

SOV/65-58-8-12/14

The Coking of Petroleum Pitch in Industrial Dinas Kilns.

and the properties of the products will depend on the point and time of establishing material equilibrium, and also when samples of gaseous and vaporous coking products are taken off for analysis. Weight of the load of raw material varied between 10 and 21-t. Values obtained on the material equilibrium are given in Table 2. Data in Table 3 shows that the properties of coke are not so dependent on the nature of the raw material as on the conditions of preparation. During the coking of petroleum pitch about 40% of distillate is obtained. This distillate has a high specific weight, a high naphthalene content and a high coking number. The percentage composition of the coke distillate is given. It was fractionated in a 6 m column (35 plates) and was found to contain 13.9% hydrocarbons (boiling between 79° and 205°C), a benzene fraction and 16.9% of a fraction boiling between 210° and 330°C. The content of sulphonating compounds in the benzene fraction having an iodine number of 103 and a molecular weight of 113 = 62%. The content of aromatic hydrocarbons was defined according to the GrozNII method (Ref.2) and did not exceed 16.5%. The octane number = 75 which makes it possible to use this fraction as a

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The Coking of Petroleum Pitch in Industrial Dinas Kilns.

component for motor fuel. The yield of gaseous products was approximately equal to that obtained during the coking of analogous raw material in a Dinas kiln (Ref.1). The hydrocarbon composition of the gas only differed by the absence of butylenes. When the temperature during the coking of petroleum pitch is increased to 650°C the butylene content decreases, and no butylenes were present at temperatures exceeding 750°C (Table 5). About 17 - 18% of other unsaturated hydrocarbons (ethylene and propylene) are contained in the coking gas; the yield of ethylene is twice as high as that of propylene. The GPK-49 type of construction for Dinas kilns was found to be most satisfactory. Kilns consisting of three blocks can produce up to 80,000-t per year of high quality coke. There are 5 Tables and 4 Soviet References.

ASSOCIATION: GrozNII.

1. Petroleum---Processing
2. Petroleum---Properties
3. Furnaces
- Performance
4. Ceramic materials---Applications

CARD 3/3

VAKSMAN, A. V., Ed.

Standards for machine tools Leningrad, Standartizatsiia i ratsionalizatsiia, 1934.  
xivii, 400 p. (50-46897).

TJ1185.K67

1. Machine-tools - Standards. 2. Machine - tools - Trade and manufacture - Russia  
I. Vaksman, A. V., ed.

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1. VAKSMAN, A.V.

2. USSR (600)

Kransnyy Proletariy Machine-Tool Plant "Permissable Stresses in Designing Machine Tool Parts" Stanki Instrument, 12, No. 4, 1941.

9. Report U-1503, 4 Oct. 1951.



VAKSMAN, A. V.

"Basic Problems of Design, Sharpening, and Utilization of Thread Chasers (Type MAAG.) Thesis for degree of Cand. Technical Sci. Sub. 14 Mar 49, Moscow Order of the Labor Red Banner Higher Technical School imeni N. E. Bauman.

Summary 82, 18 Dec 52, Dissertations Presented For Degrees in Science and Engineering in Moscow in 1949. From Vechernyaya Moskva, Jan-Dec 1949.

VAKSMAN, A.V.

Shaving allowance forms and methods of producing them. Stan.1 instr. vol.24  
no.9:10-14 S '53. (MIRA 6:10)

(Metal cutting)

VAKSMAN, A.V., dotsent, kandidat tekhnicheskikh nauk


Technical and economic bases for setting up new practical dimensional series of gear moduli. Standartizatsia no.2:34-43 Mr-Ap '55.  
(Gearing--Standards) (MLRA 8:7)



*Handwritten:* VAKSMAN, A.V.  
VAKSMAN, A.V., dotsent, kandidat tekhnicheskikh nauk

Engineering and economic aspects of setting up a new efficient  
size-series of metric gearing. Standartizatsia no.3:15-21 My-  
Je '55. (MIRA 8:10)

(Gearing--Standards)



VAKSMAN, A.V., kandidat tekhnicheskikh nauk.

Dimensional specifications for countersinking. Standartizatsiia  
no.6:59-65 N-D '56. (MIRA 10:1)  
(Drilling and boring Standards)

*Vaksman, A. V.*

AUTHOR: Vaksman, A.V., Candidate of Technical Sciences 28-3-7/33

TITLE: Standardization of Rubber Sealing Gaskets in Hydraulic Devices  
(O standartizatsii rezinovykh uplotniteley v gidravlicheskiikh ustroystvakh)

PERIODICAL: Standartizatsiya, 1957, # 3, May-June, p 35-39 (USSR)

ABSTRACT: V-shaped sealing collars are said to be standardized in the USSR. The author offers theoretical material for development of standards of sealing collars for rotating shafts and of sealing rings for cylinders and rods. Equations and calculation examples are given for specific pressure of the rubber collar on the shaft in the case of rubber alone and in the case of bracelet springs (Fig. 2) employed in the collar design, as well as for calculation of heat balance and friction. The author considers the sealing rings enclosed in metal cases - used in the machine tool industry - as being unduly complex and having no technical advantages, and recommends instead the simple design of collars without reinforcing metal rings (Fig. 3) as are used by the machine tool plant imeni Ordzhonikidze and plants of inner-grinding machine tools. The machine tool plant "Krasnyy Proletariy" uses similar rubber collars with a reinforced metal ring (Fig. 4). The metal ring is designed to pre-

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Standardization of Rubber Sealing Gaskets in Hydraulic Devices 28-3-7/33

vent the "secondary" shrinking of rubber, but large diameter metal rings get distorted after stamping, and this affects the shape and tightness of sealing ring gaskets.

