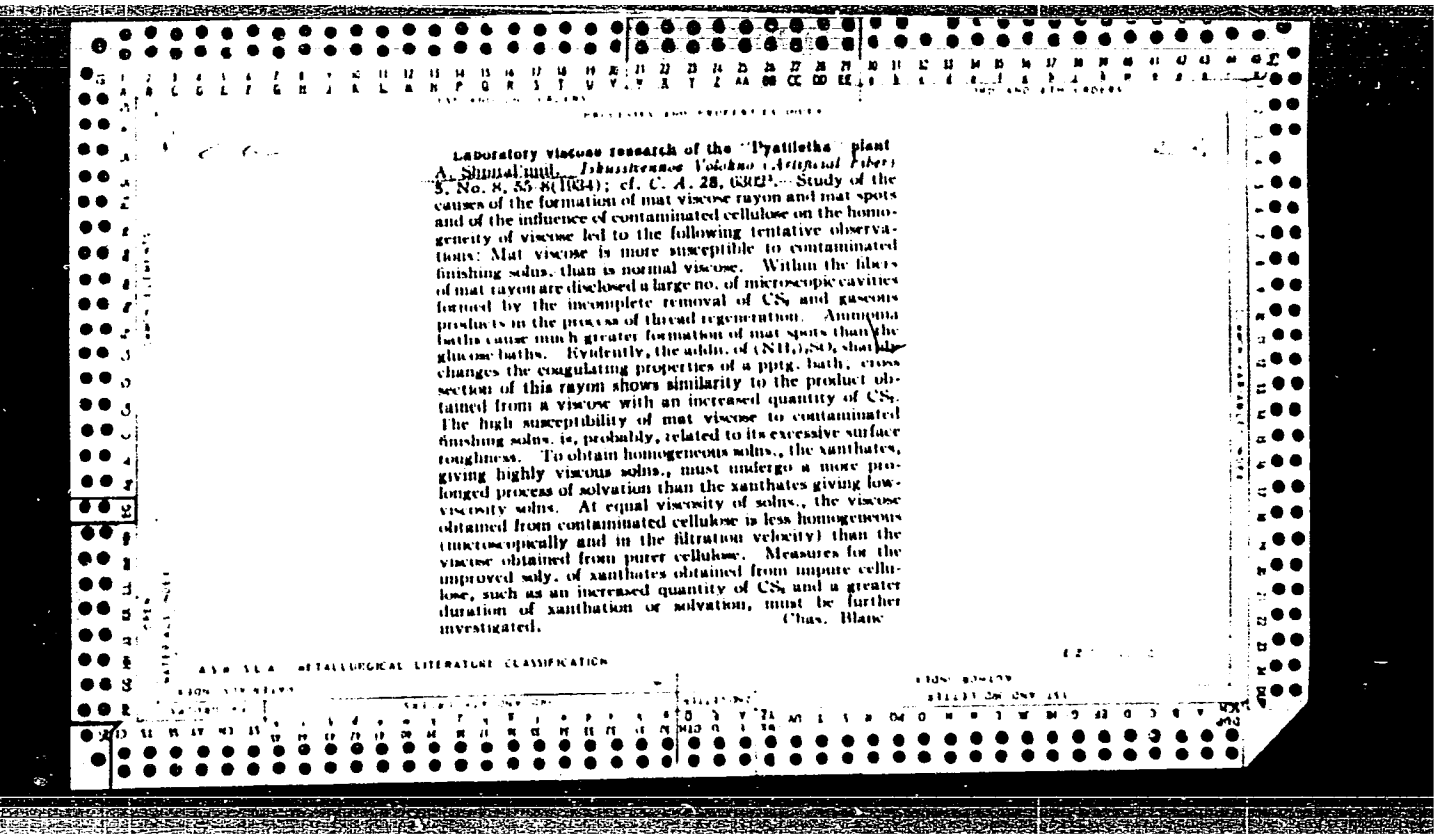
23

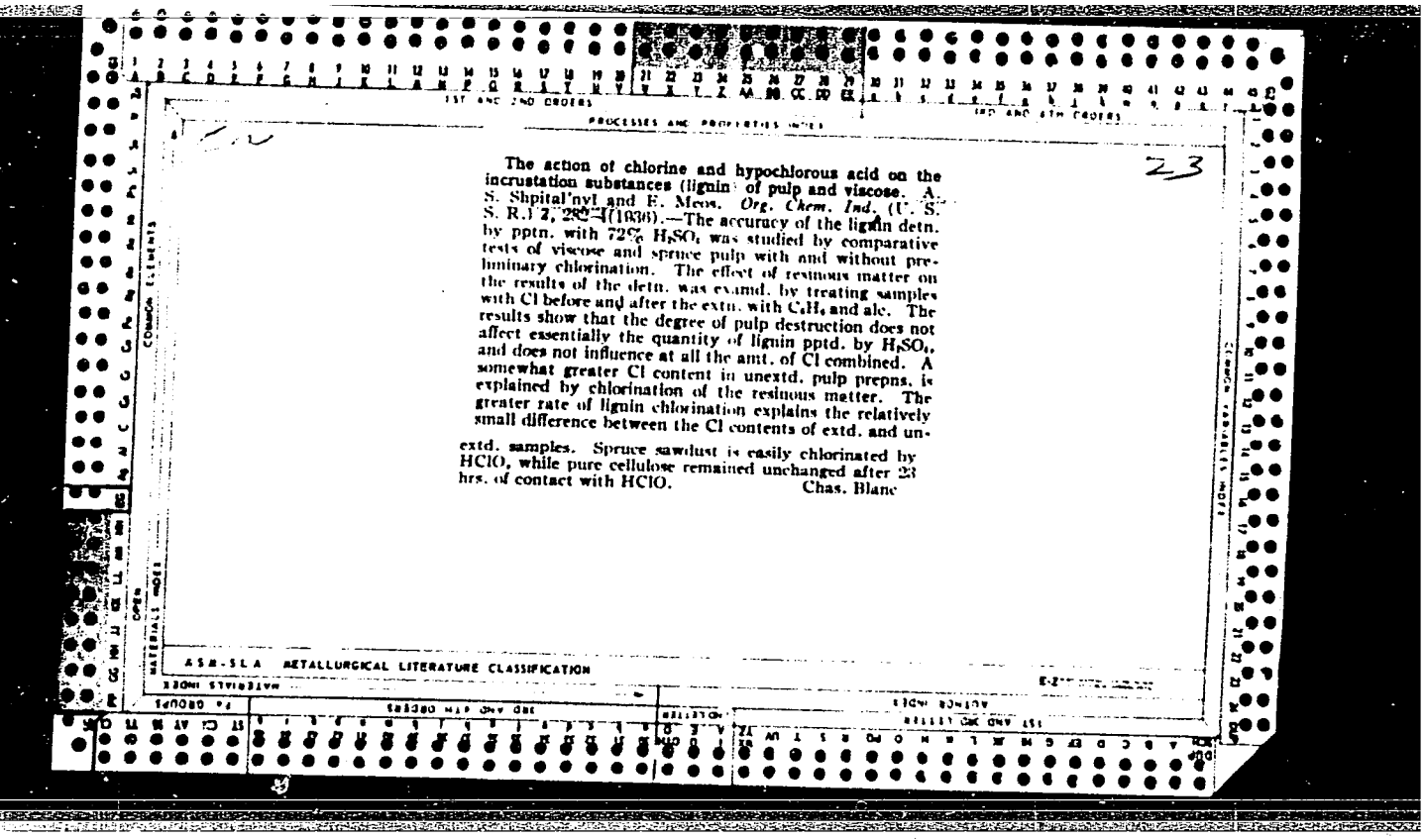
Defects of viscose made from cellulose contaminated with lignin. A. S. Shpital'nuil. *Iskusstvennoe Volokno* (*Artificial Fiber*) 5, No. 4, 29-34(1934).—Viscose made from cellulose contg. over 1% lignin when treated with dil. acid contg. free Cl_2 becomes dark-colored in the process of soaping and reworking with weak alkalies because of the presence of chlorinated lignin. The chlorinating effect of hypochlorite solns. on lignin cannot be detected by analysis. By treating cellulose with alkalies the lignin content can only be reduced to a certain degree. The presence of active Cl_2 in mercerizing alkalies furthers a better extn. of lignin in cellulose. C. B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