The article also contains data on allowances and tolerances used at the plant imeni Ordzhonikidze and on technical conditions for the rubber grades A-1 and A-2 employed for these sealing devices. It is stated that rubber rings have replaced the former cast iron rings in many applications. It was established by laboratory experiments that sealing rings made of rubber A-2 did not show any noticeable wear after 350,000 double actions at 35 atmospheres pressure in the cylinder.

There are 5 figures, no references.

AVAILABLE: Library of Congress

Card 2/2

WAKSMAN, A. V.

AUTHOR: Vaksman, A.V., Candidate of Technical Sciences 28-4-8/35  
TITLE: Standardization of Small Tools (Standartizatsiya melkorazmernogo instrumenta)  
PERIODICAL: Standartizatsiya, 1957, # 4, pp 32-36 (USSR)

ABSTRACT: Large cutting tools are essentially covered by about 150 standards and 100 branch norms, and up to 90% of their production is centralized. The normalization of small tools with nominal diameter less than 1 mm, which started only recently, becomes important in view of the development of the watch and instrument industries. The article makes a review of the present status and gives the numbers of the related GOCT Dimensions and tolerances for metric thread of the I and II accuracy classes for diameters of 0.3 - 0.9 were standardized in 1946 ( GOCT 3196-46, 3197-46 and 3198-46). Fits and tolerances for smooth work of less than 1 mm diameter were standardized in 1954 ( GOCT 3047-54). GOCT 6636-53, which established the number series for selection of linear dimensions and diameters, served as the starting point for the new standards for drills and reamers - GOCT 8032-56, 8034-56 and 8035-56, developed in 1956.

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Standardization of Minute Tools

28-4-8/35

Detailed information is given on these latter standards including the principles of construction (the preference series numbers and denominators), 4 dimension charts and one drawing of reamers. The standardized tool assortment is said to meet all the needs of the watch and instrument industries. The author considers it sensible that the technological norms recommended with the issued standards be regulated by branch norms or standards, in which the geometric progression should be followed not only for diameters but also for other values such as the length of the work portion and the overall length of tool. There are 4 tables and 1 drawing.

ASSOCIATION: All-Union Research Institute for Tools (Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy institut)

AVAILABLE: Library of Congress

Card 2/2

VAKSMAN, A.V.

28-5-14/30

AUTHOR: Vaksman, A.V., Candidate of Technical Sciences  
TITLE: Dimension Series of Small Gear Transmission Modules (Razmernyy ryad melkikh moduley zubchatykh peredach)  
PERIODICAL: Standartizatsiya, 1957, # 5, p 56-63 (USSR)

ABSTRACT: The article states that the instrument industry lacks norms for many basic dimensions and physical parameters for small-size tools, and that the "OCT 1597" for the module-dimension series is obsolete. The article gives the theoretical foundation of the project for standard series of small (under 1 mm) modules, which will have to form the basis for a chain of standards and norms. The principles of the proposed series are explained in detail and accompanied by related computations, tables and diagrams. The difference between this proposed series and the series proposed by the International Standard Organization's Technical Committee No 60 is pointed out. The module system of the Moskva Tool Plant (Moskovskiy instrumental'nyy zavod), with 11 modules, is mentioned as typical for the entire Soviet instrument industry, since this plant produces all the gear cutting tools. The technical as well as

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Dimension Series of Small Gear Transmission Modules

28-5-14/30

economical advantages of the proposed module series are pointed out.

There are 7 tables and 3 diagrams.

ASSOCIATION: All-Union Scientific Research Institute for Tools (Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy institut)

AVAILABLE: Library of Congress

Card 2/2



VAKSMAN, A.V.

PHASE I BOOK EXPLOITATION

1213

USSR. Komitet standartov, mer i izmeritel'nykh priborov

Materialy 2-go i 3-go soveshchaniy po standartizatsii i normalizatsii v mashinostroyeni (Materials of the Second [Dec. 1956] and Third [May 1957] Conferences on Standardization and Normalization in Machine Building) Moscow, Standartgiz, 1958. 135 p. 2,000 copies printed.

Resp. Ed.: Krynkin, K.M.; Ed. of Publishing House: Rozova, L.V.; Tech. Ed.: Matveyeva, A.Ye.

**PURPOSE:** This collection of articles is intended for designers and engineering specialists.

**COVERAGE:** The book contains abbreviated versions of lectures given during the 2nd and 3rd Scientific Methodology Conferences held in December 1956 and May 1957 respectively. The first part of the book reviews the significance of introducing into Soviet engineering practices a system of preferred numbers based on recommendation of the International Standards Organization (ISO). The second part of the book generalizes on the experimental studies of standardization and unification conducted by various machinery-manufacturing branches

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Materials of the Second (Cont.)

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of Soviet industry. No personalities are mentioned. There are no references.

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Tkachenko, V.V., Candidate of Technical Sciences. Sets of Preferred numbers 5

Sum-Shik, M.R., Engineer. Application of Series of Preferred Numbers in Machine-tool Manufacturing 13

Vaksman, A.V., Candidate of Technical Sciences. New Dimensional Series of Milling Cutters Established in Conformance With Number of Machine-tool Revolutions 27

PART II. EXPERIMENTS WITH STANDARDIZATION AND UNIFICATION OF BASIC PARAMETERS OF MACHINES AND EQUIPMENT

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Materials of the Second (Cont.)