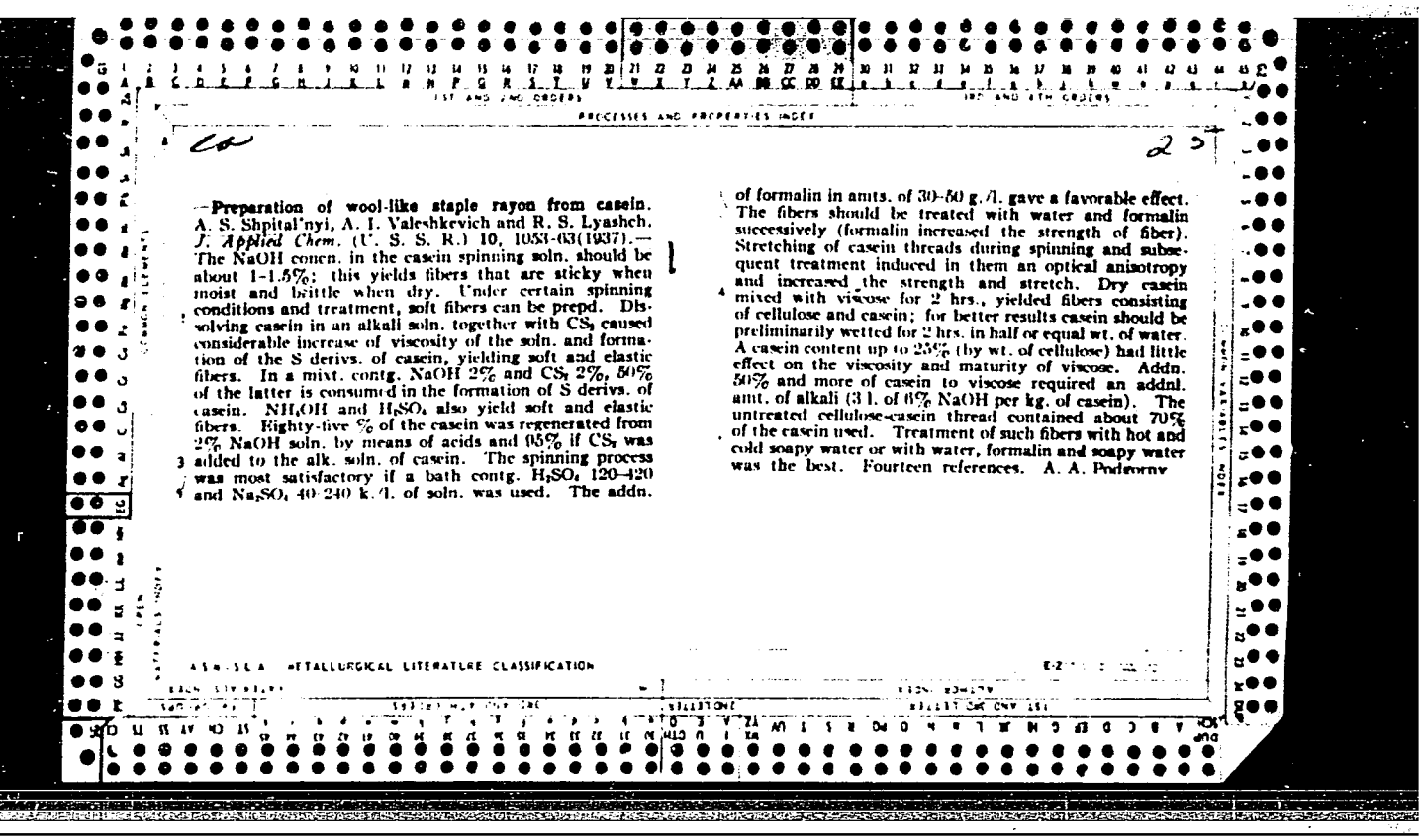


Laboratory viscose research of the "Pyatiletka" plant. A. Shmal'gauz. *Iskusstvennoe Volokno* (*Artificial Fiber*) 5, No. 8, 55-8(1934); cf. *C. A.* 28, 6302[1].—Study of the causes of the formation of mat viscose rayon and mat spots and of the influence of contaminated cellulose on the homogeneity of viscose led to the following tentative observations: Mat viscose is more susceptible to contaminated finishing solns. than is normal viscose. Within the fibers of mat rayon are disclosed a large no. of microscopic cavities formed by the incomplete removal of CS_2 and gaseous products in the process of thread regeneration. Ammonia baths cause much greater formation of mat spots than the glucose baths. Evidently, the addn. of $(NH_4)_2SO_4$ sharply changes the coagulating properties of a pptg. bath; cross section of this rayon shows similarity to the product obtained from a viscose with an increased quantity of CS_2. The high susceptibility of mat viscose to contaminated finishing solns. is, probably, related to its excessive surface roughness. To obtain homogeneous solns., the xanthates, giving highly viscous solns., must undergo a more prolonged process of solvation than the xanthates giving low-viscosity solns. At equal viscosity of solns., the viscose obtained from contaminated cellulose is less homogeneous (microscopically and in the filtration velocity) than the viscose obtained from purer cellulose. Measures for the improved soly. of xanthates obtained from impure cellulose, such as an increased quantity of CS_2 and a greater duration of xanthation or solvation, must be further investigated.

Chas. Blanc



The action of chlorine and hypochlorous acid on the incrustation substances (lignin) of pulp and viscose. A. S. Shpital'nyi and E. Mess. *Org. Chem. Ind.* (U. S. S. R.) 2, 285–7 (1936).—The accuracy of the lignin detn. by pptn. with 72% H_2SO_4 was studied by comparative tests of viscose and spruce pulp with and without preliminary chlorination. The effect of resinous matter on the results of the detn. was examd. by treating samples with Cl before and after the extn. with C_6H_6 and alc. The results show that the degree of pulp destruction does not affect essentially the quantity of lignin pptd. by H_2SO_4, and does not influence at all the amt. of Cl combined. A somewhat greater Cl content in unextd. pulp prepns. is explained by chlorination of the resinous matter. The greater rate of lignin chlorination explains the relatively small difference between the Cl contents of extd. and unextd. samples. Spruce sawdust is easily chlorinated by HClO, while pure cellulose remained unchanged after 23 hrs. of contact with HClO. Chas. Blanc



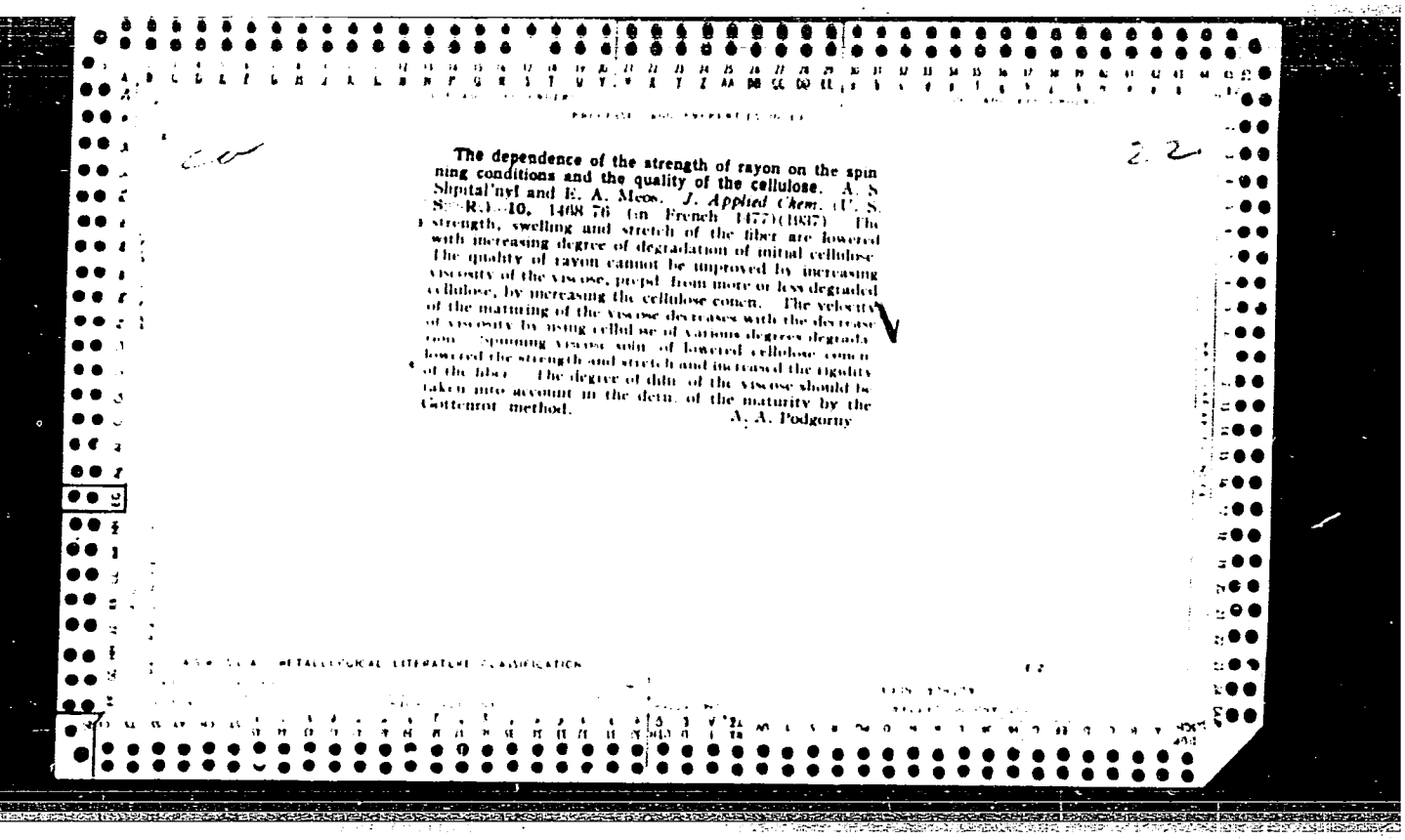
PROCESSES AND PROPERTIES INDEX

Ca

2 5

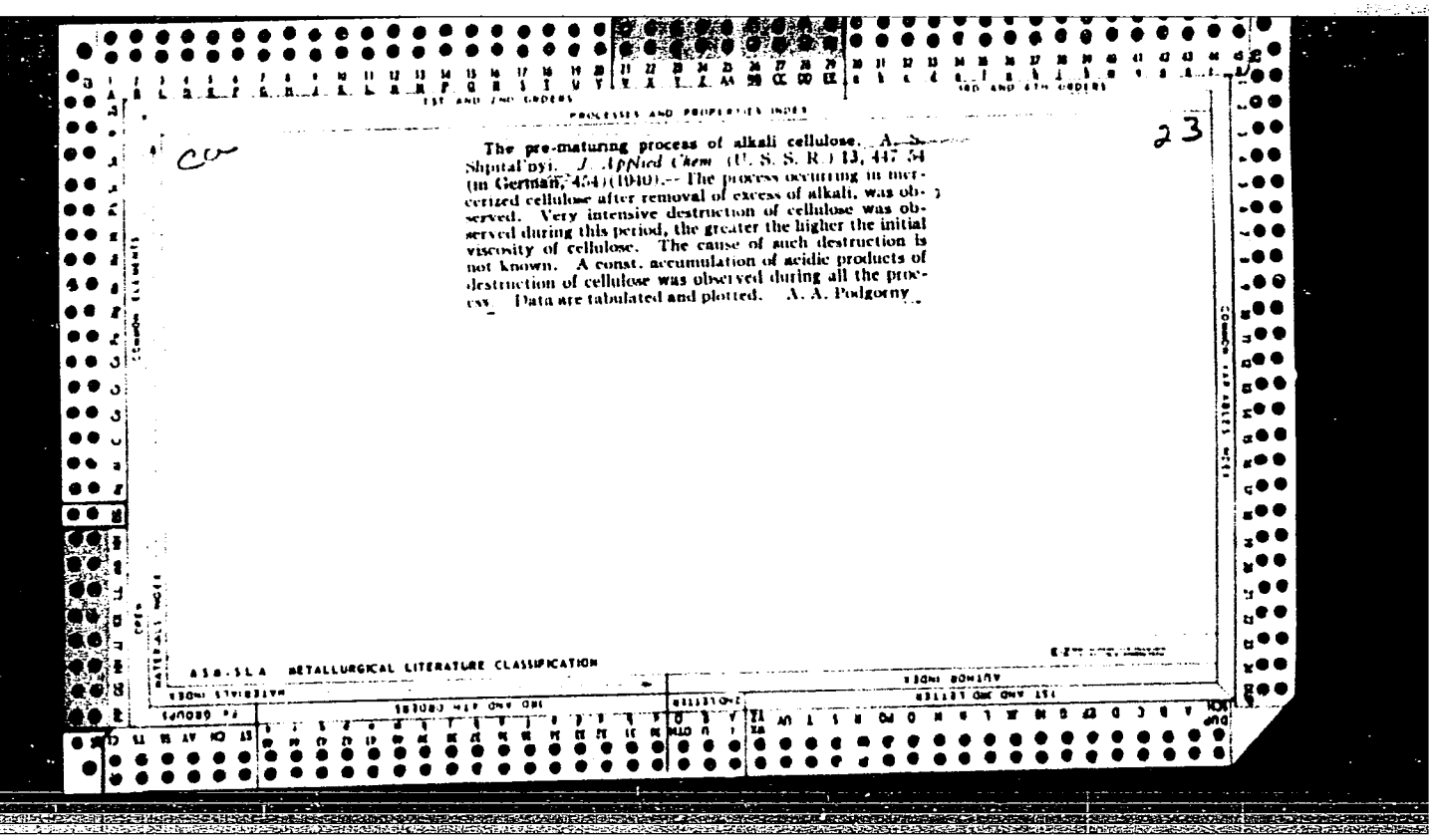
—**Preparation of wool-like staple rayon from casein.** A. S. Shpital'nyi, A. I. Valeshkevich and R. S. Lyashch. *J. Applied Chem.* (U. S. S. R.) 10, 1053-63(1937).—The NaOH concn. in the casein spinning soln. should be about 1-1.5%; this yields fibers that are sticky when moist and brittle when dry. Under certain spinning conditions and treatment, soft fibers can be prepd. Dissolving casein in an alkali soln. together with CS_2 caused considerable increase of viscosity of the soln. and formation of the S derivs. of casein, yielding soft and elastic fibers. In a mixt. contg. NaOH 2% and CS_2 2%, 50% of the latter is consumed in the formation of S derivs. of casein. NH_4OH and H_2SO_4 also yield soft and elastic fibers. Eighty-five % of the casein was regenerated from 2% NaOH soln. by means of acids and 95% if CS_2 was added to the alk. soln. of casein. The spinning process was most satisfactory if a bath contg. H_2SO_4 120–420 and Na_2SO_4 40-240 g./l. of soln. was used. The addn. of formalin in amts. of 30-50 g./l. gave a favorable effect. The fibers should be treated with water and formalin successively (formalin increased the strength of fiber). Stretching of casein threads during spinning and subsequent treatment induced in them an optical anisotropy and increased the strength and stretch. Dry casein mixed with viscose for 2 hrs., yielded fibers consisting of cellulose and casein; for better results casein should be preliminarily wetted for 2 hrs. in half or equal wt. of water. A casein content up to 25% (by wt. of cellulose) had little effect on the viscosity and maturity of viscose. Addn. 50% and more of casein to viscose required an addnl. amt. of alkali (3 l. of 6% NaOH per kg. of casein). The untreated cellulose-casein thread contained about 70% of the casein used. Treatment of such fibers with hot and cold soapy water or with water, formalin and soapy water was the best. Fourteen references. A. A. Podvorny

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



The dependence of the strength of rayon on the spinning conditions and the quality of the cellulose. A. S. Shpital'nyĭ and E. A. Mezos. *J. Applied Chem.* (U. S. S. R.) 10, 1468-76 (in French 1477)(1937). The strength, swelling and stretch of the fiber are lowered with increasing degree of degradation of initial cellulose. The quality of rayon cannot be improved by increasing viscosity of the viscose, prepd. from more or less degraded cellulose, by increasing the cellulose concn. The velocity of the maturing of the viscose decreases with the decrease of viscosity by using cellulose of various degrees degradation. Spinning viscose soln. of lowered cellulose concn. lowered the strength and stretch and increased the rigidity of the fiber. The degree of dilu. of the viscose should be taken into account in the detn. of the maturity by the Gottenrot method.

A. A. Podgorny



The pre-maturing process of alkali cellulose. A. S. Shpital'nyi. *J. Applied Chem.* (U. S. S. R.) 13, 447-54 (in German, 454) (1940).-- The process occurring in mercerized cellulose after removal of excess of alkali, was observed. Very intensive destruction of cellulose was observed during this period, the greater the higher the initial viscosity of cellulose. The cause of such destruction is not known. A const. accumulation of acidic products of destruction of cellulose was observed during all the process. Data are tabulated and plotted. A. A. Podgorny

23

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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10

Structure of salts from diamines and dicarboxylic acids of the aliphatic series. A. S. Shpital'nyi, E. A. Meos, and A. I. Koretskaya (S. M. Kirov Textile Inst., Leningrad). *Zhur. Obshchei Khim.* (J. Gen. Chem.) **20**, 571-6 (1950).—Salts of diamines and dicarboxylic acids are formed only in a definite stoichiometric ratio, established by the acid strengths of the acids used; excess of the amine has no effect on the result. The preps. made in aq. EtOH yielded: 1:1 *salts* of *adipic acid* with *hexamethylenediamine*, m. 190–1°, and with *ethylenediamine*, m. 130–1°; *succinic acid analogs*, m. 191–2°, and m. 190° (decompn.) resp.; all are most probably cyclic in structure. The salts with $(CO_2H)_2$, which have widely different pK_a values, contain 2 moles of acid and 1 mole of diamine: *ethylenediamine salt*, m. 205° (decompn.); *hexamethylenediamine salt*, m. 177°; these are undoubtedly linear, with the amine in the center of the structure.

G. M. Kosolapoff

SHPITAL'NYY, A. S.

USSR/Chemistry - Synthetic Fibers Jul 52

"The Problem of the Formation of Polyamide Resins," A. S. Shpital'nyy, Ye. A. Meos, A. Serkov, Lab of Synthetic Fibers, Leningrad Textile Inst imeni S. M. Kirov

"Zhur Obshch Khim" Vol 22, No 7, pp 1266-1270

In the formation of polyamide structures, 7-membered rings may be converted to polymers in 2 ways: polymerization and polycondensation. States that, contrary to published data, conditions could be found under which N-methylcaprolactam forms polymers. The resulting polymers

229T48

were found to be more sensitive to heat than the polymers of 7-membered rings not substituted at the N-atom. Products of the combination of ε-aminocaprolactam with adipic and succinic acids were isolated. The addn of ε-aminocaproic acid to ε-caprolactam significantly increases the relative viscosity of the polymer in the early stage of the reaction.

229T48

USSR/Chemistry - Synthetic Fibers Aug 53

"Opening the Ring in ε-Caprolactam Using Dicarboxylic Acids of the Fatty Series and Amines," A. S. Shpitalniy, Ye. A. Meos and K. Ye. Perepelkin, Leningrad Tech Inst im S. M. Kirova, Chair of Synthetic Fibers

Zhur Obshch Khim, Vol 23, No 8, pp 1382-1383

Treated ε-caprolactam (I) with aniline, hexamethylenediamine, and ethylenediamine and obtained the reaction products and the benzoyl derivs of the reaction products. Some of the products were also

270T28

isolated in the form of picrates and oxalates. Presents some ideas on the character of the polymerization-condensation processes taking place when (I) is converted to a polymer.

270T28

Shpital'nyy, A.S.

USSR/Chemistry - Macromolecular chemistry

Card 1/1 : Pub. 151 - 9/37

Authors : Shpital'nyy, A. S.; Perepelkin, K. E.; and Meos, E. A.

Title : Process of formation of polyamide resins. Part 4.- The multistage process of formation of polyamide resins and the products obtained from the reaction of ε - caprolactam with adipic acid

Periodical : Zhur. ob. khim. 24/3, 447-450, Mar 1954

Abstract : The multistage polymerization process occurring during the formation of polyamides from ε -caprolactam was definitely proven by the formation of adipic acid (ε -caprolactam reaction products with a molar ratio of 1 : 2 and 1 : 4). The properties of reaction products of different molecular ratio and the solubility of Ag-salt, a reaction product during equimolecular ratio of the basic components, were determined. The presence of benzoic acid in the reaction mixture during its reaction with ε - caprolactam is explained. Ten references: 7-USSR; 2-German and 1-USA (1843-1953). Table.

Institution: The Textile Institute, Leningrad

Submitted : July 3, 1953

SHPITAL'NYY, A. S.

2 mtg

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V Process of formation of polyamide resins. V. Participation of polymerization and polycondensation reactions in the process of transformation of ε-caprolactam into polymer. A. S. Shpital'nyĭ (Textile Inst., Leningrad). *Zhur. Obshch. Khim.* 20, 530–4 (1950); cf. *C.A.* 47, 311f; 49, 9505k.—In the course of transformation of caprolactam into the polyamide in the presence of H_2O, both polymerizational and polycondensational processes take place. Since the very low concn. of low-mol.-wt. polymers exists throughout the process, the process is accelerated by increasing amt. of H_2O in the reaction mixt. and the concn. of functional groups in the reaction mass suffers a decrease near the end of the process. Polycondensation reactions are more rapid than the stepwise polymerization even at 220°, as shown by examn. of the rate of polymer formation from the intermediate products, i.e. low-mol.-wt. polyamides. The kinetic curve of the reaction of caprolactam with adipic acid is given. Small amts. of adipic acid retard the polymer formation, while at equimolar ratio the process is accelerated (3 hrs., as against only 78% reaction in 24 hrs. with 5:100 molar ratio).
G. M. Kosolapoff

SHPITAL'NYY, A.S.; KUZNETSOV, I.V.

Alkylation ε-caprolactam and diamines of the fatty series by catalytic dehydration. Zhur.prikl.khim. 30 no.12:1848-1850 D '57. (MIRA 11:1)

(Alkylation) (Hexamethylenimine) (Amines)

AUTHORS: Shpital'nyy, A. S., Kharit, Ya. A. SOV/156-58-3-36/52

TITLE: On the Composition of the Salts Formed by Dicarboxylic Acids With Diamines and Hydrazine (O sostave soley, obrazovannykh dikarbonovymi kislotami s diaminami i gidrazinom)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 3, pp. 542 - 544 (USSR)

ABSTRACT: The salts formed under the interaction of aelaic, sebacic, and adipic acids with hexamethylene and ethylene diamine were investigated. It was found that the molecular ratio hydrazine:dicarboxylic acid = 1:1, 1:2 salts are formed having constant composition, in which the ratio of the components is 1:1. In the case of an excess of hydrazine, salts are formed in which the ratio hydrozine:acid = 2:1. By potentiometric titrations of the solutions of these salts it was found that these compounds are acid salts. Salts of dicarboxylic acid with hydrazine and diamine differ, and this difference has an effect on the formation of polyamide resins from these compounds. There are 1 figure and 13 references, 4 of which are Soviet.