1213

- Pen'kov, P.M., Engineer. Methodology and Practice of Planning and Organizing Production of a [Preferred Numbers] Series of Design-unified Machine Tools Using a Basic Design 47
- Polivanov, P.M., Engineer. Standardization of Parts and Assemblies When Planning Unit Machine Tools and Automatic Lines 70
- Urnikov, I.N., Engineer. Basic Principles for Unifying and Design-standardizing Adjustable-blade and Axial Water Turbines 78
- Rumyantsev, V.A., Docent. Methodology of Planning and Substantiating Standardized [Preferred Numbers] Series of Piston Compressors 103
- Soldatov, K.N., Engineer. Experiment to Classify by Type and Standardize Centrifugal Oil Pumps of a Normal Series 121
- Gurevich, A.Ya., Engineer. Experiment to Standardize and Normalize Construction and Road-building Machinery 132

AVAILABLE: Library of Congress

Card 3/3

JG/fal  
3-5-59

AUTHOR: Vaksman, A.V. SOV/121-58-9-10/21  
TITLE: The Design of Special Gear Hobbing Cutters for Shaved Gears (Proyektirovaniye spetsial'nykh chervyachnykh frez pod shever)  
PERIODICAL: Stanki i Instrument, 1958, <sup>29-</sup> Nr 9, pp 32 - 34 (USSR)  
ABSTRACT: Some data are recorded underlying the VNII branch standards ON 432/5-58 for gear hobbing cutters intended for shaved gears. The precise profile forms are shown in Figures 1-3, in 3 variants of which, the first has a straight  $19^{\circ}$  profile intended for small pitch gears. The other two have slightly broken flanks. The construction of the principal points of these profiles is given in detail using some numerical values listed in Table 1-4. The second profile consists of a basic profile of  $20^{\circ}$  over most of the tooth flanks followed by a profile of less than  $20^{\circ}$  near the tip. Such a profile produces a shaving allowance in the working part of the tooth flank of the cut gear.

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SOV/121-58-9-10/21

The Design of Special Gear Hobbing Cutters for Shaved Gears

The third profile produces a more perfect shaving allowance giving a lead-in to the shaving cutter by a doubly broken cutter profile.  
There are 6 figures and 4 tables.

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SOV/28-59-2-6/26

AUTHOR:

Vaksman, A.V., Candidate of Technical Sciences

TITLE:

The Method of Broach Normalization Based on the Preference Number Series (Metodika normalizatsii protyazhek na osnove predpochtitel'nykh chisel)

PERIODICAL:

Standartizatsiya, 1959, <sup>23-</sup>Nr 2, pp 21-27 (USSR)

ABSTRACT:

In connection with the planned development of standard specifications for round, grooved and key broaches, the author proposes a method for regulating initial data common for most broaches, that is the spacing of teeth, their profiles, the spaces between them and their cutting elements. The space between the teeth is correlated with the length of the broached opening, which, in turn, has a functional correlation with the diameter of the opening. Thus, before establishing a series of spacings, it is necessary to fix the series of diameters and lengths of the broached openings. Since the spacing series must correspond to a geometrical progression, the other two series will also form such progressions. The author computes analytically the interdependence between the series. There are 4 tables,

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The Method of Broach Normalization Based on the Preference Number Series

and 2 profiles.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy  
institut (The All-Union Scientific Research Instrumental  
Institute)

Card 2/2

28(1), 25(7)

S/028/60/000/04/007/023  
D041/D006

AUTHOR: Vaksman, A. V.

TITLE: The Principles of Setting Up Standards<sup>14</sup> for Gear Cutting Tools.

PERIODICAL: Standardizatsiya, 1960, Nr. 4, pp 16-21 (USSR)

ABSTRACT: The approval of the "GOST 1643-56" standard for the tolerances of cylindrical gears, has made it necessary to revise the standards for gear cutting tools (hobs, gear shaper cutters, shavers, etc.). This work has been done by the Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy institut (All-Union Scientific Research Tool Institute). All new standards are based on the same principles, the following parameters having been considered; the nominal outer diameters, the setting holes, the length and number of teeth, the dimen-

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S/028/60/000/04/007/023  
D041/D006

The Principles of Setting Up Standards for Gear Cutting Tools.

sion series of tools, overall and assembly dimensions. General principles are discussed and illustrated by formulae and tables. There are 4 tables, and 3 diagrams. ✓

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S/028/60/000/C6/05/028  
B012/B005

AUTHOR: Vaksman, A. V.

TITLE: Increase in Quality<sup>14</sup> of Metal-cutting Tools<sup>14</sup>

PERIODICAL: Standartizatsiya, 1960, <sup>24-</sup>No. 6, pp. 17 - 19

TEXT: The service life of tools depends primarily on the material. In 1958, the Komitet standartov, mer 1 izmeritel'nykh priborov (Committee on Standards, Measures, and Measuring Instruments) charged the Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy institut (All-Union Scientific Research Institute of Tools) to revise the standards for metal-cutting tools and to exchange the steel types where necessary. 35 standards were examined. High-speed steel must now be used where the temperature of processing may attain 600°C, and cobalt high-speed steel where it attains 650°C. Particularly important is the approval of IOCT 9373-60 (GOST 9373-60) which includes nine instead of four types of high-speed steel. 80-90% of all cutting tools are hard alloy. The VNII worked out standards for various types of milling tools, hard-alloy drills, and round files. The geometrical parameters of the cutting

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Increase in Quality of Metal-cutting Tools

S/028/60/000/06/05/028  
B012/BC05

elements are also important for the service life of tools. The old standards were canceled and considerably altered. Instructions concerning the geometry of cutting tools are being worked out at present. They have been published for drills, awls, reamers, and taps. The influence of inexact teeth is noticeable in conical, cylindrical, and spur-gear cutters, but only under heavy load. It was specified in the standards for coarse-tooth cutters. An increase in the slope angle of the metal-cutting groove from 25 to 40% has a favorable effect on the vibration resistance. The VNII examined a number of standards concerning the vibration resistance in the system workbench - workpiece - tool. With respect to the accuracy of tools, the tolerances for awls and reamers were fixed. The standard on tolerances for gear wheels containing nine instead of four ranges of accuracy was published in 1956. The VNII also coordinated the standards for worm cutters and planing tools with the standards for gear wheels.