Card 1/2

7(6), 5(3)

AUTHORS: Shpital'nyy, A. S., Vol'f, L. A. SOV/32-24-12-27/45

TITLE: Refractometric Method for Determining Caprolactam and N-Methyl Caprolactam (Refraktometricheskiy metod opredeleniya kaprolaktama i N-metilkaprolaktama)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 12, pp 1489 - 1489 (USSR)

ABSTRACT: Investigation of the copolymers of the compounds in the title must also include a quantitative determination of the content of monomeric product. Caprolactam (I) and N-methyl caprolactam (II) can be separated by fractional distillation, but this requires larger amounts of material. A determination was worked out which is based upon the variation of the refractive index as a function of the content of monomers in the mixture. The measurements were taken using an Abbe refractometer, whereby the refractive index of various synthetic mixtures and the pure (II) (Figure) were previously determined. At a content over 70% (I) the mixture becomes solid. In this case

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equal amounts of (II) must be added to the weighed portion. The amount of (I) is determined from the curves obtained and the content of the components in the initial mixture is then calculated. By this refractometric method as little as 0.05 g. of a mixture of (I) and (II) can be analyzed. There are 1 figure and 2 references, 1 of which is Soviet.

ASSOCIATION: Leningradskiy tekstil'nyy institut im. S.M.Kirova (Leningrad Textile Institute imeni S.M.Kirov)

AUTHORS: Shpital'nyy, A. S., Kharit, Ya. A. SOV/79-28-10-13/60

TITLE: On the Formation Process of the Polyamide Resins
(O protsesse obrazovaniya poliamidnykh smol)
VII. On the Composition and the Structure of the Salts Formed From Dicarboxylic Acids and Diamines, or Hydrazine
(VII. O sostave i stroyenii soley, obrazovannykh dikarbonovymi kislotami i diaminami ili gidrazinom)

PERIODICAL: Zhurnal obshchey khimii, 1958, Vol 28, Nr 10, pp 2687-2693 (USSR)

ABSTRACT: Shpital'nyy and his collaborators had found in their earlier paper (Ref 1) that salts from dicarboxylic acids and diamines of the aliphatic series are of constant composition although they may be acid or neutral, and they also found that this composition is not dependent on the ratio between the reacting components. The composition of a salt was determined by the magnitude of the ratio of the dissociation constants of the acid. If this ratio is small, neutral salts are formed, which would otherwise be acid. These conclusions were drawn by the authors when investigating adipic, succinic and oxalic acid. They are completed by azelaic and sebacic acid in this paper.

On the Formation Process of the Polyamide Resins. SOV/79-28-10-13/60
VII. On the Composition and the Structure of the Salts Formed From Dicarboxylic Acids and Diamines, or Hydrazine

The stability of the composition of the salts from diamines and azelaic, as well as sebacic acid was found. These salts were obtained at different molar ratios of the initial products, as was the case with the other dicarboxylic acids according to reference 1. The hydrazine forms salts with sebacic acid and azelaic acid, which contain equimolecular amounts of bases and acids. Adipic and succinic acid form such salts only if there is no excess of hydrazines. Such an excess yields salts of the composition -2 mole hydrazine : 1 mole acid. It was found that the hydrazine in aqueous solutions of the salts in which there are the hydrazine and a dicarboxylic acid in equimolecular amounts behaves like a monovalent base. The composition of the polyamide resins formed from the dicarboxylic acids and diamines or hydrazine apparently depends on the magnitudes of the dissociation constants of the initial products according to the compositions of the salts of the corresponding compounds. The 3 tables contain the composition and structure of the salts formed from the components mentioned. There are 1 figure, 3 tables, and 16 references, 4 of which are Soviet.

Card 2/3

On the Formation Process of the Polyamide Resins. VII. On the Composition and the Structure of the Salts Formed From Dicarboxylic Acids and Diamines, or Hydrazine

SOV/79-28-10-13/60

ASSOCIATION: Leningradskiy tekstil'nyy institut (Leningrad Textile Institute)

SUBMITTED: October 26, 1957

Card 3/3

AUTHORS: Shpital'nyy, A. S., Yablochnik, N. S. SOV/79-28-12-27/41

TITLE: On the Mode of Formation of Polyamide Resins (O protsesse obrazovaniya poliamidnykh smol) VIII. On the Problem of the Alkaline Polymerization of ε-Caprolactam (VIII. K voprosu o shchelochnoy polimerizatsii ε-kaprolaktama)

PERIODICAL: Zhurnal obshchey khimii, 1958, Vol 28, Nr 12, pp 3282-3285 (USSR)

ABSTRACT: Papers dealing with the transformation of caprolactam into the polymer in the presence of alkaline activating media (Refs 1-4) proved that compounds of alkaline character are capable of activating the formation process of polyamide macromolecules. It was found that in this process in the initial stage an alkali salt of lactam is formed which as an initiator causes the rapid course of reaction (Scheme 1). The present paper shows that the reaction of caprolactam with alkali at 270° does not lead to the formation of lactam alkali salt, but to the salt of amino caproic acid. With an excess of alkali conditions should be established which prevent the formation of the polymer and would make the formation of a low-molecular compound as final product possible, which is

Card 1/3

easily analyzed. If the reaction mass according to scheme (1) had an alkali salt of lactam it could be separated from it in an unchanged form after the neutralization of the lactam. In fact, in the case of the action of sodium hydroxide or soda in the reaction the ε-amino caproic acid or the polymer are obtained:

$$(CH_2)_5\begin{cases}CO\\NH\end{cases} + NaOH \rightleftarrows NaOOC\ (CH_2)_5NH_2 \quad (2).$$

It is, in any way, possible that the compound $HOOC\ (CH_2)_5\ NHNa$ is formed as an intermediate product, which due to its unstable character regroups into the sodium salt of ε-amino caproic acid. Further experiments have shown that this salt can also act as an initiator in the transformation of caprolactam into the polymer. Thus, schemes were suggested for the reaction of caprolactam with excess NaOH at 280°, as well as for its transformations into a polymer by means of the alkali salt of amino caproic acid. There are 7 references, 4 of which are Soviet.

On the Mode of Formation of Polyamide Resins. VIII. On the Problem of the Alkaline Polymerization of ε-Caprolactam

SOV/79-28-12-27/41

ASSOCIATION: Leningradskiy tekstil'nyy institut (Leningrad Textile Institute)

SUBMITTED: November 20, 1957

Card 3/3

5 (3)

AUTHORS: Shpital'nyy, A. S., Shpital'nyy, M. A. SOV/79-29-4-54/77

TITLE: On the Formation of Polyamide Resins (O protsesse obrazovaniya poliamidnykh smol). IX.On the Problem of Alkaline Polymerization of the ε-Caprolactam (IX.K voprosu o shchelochnoy polimerizatsii ε-kaprolaktama)

PERIODICAL: Zhurnal obshchey khimii, 1959, Vol 29, Nr 4, pp 1285 - 1289 (USSR)

ABSTRACT: In continuation of the work previously reported upon (Ref 1) the schemes concerning the synthesis of the polymer from caprolactam in the presence of metallic sodium are discussed in the article under review, as well as some peculiarities of the polymerization with alkali which render this process rather similar to other reactions by which the polymer is formed. According to data given in previous publications, polymers (Refs 2,3) are obtained by this reaction according to one single scheme. They are, therefore, of identical structure:

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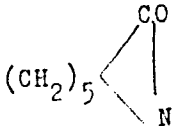
On the Formation of Polyamide Resins. IX. On the Problem of Alkaline Polymerization of the ε-Caprolactam SOV/79-29-4-54/77



$$(CH_2)_5 \begin{cases} CO \\ N \end{cases} - [CO(CH_2)_5NH]_n - H \quad (1).$$

Contrary to V.Gril's assumption, the authors consider it better on the basis of their earlier investigations (Ref 1) to explain the presence of the two final groups by the participation of the salt of aminocaproic acid in the reaction, since the lactam ring is stable vis-à-vis water and diluted alkali lyes. It seemed advisable to explain the nature of the final groups of the polymer, particularly since there are no data to be found in relevant publications. The authors found that, irrespective of the nature of the alkaline agent, all polymers behave during the analysis as though they contained amine- and carboxyl groups. It was further found that the size of the macromolecules of the polyamide obtained from caprolactam may be controlled equally well by means of the quantities of metallic sodium added as with the quantities of NaCH. It is assumed

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On the Formation of Polyamide Resins. IX.On the Problem of Alkaline Polymerization of the ε-Caprolactam SOV/79-29-4-54/77

that one of the final groups of the polyamide macromolecules obtained from caprolactam by means of metallic sodium is the lactam ring. On the basis of the mechanism of peramidation suggested by B. A. Poray-Koshits (Ref 6) 5 schemes are given which point to the fact that the mechanism of the transformation of caprolactam, diamines, and dicarboxylic acids into polyamide polymers do not basically differ from each other. Since scientists disagree on the mechanism of the polymerization under discussion, the mechanism suggested by Poray-Koshits was paid particular attention to in addition to the established assumptions. There are 1 table and 8 references, 4 of which are Soviet.

ASSOCIATION: Leningradskiy tekstil'nyy institut (Leningrad Textiles Institute)

SUBMITTED: February 24, 1958

Card 3/3

SOV/80-32-3-27/43

5(3)

AUTHORS: Shpital'nyy, A.S., Shpital'nyy, M.A., Yablochnik, M.S.

TITLE: On the Accelerated Polymerization of Caprolactam (O uskorennoy polimerizatsii kaprolaktama)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol XXXII, Nr 3, pp 617-624 (USSR)

ABSTRACT: The product of interaction of caprolactam with caustic soda at a temperature of 260°C is not the sodium salt of lactam, but the sodium salt of aminocaproic acid. The experiments were conducted with a considerable excess of caustic soda in order to exclude the possibility of polymer formation and to obtain a low-molecular compound which is easily analyzed. If calcined soda is taken instead of caustic soda, a polymer is obtained. The transformation of caprolactam to the sodium salt of aminocaproic acid leads to the formation of intermediate compounds which cannot be isolated, however, because they are hydrolyzed. The transformation of caprolactam to a polymer may be explained by the reaction of overamidation investigated by Poray-Koshits and coworkers. An interaction of

Card 1/2

On the Accelerated Polymerization of Caprolactam SOV/80-32-3-27/43

-COOH and -NH_2 groups takes also place in the production of the nylon resin. The different classification of the methods for producing polyamide polymers based on the nature of the initital products is not connected with different transformation mechanisms, i.e., is not justified.
There are 2 tables and 12 references, 5 of which are Soviet, 2 English, 2 German, 1 American, 1 Swedish, and 1 Swiss.

[illegible]: February 19, 1958

Card 2/2

SHPITAL'NYY, A. S. Cand Chem Sci -- "Study of [redacted] peculiarities of the synthesis of polyamide resins." Len, 1960. (Acad Sci USSR. Inst of High-Molecular Compounds) (KL, 1-61, 184)

MEOS, A.I.; SHPITAL'NYY, A.S., nauchnyy red.; VOROB'YEV, G.S., red.izd-va; GURDZHIYEVA, A.M., tekhn.red.

[Synthetic fibers and their production] Khimicheskie volokna i protsess ikh formirovaniia. Leningrad, Ob-vo po raspr. polit. i nauchn.znanii RSFSR, Leningr.otd-nie, 1960. 43 p.
(MIRA 14:1)

(Textile fibers, Synthetic)

SHPITAL'NYY, A.S.; SHPITAL'NYY, M.A.; KHARIT, Ya.A.

Formation of polyamide resins from caprolactam, diamines, and dicarboxylic acids. Khim.volok. no.3:13-14 '60. (MIRA 13:7)

1. Leningradskiy tekstil'nyy institut im. Kirova.
(Nylon) (Hexamethylenimine) (Amines) (Acids)

SHPITAL'NYY, A.S.; KHARIT, Ya.A.; SOKOLOVSKIY, M.A.

Preparation of modified polymers, based on the use of polyamide wastes. Zhur. prikl. khim. 33 no.8:1907-1908 Ag '60. (MIRA 13:9)
(Polymers) (Polyamides)

SHPITAL'NYY, A.S.; SHPITAL'NYY, M.A.; KHARIT, Ya.A.

Some aspects of the theory and practice of polyamide synthesis.
Zhur. prikl. khim. 33 no.9:2108-2112 S '60. (MIRA 13:10)
(Polyamides)

84884

S/079/60/030/010/026/030
B001/B066

158107

AUTHORS: Shpital'nyy, A. S., Kharit, Ya. A., Chernomordik, R. B., and Kulakova, D. G.

TITLE: Formation of Polyamide Resins. XI. Synthesis of Polyamides by Interfacial Polycondensation

PERIODICAL: Zhurnal obshchey khimii, 1960, Vol. 30, No. 10, pp. 3430 - 3434

TEXT: According to the interfacial polycondensation described in Ref.1, polyamides of the nylon type 66 and perlon type are now synthesized from diamines, dicarboxylic acids, or caprolactams, while polyurethans are synthesized from diisocyanates and glycols. Dicarboxylic acid is replaced by its acid chloride, and instead of diisocyanates and glycols it is possible to use the chlorocarbonic acid esters of glycols and diamines (Ref.2). Polymers of high molecular weight are quickly obtained by interfacial polycondensation at a fairly low temperature. As this method had also been used for the synthesis of polyamides, which has been earlier studied by the authors, they checked their theory of the formation

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84884

Formation of Polyamide Resins. XI. Synthesis of Polyamides by Interfacial Polycondensation S/079/60/030/010/026/030 B001/B066

of polyamides through interfacial polycondensation, taking into account the effect of the structure of the initial compound on the reaction carried out. In interfacial polycondensation carboxylic acids are replaced by acid chlorides. It is to be assumed that the substitution of chlorine for the hydroxyl group of the carboxyl and the impossibility of dissociation increases considerably the electrophilic activity of the carbon atom of the carboxyl group. The smooth course of reaction at room temperature can only be explained in this way, while in other cases amidation requires high temperatures. The reaction scheme of amidation through interfacial polycondensation is not assumed to differ from the schemes given. Therefore, amidation is expected to take place according to the given scheme (Refs. 3,5). The various kinds of amidation indicate that the activity of the functional groups influences the reaction rate considerably (Refs. 3 and 4). Consequently, the mechanisms of ordinary amidation do not differ from those of the above-mentioned amidation. The low polyamide yield of interfacial polycondensation can be raised by increasing the number of carbon atoms in the acid chloride, or by replacing a linear component by a cyclic one (in certain cases, viscosity is also increased). The further investigation of the reaction

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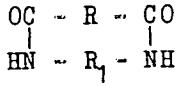
Formation of Polyamide Resins. XI. Synthesis of Polyamides by Interfacial Polycondensation

S/079/60/030/010/026/030
B001/B066

course of the chain components showed that a ring



is formed in addition to the polymer. Thus, low yields of polymers are primarily do to the fact that the reaction takes place in two directions under the formation of linear polymers and low-molecular, cyclic compounds. The structure of the initial components considerably affects the polyamide yield in interfacial polycondensation. The authors mention a paper by B. A. Poray-Koshits. There are 7 references: 4 Soviet, 1 French, 2 US, and 1 Japanese.

ASSOCIATION: Leningradskiy tekstil'nyy institut (Leningrad Textile Institute)

SUBMITTED: November 12, 1959

SHPITAL'NYY, A.S.

Anionic polymerization of caprolactam. Zhur. ob.khim. 31 no.3:1037-1040 Mr '61. (MIRA 14:3)

1. Leningradskiy tekstil'nyy institut.
(Hexamethylenimine)

SHPITAL'NYY, A.S., KHARIT, Ya.A, CHERNOMORDIK, R.B., KULAKOVA, D.G.

Characteristics of the preparation of polyamides by means of polycondensation at the interface. Zhur.prikl.khim. 33 no.5: 1150-1154 My '60. (MIRA 13:7)

1. Leningradskiy tekstil'nyy institut imeni S.M. Kirova.
(Polyamides)

S/080/60/033/008/013/013
A003/A001

AUTHORS: Shpital'nyy, A.S., Knarit, Ya.A., Sokolovskiy, M.A.

TITLE: The Production of Modified Polymers on the Base of Using Polyamide Wastes

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol. 33, No. 8, pp. 1907-1908

TEXT: A method was developed for producing modified polyamides from wastes based on the interaction of polyamides with those monomers, the structure of which made it possible to obtain copolymers. A mixture of the polyamide and the monomer was heated for 3 hours at 260-270°C in the autoclave in an inert medium. Polycaprolactam crumbs, polyamide wastes and polyamide articles out of use and АГ(AG) and СГ(SG) salts are the initial materials. After 3-hour heating the reaction mass is heated for 1 hour in the vacuum or at atmospheric pressure, but with a continuous supply of nitrogen into the reaction vessel. In all cases copolymers were obtained, the viscosity of which and their solubility in an alcohol-water solution did not differ from copolymers obtained from the corresponding monomers. The copolymers obtained dissolve in a hot alcohol solution. There is 1 table and 11 references: 8 Soviet, 1 English, 1 American and 1 Japanese.

SUBMITTED: January 22, 1960

Card 1/1

83978

S/080/60/033/009/011/021
A003/A001

158107

AUTHORS: Shpital'nyy, A.S., Shpital'nyy, M.A., Kharit, Ya.A.

TITLE: Some Problems of Theory and Practice of Polyamide Formation

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol. 33, No. 9, pp. 2108-2112

TEXT: The interaction of caprolactam with adipic, succinic and benzoic acids or with ethylenediamine, hexamethylenediamine and aniline (Ref. 6) was investigated. The molar ratios of caprolactam:adipic acid were 1:1, 2:1, 4:1, 100:5. The interaction products with two or three structural groups had a wax-like appearance. The products with 5 structural groups were similar to hard resin. At a ratio of 1:1 the reaction runs to completion within 3 hours. Benzoic acid reacts at 240°C during long heating only with $\frac{1}{3}$ of the caprolactam volume. The activators for the transformation of caprolactam into the polymer can be divided into two groups: activators causing only reactions of the polymerization type (carboxylic acids, organic bases and alkali agents) and activators promoting reactions of polymerization and polycondensation types (water, amino-acids). The experiments have shown that the fastest transformation of caprolactam is obtained where many compounds with functional groups having opposite

Card 1/2

Some Problems of Theory and Practice of Polyamide Formation

signs are contained in the reaction mass at the initial stage. The production of "silon" fiber in Czechoslovakia showed that in the presence of 20% water the continuous polymerization of caprolactam can be organized (Ref. 8). There is 1 table and 8 references: 6 Soviet, 1 English, 1 German.

SUBMITTED: February 5, 1960

25395

S/080/61/034/002/016/025
A057/A129

15 8080

AUTHORS: Shpital'nyy, A.S., Shpital'nyy, M.A., Kulakova, D.G., Kharit, Ya.A., Sorokin, A.Ya.

TITLE: On conditions effecting the yield, viscosity and other properties of polyamides in synthesis by the method of phase interface polycondensation

PERIODICAL: Zhurnal Prikladnoy Khimii, v 34, no 2, 1961, 408-412

TEXT: The present paper is the 12th communication of the series "On the process of polyamide resin formation". The discussion concerning conditions for increasing yield and viscosity of polyamides obtained by phase interface polycondensation is continued and data are presented on the use of this method for syntheses of modified polyamides. The present investigations were important, since only polyamides with sufficient high molecular weights and good yield are of interest. In previous works

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On conditions effecting the yield, ...

(Ref 3: ZhPKh, 33, 1150 (1960)) the present authors observed that the structure of the initial monomers is of particular importance for the viscosity and yield of the obtained polyamides. This was confirmed by the present experiments. It can be seen from results presented in Table 1 that the effect of concentration of initial monomers or of mixing of the components is very low, while substitution of adipylchloride by sebacylchloride sharply increases viscosity and yield of the polymer. This effect can be explained by hypotheses concerning phase interface polycondensation developed by P.W. Morgan (Ref 4: SPEJ, 15, 485 (1959)), i.e., by the diffusion of diamine from the aqueous into the organic phase where polycondensation occurs. Sebacylchloride, containing a longer molecular chain, is more hydrophobic than adipylchloride. Thus the latter diffuses much more quickly from organic into aqueous phase emerging from the reaction zone, which decreases yield and viscosity of the polyamide. Hence phase interface polycondensation using adipylchloride hardly seems reasonable. Experimental results in Table 1 demonstrate also the favorable substitution of hexamethylene diamine by piperazine. In the previous work (Ref 3) formation of a cyclic diamide in polycondensation of adipylchloride and

Card 2/6

On conditions effecting the yield, ...

hexamethylenediamine was observed. Accordingly, in the present experiments a cyclic diamide (melting point 225°-226°C) was isolated from the polycondensation product of sebacylchloride and hexamethylenediamine. By co-polycondensation of caprolactam and salt AG (AG) products can be obtained which are soluble in alcohol solutions and have low melting points. In the present investigations a corresponding copolymer was obtained by phase interface polycondensation. It was observed that the properties of modified polyamides depend not only on the structure of the initial monomers, but also on other factors, particularly on the degree of destruction of structure regularities in the polyamide. In order to increase the effectiveness in decrease of the structure regularity of the copolymer, the present authors substituted caprolactam by polyamide caprone in phase interface polycondensation with hexamethylenediamine and obtained polyamides completely soluble in hot alcohol solutions. Polycondensation without mixing was carried out in the present experiments by the removal of the film formed in the phase interface of the aqueous solution containing diamine and alkali and the benzene solution containing the chloroanhydride of dicarboxylic acid. The cyclic diamide was isolated by a method

Card 3/6

On conditions effecting the yield, ...

described previously (Ref 3). Diffusion rate of the chloroanhydride was determined (cooperation of M.P. Vasil'yev and V.D. Shakhanov) by measuring the chlorine content in the aqueous phase. Polycondensation of hexamethylenediamine (I) and caprolactam (II) was carried out (cooperation A.V. Budylov) by heating 11.3 g (II) and 23.3 g (I) at 265°-270°C for 8 hrs in a sealed ampoule. Then the excess (I) was distilled off, 1.2 g of the residue was diluted in 25 ml H_2O and 0.78 g NaOH was added. On the other hand 0.3 g adipylchloride (III) was dissolved in 25 ml benzene. By mixing the two solutions the polymer is precipitated with a 55.7% yield, having a melting point of 210°-215°C. The polyamide from (I) and caprone (IV) fiber was obtained by heating 2.26 g (IV) and 2.32 g (I) in a sealed ampoule at 265°C for 9 hrs. After that the excess (I) was distilled off. The following characteristics are given for the polymer obtained with (III): viscosity of the 0.5% solution in tricresol η = 0.875, melting point 160°C, readily soluble in 90% ethanol. There are 2 tables and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: June 11, 1960

Card 4/6

SHPITAL'NYY, M.A.; SHPITAL'NYY, A.S.