Card 2/2

VAKSMAN, A.V.

Standardization of metal-cutting tools. Standartizatsiia 25  
no.8:3-7 Ag '61. (MIRA 14:7)  
(Metal-cutting tools--Standards)

VAKSMAN, A.V.

History of the development and approval of the standard for tolerances. Standartizatsiia 26 no.1:16-17 Ja '62. (MIRA 15:1)  
(Tolerance (Engineering))

VAKSMAN, A.V.

Development of standards for low-module gear-cutting tools.  
Standartizatsiia 26 no.8:7-12 Ag '62. (MIRA 15:8)  
(Gear-cutting machines--Standards)

VAKSMAN, Abram Vil'gel'movich; REMEZOV, N.S., inzh., nauchnyy red.;  
BAL'YAN, L.G., red. izd-va; MATVEYEVA, A.Ye., tekhn. red.

[Cylindrical cutters with inserted high-speed steel blades]  
Frezy tsilindricheskie so vstavnyimi nozhami iz bystrorezhu-  
shchei stali. Moskva, Standartiz, 1963. 49 p.  
(MIRA 16:6)

(Metal-cutting tools)

I 14462-66

ACC NR: AP6002972

(N)

SOURCE CODE: UR/0286/65/000/024/0147/0148

INVENTOR: Sinitskiy, B. A.; Kuznetsov, V. M.; Yaksman, A. Z.; Ratner, A. G.; Vikh-  
man, B. A.; Rimmer, A. I.; Dmitriyev, V. P.; Rikhter, A. A.; Zagaytov, A. P.

ORG: none

TITLE: A universal form for hulls in shipbuilding<sup>55</sup> Class 65, No. 177291

23  
3

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 24, 1965, 147-148

TOPIC TAGS: shipbuilding engineering, marine equipment, ship

ABSTRACT: This Author's Certificate introduces a universal form for hulls in shipbuilding. The installation includes a foundation with standard elements, e.g. beams, stands and frames in a form depending on the members which make up the hull structure. The installation is designed for convenience in assembly, efficiency in the use of production area and economy of metal. The foundation is made up of anchored longitudinal or transverse channel or angle tracks. The projecting horizontal shelves of the tracks form T-slots above the level of the foundation by the thickness of a shelf. The standard elements are made with mating sockets for fastening

UDC: 629.12.002.011 : 621.757 :  
: 621.791 : 621-783.624

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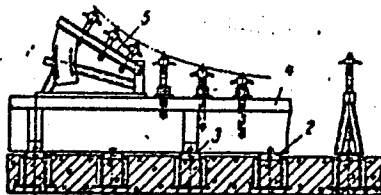
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L 14462-66

ACC NR: AP6002972

8



1 - foundation; 2 - tracks; 3 - horizontal shelves;  
4 - standard element; 5 - metal units.

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L 14462-66

ACC NR: AP6002972

to the angle or channel tracks. Detachable metal units are mounted on the standard elements. 0

SUB CODE: 13/ SUBM DATE: 12Nov64

*PC*  
Card 3/3

VAKSMAN, E.G.

Characteristics of the circulation of wash and underground  
waters in the Karalang Experimental Melioration Plot. Izv.  
Otd. biol. nauk AN Tadsh. SSR no.1:3-13 '63.

(MIRA 17:10)

YEVDOKOMOV, M.V.; VAKSMAN, E.Ya.; YUDIN, N.A.

Selecting an effective type of refractory material. Leg.prom,14  
no.3:43-45 Mr '54.

(Refractory materials) (MLRA 7:5)

PANASYUK, V.I.; ASLANOVA, M.S., doktor khim. nauk, prof., retsenzent;  
TSOY, R.M., kand.tekhn.nauk, retsenzent; VAKSMAN, E.Ye., inzh.,  
retsenzent; PLEBYANNIKOV, M.N., red.; ZOLOTAJEVA, I.Z., tekhn.  
red.

[Chemical control of glass manufacture] Khimicheskii kontrol'  
proizvodstva stekla. Leningrad, Rastekhizdat, 1962. 195 p.

(MIRA 15:7)

(Glass manufacture--Chemistry)

VAKSMAN, I.A. (Pskov)

N.N.Burdenko in Pskov. Sov. zdrav. 21 no.4:33-35 '62. (MIRA 15:5)  
(BURDENKO, NIKOLAI NILOVICH, 1876-1946)

VAKSMAN, I.A.

(Pskov)

Pskov government and its role in medical service to the Russian  
army in the Patriotic War of 1812. Sovet zdravookhr. 12 no.1:  
84-85 '63 (MIRA 17:2)

VAKSMAN, I.A.

A.P. Bel'skii, physician, man and citizen. *Pediatrifa* 42 no.8:  
96-97 Ag'63 (MIRA 17:4)



YAKSMAN, K., studenta kursa

Soviet marbles and limestones in the decoration of Moscow subway  
stations. Izv. vys. uchev. zav.; geol. i razv. no.3:123-125 Mr '58.  
(MIRA 11:10)

1. Moskovskiy gos. pedagogicheskiy institut'.  
(Moscow--Subways)

GELLER, D.S.; VAKSMAN, L.F.

"Fixed" Rh antibodies and a method for analyzing them. Lab.delo  
2 no.4:14-18 J1-Ag '56. (MLRA 9:10)

1. Iz laboratorii Moskovskoy gorodskoy stantsii perelivaniya krovi  
(nach. A.I.Uspenskaya) i laboratorii (sav. - prof. Ye.A.Kost)  
bol'nitsy imeni S.P.Botkina.  
(BLOOD--ANALYSIS) (ANTIGENS AND ANTIBODIES)

VAKSMAN, L.F.

DERVIZ, G.V.; ASTRAKHAN, M.N.; VAKSMAN, L.F.

Relation of various proteins to the action of hot solutions of sulfosalicylic acid [with summary in English]. *Biokhimiia* 23 no.1:3-10 Ja-P '58. (MIRA 11:3)

1. Biokhimicheskaya laboratoriya Tsentral'nogo instituta gematologii i perelivaniya krovi, Moskva.

(BLOOD PROTEINS,

eff. of hot solutions of sulfosalicylic acid (Rus)

(SALICYLIC ACID, related cpds.

sulfosalicylic acid in hot solutions, eff. on blood proteins (Rus)

VAKSMAN, M.G., gornyy inzh.; PALIY, I.K., gornyy inzh.

Light type skip feeding unit. Ugol' Ukr. 6 no.11:35 N '62.

(MIRA 15:12)

1. Shakhta No.21 tresta Krasnoluchugol'.  
(Mine hoisting)

VAKSMAN, S.A.

Classification of actinomycetes with special reference to *Streptomyces griseus*. *Mikrobiologiya* 28 no.5:789-793 S-0 '59.

(MIRA 13:2)

1. Institut mikrobiologii Rutgerskogo universiteta, N'yu-Brunsvik,  
N'yu Dzherci, SShA.  
(STREPTOMYCES)

WAKSMAN, SELMAN A.

WAKSMAN, Selman, A. [Waksman, Selman, A.]

Age of antibiotics. Znan.sila 32 no.8:42-43 Ag '57.  
(Antibiotics)

(MIRA 10:10)

IOLIN, M.V.; ALEKSEYEV, V.V.; VAKSMAN, Sh.; YEGOROV, B.F.;  
STEPASHKIN, N.I.

[Building an automobile bridge using precast reinforced  
concrete structural elements] Stroitel'stvo avtodorozhnogo  
mosta iz sbornyykh zhelezobetonnykh konstruktsii. Moskva,  
Ogtransstroi, 1963. 24 p. (MIRA 17:7)

VAKSMAN S.KH

**AUTHOR:** Plisan, I.G. (Engineer) & Vaksman, S.Kh. (Engineer) 96-3-7/26

**TITLE:** Rationalisation of the combustion of anthracite dust at the Minsk Heat and Electric Power Station No.3. (Ratsionalizatsiya szhiganiya antratsitovogo shtyba na Minskoy TETs-3)

**PERIODICAL:** Teploenergetika, 1958, 5- No.3. pp.26-28 (USSR)

**ABSTRACT:** Boilers type TИ-230-2 intended for burning lean coal were installed at Minsk Heat and Electric Power Station No.3. At the station the boilers were adapted to burn anthracite dust, of the three boilers two were reconstructed to have liquid ash removal and to operate at constant high loads. The third boiler had dry ash removal and was used to follow load variations. The reconstruction of the boilers to burn anthracite dust, with liquid slag removal is then described. The general arrangement of the reconstructed boiler with horizontal slag hearth and two cooled slag holes is illustrated in Fig.1. Boiler No.1. was reconstructed in this way and operated with liquid slag removal for three months. It was found that when combustion was steady the slag was not liquid enough and the slag holes clinkered up every three or four days, so that the boiler had to be stopped for deslagging. Because of this unsatisfactory experience, in adapting boiler No.3. use was made of the liquid ash removal arrangements illustrated in Fig.2, which was developed by the Taganrog Boiler Works and in which the hearth contains four ash holes, one of which is especially large, and one slag pit filled with water.

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Rationalisation of the combustion of anthracite dust at the Minsk Heat and Electric Power Station No.3.

The centre turbulent burners were also lowered 2 metres. With this hearth there was no accumulation of liquid slag on the hearth. The performance of Boiler No.3. was satisfactory. With a milling fineness of 7% on an 88 micron sieve the heat loss due to mechanical non-combustion is 5.2% and loss with the flue gases 6.9%. The efficiency of the boiler is 87.7%. The ash hole cooling coil was unsatisfactory and a new one was constructed as illustrated in Fig.3. When burning anthracite dust there is a strong tendency for slag to stick to the heating surfaces, particularly if combustion is good. Intense slagging of the heating surfaces was observed on boiler No.3. and this gave rise to very uneven temperature distribution in the superheater as will be seen from the graphs in Fig.5. Because of ash deposits it was necessary to shut down the boiler to prevent damage to the tubes. Attempts to remove the deposits by hand were unsuccessful, but the problem has now been partially solved by short periods of washing with water at a pressure of 10 atms whilst the boiler is operating. This does not endanger the superheater tubes. Tube slagging was not observed on boilers operating with dry ash removal. There was also intensive ash deposition on the tail heating surfaces in the gas temperature range 450 - 650°C. The output of the boiler was indeed limited because of the increased