Production of alcohol soluble polyamides by means of interphase polycondensation. Zhur. prikl. khim. 34 no. 12:2722-2726 D '61. (MIRA 15:1)

(Polyamides) (Polymerization)

S/079/62/032/006/003/006
D202/D304

AUTHORS: Shpital'nyy, A. S. and Dubrovski, Sh.

TITLE: The process of formation of polyamide resins

PERIODICAL: Zhurnal obshchey khimii, v. 32, no. 6, 1962, 1984-1986

TEXT: In previous investigations the authors obtained resins from fatty acids and caprolactam but because of the high temperature needed for the resin formation they were unable to isolate intermediate reaction products. In this study acetyl chloride was used instead of the acid; the reaction took place at room temperature and proceeded without lactam ring fission. N-acetylcaprolactam was formed and isolated. On heating, this lactam polymerized to give a polyamide with the elimination of some acetyl chloride. The authors conclude that the structure of the polyamide needs further investigation.

SUBMITTED: June 10, 1961

Card 1/1

SHPITAL'NYY, A.S.; KHARIT, Ya.A.; KAUFMAN, Kh.Ya.

Process of polyamide formation. Part 14: Composition and structure of salts formed by dicarboxylic fatty acids and piperazine. Zhur.-ob.khim. 32 no.6: 1981-1984 Je '62. (MIRA 15:6)
(Acids, Fatty) (Piperazine) (Polyamides)

SHPITAL'NYY, A.S.; DUBROVSKI, Sh.

Process of the formation of polyamide resins. Part 15: Intermediate products of caprolactam conversion to polymer. Zhur.ob.khim. 32 no.6:1984-1986 Je '62. (MIRA 15:6)
(Azepinone) (Polyamides)

S/080/63/036/002/019/019
D204/D307

AUTHORS: Kharit, Ya. A., Shpital'nyy, A. S. and Sokolovskiy, M. A.

TITLE: Preparation of copolymers based on caprone and AH salt

PERIODICAL: Zhurnal prikladnoy khimii, v.36, no. 2, 1963, 467-468

TEXT: Continuation of earlier work (ZhPKh, 33, 1907 (1960)) which was concerned with modifying polycaprolactam by interactions with monomers of structure capable of yielding copolymers. The reaction mass was heated at 260 - 270°C, for 3 hours, under a negligible pressure, followed by 1 hour at reduced pressure; this yielded highly viscous copolymers which gave good films from alcohol. In the present study, the effect of deviations from these conditions on copolymer properties were investigated. Polycondensations of caprone or caprolactam with AH salt over 1 to 24 hours, at 265 ± 3°C, with and without subsequent 1 hour heating at the same temperature at 5 mm Hg, showed that: (1) duration of the re-

Preparation of copolymers ...

action had practically no effect on the specific viscosity η, whilst (2) the supplementary 1 hour heating at 5 mm Hg made the viscosity a function of previous duration of polycondensation - η decreased with longer reaction times. Copolymers soluble in alcohols could be prepared by carrying out the reactions at 265 + 3°C, for 3 hours, without solvent, in an inert medium, with subsequent heating for 1 hour at 5 mm Hg. The results are discussed. There is 1 figure.

SUBMITTED: June 10, 1961

SHPITAL'NYY, B.

Everybody can do it if he tries hard enough. Izobr. i rats. no.11: 36-37 N '60. (MIRA 13:10)
(Technological innovations)

SHPITAL'NYY, B.G., geroy sotsialisticheskogo truda, doktor tekhnicheskikh nauk; TIMOSHUK, L.T., inzhener.

"The properties of metals in impact loading." G.I.Pogodin-Alekseev. Reviewed by B.G.Shpital'nyi, L.T.Timoshuk. Stal' 15 no.12: 1144-1146 D '55. (MLRA 9:2)

1.TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (for Timoshuk).
(Metals--Testing) (Pogodin-Alekseev, G.I.)

SHPITAL'NYY, B. G.

"Automatic Moulding Machine Nr. 96264."

report presented at Conference on Construction and Utilization of Casting Equipment. Gor'kiy, Dec 1957.
Mashinostroitel', 1958, No. 5, p. 48.

(NIILITMASH)

SHPITAL'NYY, D.G.

TITOV, N.D.

25(1, 7) PHASE I BOOK EXPLOITATION SOV/3281

Berezin, Boris Prokop'yevich, Aron Abramovich Moyzak, Viktoriy Markianovich Nikiforov, Georgiy Ivanovich Pogodin-Alekseyev, Nikolay Dmitriyevich Titov, Boris Gavrilovich Shpital'nyy, and Nikolay Aksent'yevich Shcherbina

Tekhnologiya vazhneyshikh otrasley promyshlennosti, chast' 2: Mashinostroyeniye; uchebnoye posobiye dlya vysshikh partiynykh shkol [Manufacturing Processes of the More Important Branches of Industry, Part 2: Machinery Manufacture. Manual for Higher Party Schools] Moscow, Izd-vo VPSh i AON pri TsK KPSS, 1959. 376 p. 15,600 copies printed.

Sponsoring Agency: Kommunisticheskaya partiya Sovetskogo Soyuza. Vysshaya partiynaya shkola. Kafedra promyshlennogo proizvodstva i stroitel'stva.

Eds.: G.I. Pogodin-Alekseyev, A.G. Kokoshko, and D.E. Beysel'man; Tech. Ed.: K. M. Naumov.

PURPOSE: This textbook is intended for students of higher party schools.

COVERAGE: The book deals with manufacturing processes in the machine industry. Rolling, drawing, pressing, forging, and stamping of metals are discussed in Part I, founding in Part II, welding and gas cutting in Part III, and metal cutting in Part IV. No personalities are mentioned. There are no references.

Card 1/9

BALANDIN, Gennadiy Fedorovich; POGODIN-ALEKSEYEV, Georgiy Ivanovich, doktor tekhn.nauk, prof.; RAZUMOV, Nikolay Alekseyevich; SHPITAL'NYY, Boris Gavrilovich; SHCHERBINA, Nikolay Avksent'yevich; KOKOSHKO, A.G., red.; NAUMOV, K.M., tekhn.red.

[Hot working of metals] Goriachaia obrabotka metallov. Moskva, Izv-vo VPSh i AON pri TsK KPSS, 1960. 148 p. (Dostizheniia nauki i tekhniki i peredovoi opyt v promyshlennosti i stroitel'stve, no.3). (MIRA 13:8)

(Metalwork)

5 (3)

AUTHORS: Shpital'nyy, A. S., Shpital'nyy, M. A. SOV/79-29-4-54/77

TITLE: On the Formation of Polyamide Resins (O protsesse obrazovaniya poliamidnykh smol). IX.On the Problem of Alkaline Polymerization of the ε-Caprolactam (IX.K voprosu o shchelochnoy polimerizatsii ε-kaprolaktama)

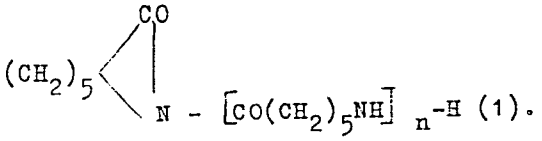
PERIODICAL: Zhurnal obshchey khimii, 1959, Vol 29, Nr 4, pp 1285 - 1289 (USSR)

ABSTRACT: In continuation of the work previously reported upon (Ref 1) the schemes concerning the synthesis of the polymer from caprolactam in the presence of metallic sodium are discussed in the article under review, as well as some peculiarities of the polymerization with alkali which render this process rather similar to other reactions by which the polymer is formed. According to data given in previous publications, polymers (Refs 2,3) are obtained by this reaction according to one single scheme. They are, therefore, of identical structure:

Card 1/3

On the Formation of Polyamide Resins. IX. On the Problem of Alkaline Polymerization of the ε-Caprolactam

SOV/79-29-4-54/77



$$(CH_2)_5 \begin{cases} CO \\ N \end{cases} - [CO(CH_2)_5NH]_n - H \quad (1).$$

Contrary to V.Gril's assumption, the authors consider it better on the basis of their earlier investigations (Ref 1) to explain the presence of the two final groups by the participation of the salt of aminocaproic acid in the reaction, since the lactam ring is stable vis-à-vis water and diluted alkali lyes. It seemed advisable to explain the nature of the final groups of the polymer, particularly since there are no data to be found in relevant publications. The authors found that, irrespective of the nature of the alkaline agent, all polymers behave during the analysis as though they contained amine- and carboxyl groups. It was further found that the size of the macromolecules of the polyamide obtained from caprolactam may be controlled equally well by means of the quantities of metallic sodium added as with the quantities of NaOH. It is assumed

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that one of the final groups of the polyamide macromolecules obtained from caprolactam by means of metallic sodium is the lactam ring. On the basis of the mechanism of peramidation suggested by B. A. Poray-Koshits (Ref 6) 5 schemes are given which point to the fact that the mechanism of the transformation of caprolactam, diamines, and dicarboxylic acids into polyamide polymers do not basically differ from each other. Since scientists disagree on the mechanism of the polymerization under discussion, the mechanism suggested by Poray-Koshits was paid particular attention to in addition to the established assumptions. There are 1 table and 8 references, 4 of which are Soviet.