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96-3-7/26

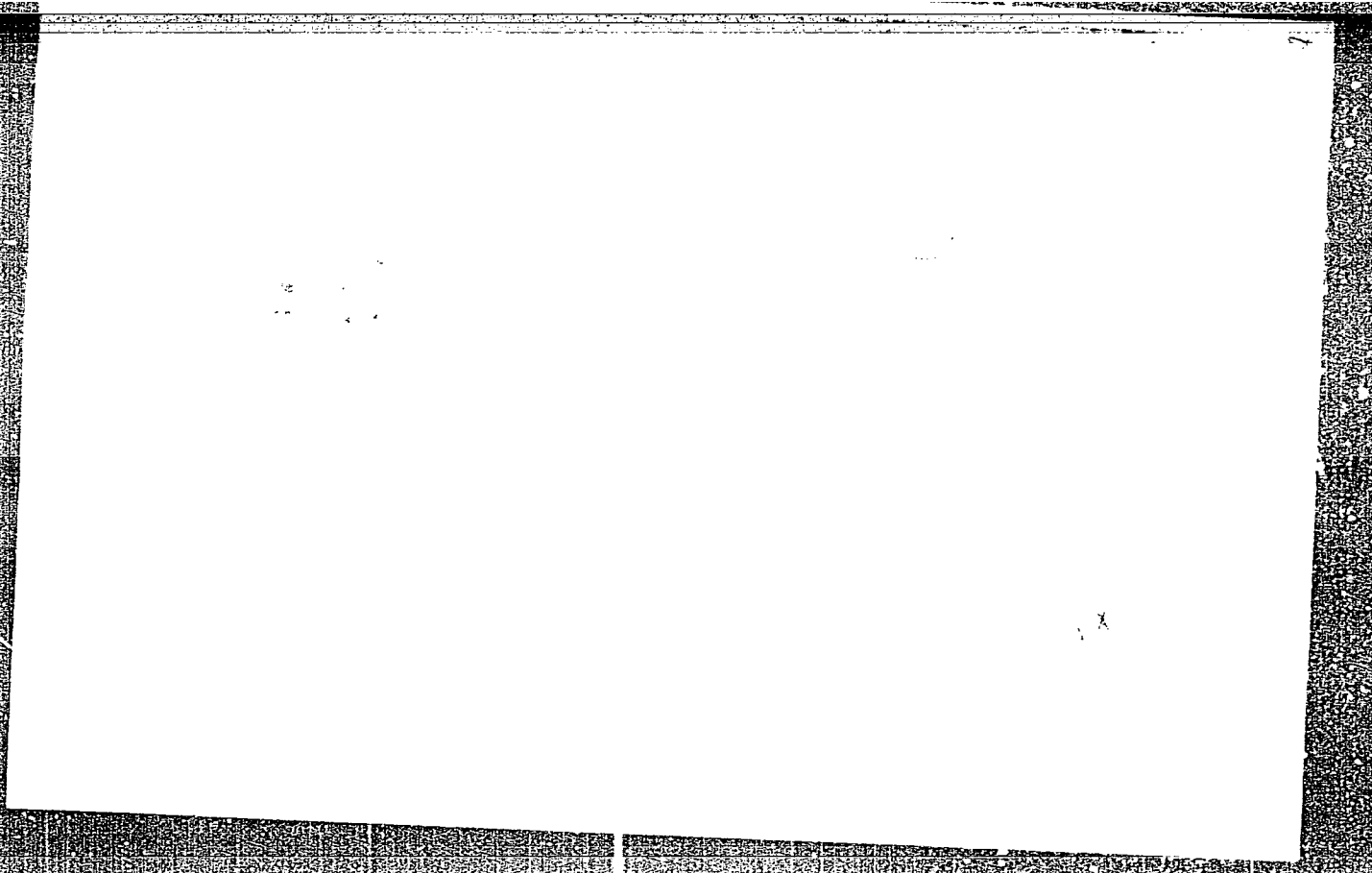
Rationalisation of the combustion of anthracite dust at the Minsk Heat and Electric Power Station No.3.

resistance of the gas ducts. Further improvements were made on Boiler No.4. which commenced operation in June, 1957. The method of delivering fuel to the furnace was improved, the embrasures were reconstructed and conical ends were used on the burners instead of cylindrical. Until now air has been used to transport dust to the furnace, a large part of the heat of the air was used to dry the fuel. After reconstruction, the air temperature will be increased to 350 - 400°C. The dusty air from the fuel preparation system is passed into the furnace through special nozzles arranged as shown in Fig.8. The new conical embrasures are illustrated in Fig.7. The performance of boiler No.4. after reconstruction is characterised by the following data. When the fineness of milling is such that there is 10.5% residue on an 88 micron sieve the heat loss due to mechanical non-combustion is 4.4%, the heat lost with the flue gas is 6.5% and the boiler efficiency is 88.5%. The use of liquid ash removal with the burners installed lower down reduces the loss due to mechanical non-combustion and reduces the temperature of the outgoing flue gas by 20 - 30°C. There are 7 figures.

ASSOCIATION: Minsk Heat & Electric Power Station, No.3. (Minskaya TEPs-3)

AVAILABLE: Library of Congress.

Card 3/3



Vaksmann, S.S.

4500

Ways of Improving the Mechanical Properties of Metal  
Melted in Gas Welding. A. N. Shaahkov and S. S. Vaksmann.  
(*Astog. Delo*, 1953, (3), 5-11). [In Russian]. In the investiga-  
tion described the properties of deposited metal in the gas-  
welding of low-carbon steel were related to the type of filler  
rod used and the supplementary treatment to which the  
joint had been subjected.—s. x.

*S. S. Vaksmann*

SOV/32-24-10-65/70

AUTHORS: Lukin, V. V., Vaksman, S. S., Dolzhanskiy, A. I., Berezin, V. I., Malkin, S. Z., Moldaver, T. I.

TITLE: News in Brief (Korotkiye soobshcheniya)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 10, pp 1292-1293 (USSR)

ABSTRACT: V. V. Lukin (Moskovskiy inzhenerno-fizicheskiy institut) (Moscow Technological-Physical Institute) suggests a new method of determining the maximum plasticity of metals by the destruction of crosspieces (obtained by the drilling of two holes at the ends of the metal piece to be investigated). The crosspieces are destroyed by pressing a special instrument into the bore holes (Figure). The tests are carried out with the testing machine -5. The measurements of the crosspiece prior to and after the test are carried out by means of a metallographical microscope. The idea of this testing method comes from M. P. Markovets (Ref 1). S. S. Vaksman (Vsesoyuznyy nauchno-issledovatel'skiy institut avtogennoy obrabotki metallov) (All-Union Scientific Research Institute for the Autogenous Treatment of Metals) mentions that at this institute an electric furnace with a capacity of 15 kg was constructed for the melting of cast-iron and non-ferrous

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SOV/32-24-10-65/70

News in Brief

metals. The highest operation temperature of the furnace is 1600°, the current being supplied by a transformer STE-34. A. I. Dolzhanskiy (zavod "Elektrostal'") ("Elektrostal'" Factory) wrote that the crack detector according to L. K. Tatochenko, V. V. Lyndin et al. (Ref 1) was completed. According to a suggestion by the foreman A. A. Polyakov two permanent magnets ~~BRONZIN~~ were used for the holding device. V. I. Berezin, S. Z. Malkin completed the laboratory jaw crusher 58-~~It~~. To secure a higher resistivity the casing will be made of steel type St. 25-4518. The other modifications are explained by diagrams. T. I. Moldaver (Berdskiy radiozavod) ~~Cardak~~ Wireless Factory) recommends the use of Teflon rings of a thickness of 2 mm in carbon analyses in Mars furnaces to protect the rubber sealings on the porcelain tubes. There are 3 figures and 2 references, which are Soviet.

ASSOCIATION: Moskovskiy inzhenerno-fizicheskii institut (Moscow Technological Physical Institute); Vsesoyuznyy nauchno-issledovatel'skiy institut avtogennoy obrabotki metallov (All-Union Research Institute for the Autogenous Treatment of Metals); zavod "Elektrostal'" ("Elektrostal'" Factory); Berdskiy radiozavod

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SOV/32-24-10-65/70

News in Brief

(Berde Wireless Factory)

Card 3/3

VAKSMAN, S.S., inzh.; RODIN, Yu.K., tekhn.

Low temperature welding of cast iron with a propane-butane-oxygen flame. Svar. proizv. no.9:22-23 S '60. (MFI 17:22)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut avtogennoy obrabotki metallov.



SHASHKOV, A.N., kand. tekhn. nauk; NEKRASOV, Yu.I., inzh.; VAKSMAN, S.S.,  
inzh.

Coated wire for steel welding with a propane-butane-oxygen  
flame. Svar. proizvod. no.10:26-28 O '65. (MIRA 18:10)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut avtogennogo  
mashinostroyeniya.

VAKSMAN, V.; TOMSEN, A.

Organizing housing construction with the participation of workers  
and employees. Sots.trud 4 no.1:73-76 Ja '59. (MIRA 12:2)

(Labor and laboring classes—Dwellings)

VAKSMAN, V.S.

- 5) A Ya Buzitskiy - The Differential Equations of Expanded Production
  - 6) I V Kuznetsov - Optimal Planning and Economic Indicators
  - 7) A A Kuznetsov - Mathematical Analysis of the Optimal Control of Production
  - 8) N I Nadezhda - Mathematical Analysis of Rates and Proportions in the National Economy (Primarily in Determining the Economic Efficiency of Capital Investment)
  - 9) B I Klyuchnik, B P Kuznetsov - Error Relationships in Expanded Production
  - 10) L N Rubin and V S Vaksmann - Statistical (sic) and Dynamic Models of a Socialist National Economic Balance in Physical Terms
- e. Working Session - 15 December 1979, 1600 hours
- II. The Theory of Linear Programming
    - 1) G S Babitskiy - Series of Methods for the Solution of Linear Programming Problems
    - 2) A L Kozlov - Algorithmic Solutions of Transport Problems Through Approximation by Means of Hyperbolicity
    - 3) O I Krasovskiy - The Algebra of Linear Programming
    - 4) B V Dzhagal'skiy - Recommendation for a Method of Re-computing Matrices of Total Input Coefficients under Conditions of Changing Technology
    - 5) N Chayvaldin - A Practical Interpretation of Kantorovich's Controlling Multipliers
    - 6) E Ilov and Yarov - Linear Programming Methods and Material Supply
4. Working Session - 16 December 1979, 1000 hours
- III. Economic Models and Dynamic Programming
    - 1) V V Korovin - Mathematical Models of the National Economy in Economic Dynamics and a Control Theory
    - 2) B N Kikhalovskiy - Mathematical Methods of Determining the National Efficiency of Capital Investment
    - 3) V V Blyudskiy - Comments on the Economic Cycle Models and Dynamic Economic Models of Economic Concentrations
    - 4) V V Trifonov - Problems in the Application of Dynamic Programming in Economic Research
    - 5) L Gorbunov - Error-Probable Economic Models and the Analysis of Certain Economic Indicators
    - 6) V I Ruzhitskiy - The Dynamic Programming Method and Its Use in Economics
    - 7) B I Gordin - The Method of (Stochastic) Models as a Model for the Application of Mathematical Methods in Long-Term Economic Planning
6. Working Session - 16 December 1979, 1600 hours
- IV. The Transportation Problem
    - 1) D I Volovoy - Finding the Most Suitable Assignment of Various Types of Fleet Vessels to Lines
    - 2) A M Poyval'tsev - Extremal Methods in Economic Research on the Optimal Spatial Distribution of Projects
    - 3) S P Bayantseva - The Application of Linear Programming to Air Transport Economic

Report submitted at the Joint Conference on Problems in the Application of Mathematical Methods in Economic Research, Leningrad, 19-21 January 1980.