ASSOCIATION: Leningradskiy tekstil'nyy institut (Leningrad Textiles Institute)

SUBMITTED: February 24, 1958

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5(3) SOV/80-33-3-27/43

AUTHORS: Shpital'nyy, A.S., Shpital'nyy, M.A., Yablochnik, N.S.

TITLE: On the Accelerated Polymerization of Caprolactam (Ob uskorennoy polimerizatsii kaprolaktama)

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol XXXII, Nr 3, pp 617-624 (USSR)

ABSTRACT: The product of interaction of caprolactam with caustic soda at a temperature of 280°C is not the sodium salt of lactam, but the sodium salt of aminocaproic acid. The experiments were conducted with a considerable excess of caustic soda in order to exclude the possibility of polymer formation and to obtain a low-molecular compound which is easily analyzed. If calcined soda is taken instead of caustic soda, a polymer is obtained. The transformation of caprolactam to the sodium salt of aminocaproic acid leads to the formation of intermediate compounds which cannot be isolated, however, because they are hydrolyzed. The transformation of caprolactam to a polymer may be explained by the reaction of overamidation investigated by Poray-Koshits and coworkers. An interaction of

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-COOH and -NH_2 groups takes also place in the production of the nylon resin. The different classification of the methods for producing polyamide polymers based on the nature of the initital products is not connected with different transformation mechanisms, i.e., is not justified.
There are 2 tables and 12 references, 5 of which are Soviet, 2 English, 2 German, 1 American, 1 Swedish, and 1 Swiss.

[illegible]: February 19, 1958

SHPITAL'NYY, A.S.; SHPITAL'NYY, M.A.; KHARIT, Ya.A.

Formation of polyamide resins from caprolactam, diamines, and dicarboxylic acids. Khim.volok. no.3:13-14 '60. (MIRA 13:7)

1. Leningradskiy tekstil'nyy institut im. Kirova.
(Nylon) (Hexamethylenimine) (Amines) (Acids)

83978

S/080/60/033/009/011/021
A003/A001

158107

AUTHORS: Shpital'nyy, A.S., Shpital'nyy, M.A., Kharit, Ya.A.

TITLE: Some Problems of Theory and Practice of Polyamide Formation

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol. 33, No. 9, pp. 2108-2112

TEXT: The interaction of caprolactam with adipic, succinic and benzoic acids or with ethylenediamine, hexamethylenediamine and aniline (Ref. 6) was investigated. The molar ratios of caprolactam:adipic acid were 1:1, 2:1, 4:1, 100:5. The interaction products with two or three structural groups had a wax-like appearance. The products with 5 structural groups were similar to hard resin. At a ratio of 1:1 the reaction runs to completion within 3 hours. Benzoic acid reacts at 240°C during long heating only with $\frac{1}{3}$ of the caprolactam volume. The activators for the transformation of caprolactam into the polymer can be divided into two groups: activators causing only reactions of the polymerization type (carboxylic acids, organic bases and alkali agents) and activators promoting reactions of polymerization and polycondensation types (water, amino-acids). The experiments have shown that the fastest transformation of caprolactam is obtained where many compounds with functional groups having opposite

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signs are contained in the reaction mass at the initial stage. The production of "silon" fiber in Czechoslovakia showed that in the presence of 20% water the continuous polymerization of caprolactam can be organized (Ref. 8). There is 1 table and 8 references: 6 Soviet, 1 English, 1 German.

SUBMITTED: February 5, 1960

25395
S/080/61/034/002/016/025
A057/A129

158080

AUTHORS: Shpital'nyy, A.S., Shpital'nyy, M.A., Kulakova, D.G., Kharit, Ya.A., Sorokin, A.Ya.

TITLE: On conditions effecting the yield, viscosity and other properties of polyamides in synthesis by the method of phase interface polycondensation

PERIODICAL: Zhurnal Prikladnoy Khimii, v 34, no 2, 1961, 408-412

TEXT: The present paper is the 12th communication of the series "On the process of polyamide resin formation". The discussion concerning conditions for increasing yield and viscosity of polyamides obtained by phase interface polycondensation is continued and data are presented on the use of this method for syntheses of modified polyamides. The present investigations were important, since only polyamides with sufficient high molecular weights and good yield are of interest. In previous works

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(Ref 3: ZhPKh, 33, 1150 (1960)) the present authors observed that the structure of the initial monomers is of particular importance for the viscosity and yield of the obtained polyamides. This was confirmed by the present experiments. It can be seen from results presented in Table 1 that the effect of concentration of initial monomers or of mixing of the components is very low, while substitution of adipylchloride by sebacylchloride sharply increases viscosity and yield of the polymer. This effect can be explained by hypotheses concerning phase interface polycondensation developed by P.W. Morgan (Ref 4: SPEJ, 15, 485 (1959)), i.e., by the diffusion of diamine from the aqueous into the organic phase where polycondensation occurs. Sebacylchloride, containing a longer molecular chain, is more hydrophobic than adipylchloride. Thus the latter diffuses much more quickly from organic into aqueous phase emerging from the reaction zone, which decreases yield and viscosity of the polyamide. Hence phase interface polycondensation using adipylchloride hardly seems reasonable. Experimental results in Table 1 demonstrate also the favorable substitution of hexamethylene diamine by piperazine. In the previous work (Ref 3) formation of a cyclic diamide in polycondensation of adipylchloride and

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hexamethylenediamine was observed. Accordingly, in the present experiments a cyclic diamide (melting point 225°-226°C) was isolated from the polycondensation product of sebacylchloride and hexamethylenediamine. By co-polycondensation of caprolactam and salt AF (AG) products can be obtained which are soluble in alcohol solutions and have low melting points. In the present investigations a corresponding copolymer was obtained by phase interface polycondensation. It was observed that the properties of modified polyamides depend not only on the structure of the initial monomers, but also on other factors, particularly on the degree of destruction of structure regularities in the polyamide. In order to increase the effectiveness in decrease of the structure regularity of the copolymer, the present authors substituted caprolactam by polyamide caprone in phase interface polycondensation with hexamethylenediamine and obtained polyamides completely soluble in hot alcohol solutions. Polycondensation without mixing was carried out in the present experiments by the removal of the film formed in the phase interface of the aqueous solution containing diamine and alkali and the benzene solution containing the chloroanhydride of dicarboxylic acid. The cyclic diamide was isolated by a method

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described previously (Ref 3). Diffusion rate of the chloroanhydride was determined (cooperation of M.P. Vasil'yev and V.D. Shakhanov) by measuring the chlorine content in the aqueous phase. Polycondensation of hexamethylenediamine (I) and caprolactam (II) was carried out (cooperation A.V. Budylov) by heating 11.3 g (II) and 23.3 g (I) at 265°-270°C for 8 hrs in a resealed ampoule. Then the excess (I) was distilled off, 1.2 g of the residue was diluted in 25 ml H_2O and 0.78 g NaOH was added. On the other hand 0.3 g adipylchloride (III) was dissolved in 25 ml benzene. By mixing the two solutions the polymer is precipitated with a 55.7% yield, having a melting point of 210°-215°C. The polyamide from (I) and caprone (IV) fiber was obtained by heating 2.26 g (IV) and 2.32 g (I) in a sealed ampoule at 265°C for 9 hrs. After that the excess (I) was distilled off. The following characteristics are given for the polymer obtained with (III): viscosity of the 0.5% solution in tricresol η = 0.875, melting point 160°C, readily soluble in 90% ethanol. There are 2 tables and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: June 11, 1960

Card 4/6

SHPITAL'NYY, M.A.; SHPITAL'NYY, A.S.

Production of alcohol soluble polyamides by means of interphase polycondensation. Zhur. prikl. khim. 34 no. 12:2722-2726 D '61. (MIRA 15:1)

(Polyamides) (Polymerization)

DOBRYNIN, Il'ya Nikolayevich; FRENKEL' Izrail' Shmulevich; SHPITAL'SKIY, N.I., redaktor; ROGACHEV, F.G., redaktor; OSTRIKOV, N.S., tekhnicheskiy redaktor.

[Collection of geometry problems] Sbornik zadach po geometrii. 2-e izd.ispr. i dop. Moskva, Vses. uchebno-pedagog.izd-vo Trudrezervizdat, 1955. 129 p. (MLRA 8:10)
(Geometry--Problems, exercises, etc.)

SHPITONOV, A.

Toy balloons. Pozh.delo 3 no.8:32 Ag '57. (MLRA 10:8)
(Balloons--Safety measures)

SHPITONOV, A.; ZHURAVLEVA, A.

Using luminiscence properties of liquids in investigating causes of fires. Pozh. delo 4 no. 7:10 Jl '58. (MIRA 11:8)
(Fires)

SHPITONOV, A., inzh.; ISAKIN, V.

Operating fire sprinklers and drenchers. Pozh.delo 4 no.12:6 D '58. (MIRA 11:12)

(Fire sprinklers)

AVDEYEVA, N.V.; LAVRENT'YEVA, V.A.; SHPITS, I.I.

Bacterial contamination of semi prepared and prepared food products (from data in Dnepropetrovsk). Vop. pit. 21 no.2: 60-63 Mr-Ap '62. (MIRA 15:3)

1. Iz laboratorii (zav. I.I. Shpits) Dnepropetrovskoy gorodskoy sanitarno-epidemiologicheskoy stantsii.
(DNEPROPETROVSK—FOOD CONTAMINATION)

GUDKIN, G.M.; SHPITS, L.I.

Automatic adjusting instrument for a centerless grinding machine. Podshipnik no.4:25-28 My '53. (MLRA 6:5)
(Grinding and polishing)

SHPITS, I.I.; PINSKAYA, F.S.

Organization of sanitary control over the purity of the atmospheric air of Dnepropetrovsk. Gig. i san. 26 no.6:105 Je '61. (MIRA 15:5)

1. Iz Dnepropetrovskoy gorodskoy sanitarno-epidemiologicheskoy stantsii.
(DNEPROPETROVSK--AIR--POLLUTION)

SHPITS, R.O.

Apparatus for blood collecting. Lab.delo no.2:31 Mr-Ap '55.
(MLRA 8:8)

(HEMATOLOGY, apparatus and instruments,
for blood-taking)

SHPITS, R.O.

Modified quantitative and qualitative determination of bilirubin in blood serum. Lab.delo no.4:11-13 Jy-Ag '55. (MLRA 8:8)

(BLOOD
bilirubin, determ.technic)
(BILIRUBIN, in blood,
determ., technic)

SHPITS, R.O.

Modification of the colorimetiric determination of residual nitrogen in the blood. Lab.delo 6 no.3:57 My-Je '60. (MIRA 13:7)

(NITROGEN IN THE BODY) (COLORIMETRY)

SHPITS, T. [Spitz, T.]; GERK, G. [Goerk, H.]

In Czechoslovakia. Stek.iker. 22 no.10:2-7 O '65. (MIRA 18:12)

SHPITS, Zh.D.; SANIN, V.A.; KISH, S.S.; TSAPKO, V.G.

Granulated chlorophos for corn fields. Zashch. rast. ot vred. i bol. 9 no.9:19 '64. (MIRA 17:11)

1. Ukrainskiy nauchno-issledovatel'skiy institut zashchity rasteniy i Gosudarstvennyy nauchno-issledovatel'skiy institut Grazhdanskogo vozdushnogo flota.

ACC NR: AP6032052 SOURCE CODE: UR/0148/66/000/009/0115/0119

AUTHOR: Varli, K. V.; Skakov, Yu. A.; Umanskiy, Ya. S.; Shpitsberg, A. L.

ORG: Moscow Steel and Alloys Institute (Moskovskiy institut stali i splavov)

TITLE: Effect of molybdenum on the phase composition and microstructure of chromium-nickel steels

SOURCE: IVUZ. Chernaya metallurgiya, no. 9, 1966, 115-119

TOPIC TAGS: chromium nickel alloy, molybdenum containing alloy, titanium containing alloy, alloy structure, alloy property, alloy heat treatment, PHASE COMPOSITION, STEEL MICROSTRUCTURE, CHROMIUM STEEL, NICKEL STEEL

ABSTRACT: The effect of molybdenum (from 0 to 9%) on structural changes in chromium-nickel steels (17% Cr, 7.5% Ni) has been investigated. The hardness of steels containing 4.3% or more molybdenum significantly increased after water quenching from 1200C and aging in the range 500—900C; the structure of this steel consisted of α- and γ-phases. The x phase was formed after quenching from 1000C, and the amount of α-phase decreased sharply. In steels containing up to 2.3% molybdenum, quenched from 900C, the content of α-phase increased, that of γ-phase decreased, and the steels became magnetic. In steels with 4.3—5.9% molybdenum, quenching from 900C reduced the content of α-phase but caused the formation of x-phase, the amount of which increased with increasing molybdenum content. However, with molybdenum content increased to the content of x-phase decreased and the structure consisted mainly of

Card 1/2 UDC: 669.15-194:669.26'24.046.51:669.28.620.183:541.412

ACC NR: AP6032052

γ-phase. An increase of molybdenum from 2.3 to 5.9% increased the amount of δ-ferrite from 30 to 70%. Maximum hardness (400 HV) was obtained in steels containing 8—9% molybdenum after aging at 850C. No hardness increase was observed in steels with 4% molybdenum or less aged at the same temperatures. An increase of molybdenum content and hardness brings about embrittlement in the range 600—1100C. Orig. art. has: 4 figures. [AZ]

SUB CODE: 11, 13/ SUBM DATE: 20Oct65/ ORIG REF: 004/ OTH REF: 002

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L 9068-65 EWT(m)/EPR/EWP(k)/EWP(b) Pf-4/Pg-4 ASD(f)/ASD(m)-3/AFMDC
JD/HW

ACCESSION NR: AP4030658 S/0129/64/000/004/0002/0005

B

AUTHOR: Varli, K. V.; Skakov, Yu. A.; Sokolova, N. G.; Shpitsberg, A. L.

TITLE: Work-hardening of chromium-nickel stainless steels with aluminum and titanium during heat treatment

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 4, 1964, 2-5 and top half of insert facing p. 24

TOPIC TAGS: steel, stainless steel, chromium nickel steel, chromium nickel stainless steel, heat treatment, steel work hardening aluminum, titanium, steel aging

ABSTRACT: The changes in the structure, phase composition and some properties resulting from the aging of chromium-nickel stainless steels were studied. The test specimens were water quenched from 950C and squeeze rolled by 20 and 80%. The aging was carried out at 500 and 600C after hardening or after hardening and deformation. Holding up to 3000 hours was effected at 500C. The x-ray phase analysis of the alloy was carried out on wire type specimens of 0.7 to 0.8 diameter and on powders. The separation phase compostion was determined by

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ACCESSION NR: AP4030658

electrolytic dissolution of the test samples after aging for 1000 and 3000 hours at 500C and for 100 to 400 hours at 600C. Hardness was determined by Vickers hardness number with a 1 kg load. The amount of residual austenite was determined by comparing the intensity of the lines of the α-phase and of the γ-phase, as well as by measurement of the amount of magnetic saturation. Five different heats were tested this way. The basic growth of hardness as a result of aging at 500C in the case of heat 1, 3, and 5 occurs at holding up to 30 minutes. The hardness does not change too much at more prolonged aging up to 100-200 and even 1000 hours. The hardness lowers after aging for 1000-3000 hours. The amount of austenite is reduced somewhat with short-duration holdings. Hence, work hardening as the result of aging is not directly associated with martensitic transformation. Its work hardening proceeds in the martensitic component, however. The capability of martensite to work harden during annealing is associated with the presence of Al or Ti; the ratio of the chromium and nickel content does not have an essential significance. The electrical resistance is greatly reduced as the result of aging, especially in the first 30 minutes. The change in the alloy's properties as a function of aging time corresponds to the ordinary changes during the decomposition of the supersaturated solid solutions.

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ACCESSION NR: AP4030658

The hardness values attain maximums and then diminish; the electric resistance continually lowers. X-ray and microstructural analyses of the given alloys did not confirm the fact that precipitation hardening occurs. Chemical analysis of the precipitate from heat showed the ratio of nickel to the sum of Ti and Al (in atomic fractions) to be:

$$\frac{0.71}{0.23 + 0.06} = 2.4$$

The work hardening of the heats in question occurs on account of the α-component, which is formed as the result of martensitic transformation. The martensitic structure obviously has such lattice defects that impurities (Ti and Al atoms in this case) interact with them at an elevated temperature. It is quite possible that this interaction also causes work hardening and has a vital effect upon the aging kinetics. Orig. art. has: 5 figures and 1 table.

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute for Steel and Alloys)

SUBMITTED: 00 ENCL: 00
SUB CODE: MM NO REF SOV: 004 OTHER: 000

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L 31820-66 EWP(e)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/HW/JG

ACC NR: AP6019500 (N) SOURCE CODE: UR/0129/66/000/006/0012/0016

AUTHOR: Borisov, V. A.; Rakhshtadt, A. G.; Shpitsberg, A. L.

ORG: MVTU im. Bauman

TITLE: Properties of additionally alloyed nickel-beryllium alloys

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 6, 1966, 12-16

TOPIC TAGS: nickel alloy, beryllium containing alloy, molybdenum containing alloy, boron containing alloy, tungsten containing alloy, vanadium containing alloy, cobalt containing alloy, spring alloy, alloy heat treatment, alloy property

ABSTRACT: EI996 nickel-base alloy with 2% beryllium (1) is used to manufacture current-carrying contact springs and elastic elements working at temperatures of 250C or over. In a search for materials with better structural stability, electric conductivity, and plasticity, a series of nickel-beryllium alloys additionally alloyed with 5.6% Mo (2), 5.6% Mo + 0.0025% B (3), 1.8% W (4), 1.7% W + 0.2% V (5), 0.95% Co (6), 2.6% Co (7), 4.8% Co (8), or 9% Co (9) were tested in the form of wires 1.5 mm in diameter. Water quenching from 1100C and tempering at 550C was found to be the optimum heat treatment for all the alloys tested. Alloys (3) and (5) showed the best combination of mechanical properties: a hardness HB of 540 and 520, elastic limit 52 and 47.5 kg/mm^2, electric resistivity 0.397 and 0.251 ohm·mm^2/m, respectively, compared to HB 480, elastic limit 27 kg/mm^2, and electric resistivity 0.298 ohm·mm^2/m

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ACC NR: AP6019500

for alloy (1). The respective tensile strength and elongation at 20C and 450C of alloy (3) were 197 kg/mm^2 and 11% and 167 kg/mm^2 and 8.1%; those of alloy (5) were 190 kg/mm^2 and 3%, and 170 kg/mm^2 and 1.5%; and those of alloy (1) were 170 kg/mm^2 and 3.5%, and 143 kg/mm^2 and 4.5%. Molybdenum and boron produced intensive strengthening and a reduced rate of alloy softening at tempering temperatures. Molybdenum also lowered the Curie point. Alloys (3) and (5) are paramagnetic at temperatures as low as 20C; these alloys can be used for nonmagnetic elastic elements in which high strength and structural stability are required. Tungsten sharply increased the resistance to small plastic deformation and had no effect on strengthening rate, but delayed softening at prolonged holding at tempering temperatures as high as 550C. Tungsten and vanadium in alloy (5) ensure the highest hardness, especially after quenching from 1150C and tempering at 550C for 0.5—1 hr. This alloy had a high elastic limit and structural stability close to those of alloy with molybdenum and boron (3). Addition of 0.95—0.99% Co (6) increases somewhat the hardness, structural stability, and increases significantly the elastic limit. The structural stability of alloy with 4.8% Co (8) is lower than that of alloys with molybdenum, tungsten, and vanadium, but the electric conductivity of cobalt-containing alloys is higher than that of other tested alloys. Orig. art. has: 2 figures and 3 tables. [AZ]

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 004/ ATD PRESS: 5128

Card 2/2

L 09963-67 EWT(m)/EWP(t)/ETI IJP(c) JD/HW/WB

ACC NR: AP6035721 SOURCE CODE: UR/0413/66/000/019/0083/0083

INVENTOR: Shpitsberg, A. L.; Zhuchin, V. N.; Dobrotin, V. D.; Fadeyeva, I. V.; Borisov, V. A.

ORG: none

TITLE: Corrosion-resistant nickel-base alloy. Class 40, No. 186691

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 19, 1966, 83

TOPIC TAGS: corrosion resistant alloy, nickel base alloy, chromium containing alloy, tungsten containing alloy, cobalt containing alloy, aluminum containing alloy, titanium containing alloy, boron containing alloy, niobium containing alloy, vanadium containing alloy, copper containing alloy, zirconium containing alloy

ABSTRACT: This Author Certificate introduces a corrosion-resistant nickel-base alloy containing chromium, tungsten, cobalt, aluminum, titanium and boron. To improve its physicomechanical and technological properties, the alloy chemical composition is set as follows: 16—25% chromium, 6—16% tungsten, 4.5—10.0% cobalt, 0.8—2.5% aluminum, 2—5% titanium, and 0.008—0.25% boron. A variant is additionally alloyed with niobium, vanadium, copper and zirconium at a total content of up to 6%.

SUB CODE: 11/ SUBM DATE: 17Feb65/ ATD PRESS: 5105