L 09505-67 EWT(d)/EWT(1)/EWP(c)/EWP(v)/EWP(k)/EWP(1) IJP(c) TG  
ACC NR: AT6025454 (A) SOURCE CODE: UR/2649/65/000/222/0044/0047

AUTHOR: Vaksman, V. S.

ORG: none

TITLE: One class of problems in the theory of reliability 14

SOURCE: Moscow. Institut inzhenerov zheleznodorozhnogo transporta. Trudy, no. 222, 1965. Nekotoryye voprosy geometrii i gidrodinamiki (Some problems in geometry and hydrodynamics), 44-47

TOPIC TAGS: reliability theory, mathematic analysis

ABSTRACT: The greatest practical advantage in using the results of the theory of reliability is the possibility of not having to carry out a great number of experiments. However, the possibility of narrowing down the field of experimentation thanks to a knowledge of the physical properties of a piece of apparatus has evidently not been studied at all. The present article is devoted to a mathematical consideration of this question. The article considers a piece of apparatus whose state at any given moment of time is described by a quantity  $x$ , which is called the load. Thus, every possible manner of using the apparatus over a period of time can be described by a function  $x(t)$ ,  $0 \leq t < \infty$ , which is called the trajectory of the load. The total class of permissible trajectories is designated as  $M$ . The general problem.

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ACC NR: AT6025454

consists in seeking an operator  $\Phi$ , determined with  $M$ , such that  $\Phi(x) = p(t)$  is the differential function of the distribution of the time of continuous operation of the apparatus, described by the trajectory  $x$ . After an extended mathematical exposition, the author arrives at the expression

$$p(\tau) = \varphi(x) = \frac{1}{\sqrt{2\pi\sigma}} \frac{d}{d\tau} \int_0^\tau \exp\left(-\frac{t - a\left(\frac{\int_0^\tau x dt}{\tau}\right)}{2\sigma^2}\right) dt.$$

Here  $\tau$  is any given moment of time. Orig. art. has: none.

SUB CODE: 12/14/ SUBM DATE: none

Card 2/2 LC

VAKSMAN, V. YE.

Construction Industry - Management

Production planning and scheduling, and record keeping by master-foremen. Stroi.  
prom. 30, no. 5, 1952.

SO: Monthly List of Russian Accessions, Library of Congress, September <sup>2</sup>195~~3~~, Uncl.

ISAYEV, V.Ya.; VAKSMAN, V.Ye.[deceased]; IVANOV, A.K.; BUDO, A.S.;  
FAKTOROVICH, Yu.A., kand. tekhn. nauk, nauchnyy red.;  
GERASIMOVA, G.S., red. izd-va; BOROVNEV, N.K., tekhn. red.

[Consolidation and specialization in the building organizations of the Main Leningrad Construction Trust; practices and economic effectiveness] Ukruplenie i spetsializatsia stroitel'nykh organizatsii v Glavleningradstroe; opyt i ekonomicheskaya effektivnost'. Moskva, Gos. izd-vo lit-ry po stroit., arkhitekt. i stroit. materialam, 1960. 74 p.  
(MIRA 15:2)

(Construction industry)

VAKSMAN, Yefim Natanovich [Vaksman, IU.N.]; LISHAK, Feliks Iosifovich  
[Lyshak, F.I.]; KOCHERGA, M., red.; PATSALYUK, P., tekhn.red.

[Economist's handbook] Dovidnyk hospodarnyka. Kyiv, Derzh.  
vyd-vo tekhn. lit-ry URSR, 1958. 388 p. (MIRA 12:1)  
(Economics)



VAKSMAN, YE. YA.

1/10

Selection of rational type of refractory. M. V. Bydovkinov, B. Ya. Vaksman, and N. A. Yudin. *Legkaya Prom.* 14, No. 8, 43-5 (1954).—The process of continuous furnace melting alumina borosilicate glass lined with electrofused quartz blocks from the Lomonosov Works lasted 121 days, compared with 14 days for mullite blocks, 93 days for kaolin blocks, and 42 days for quartz blocks from Druzhnaya Gorka Works. Electrofused blocks were monolithic and had good heat cond. (outside temp. of wall blocks was about 550°); this caused the adjacent glassmelt to become cool and more viscous, thus decreasing corrosion of blocks. Sol. of quartz in glass was 0.05%. Av. deviation of SiO<sub>2</sub> during the entire process was 0.38%. B. Z. Kamich

PK  
BZH  
②

VAKSMAN, Z. A.

"Antagonizm mikrobov i antibioticheskiye veshchestva (Microbial Antagonism to Antibiotics), translated from the English by M. G. Brazhnikova, under editorial supervision of Professor G. F. Gauze, Izd. inostr. lit., Moscow, 1947

VAKSOV, V.V. (Moskva)

Tests for nonrepetitive switching circuits. Avtom. i telem. 26  
no.3:521-524, Mr '65. (MIRA 18:6)

VAKTA, F.

Problems of our bitumen production. p. 39.

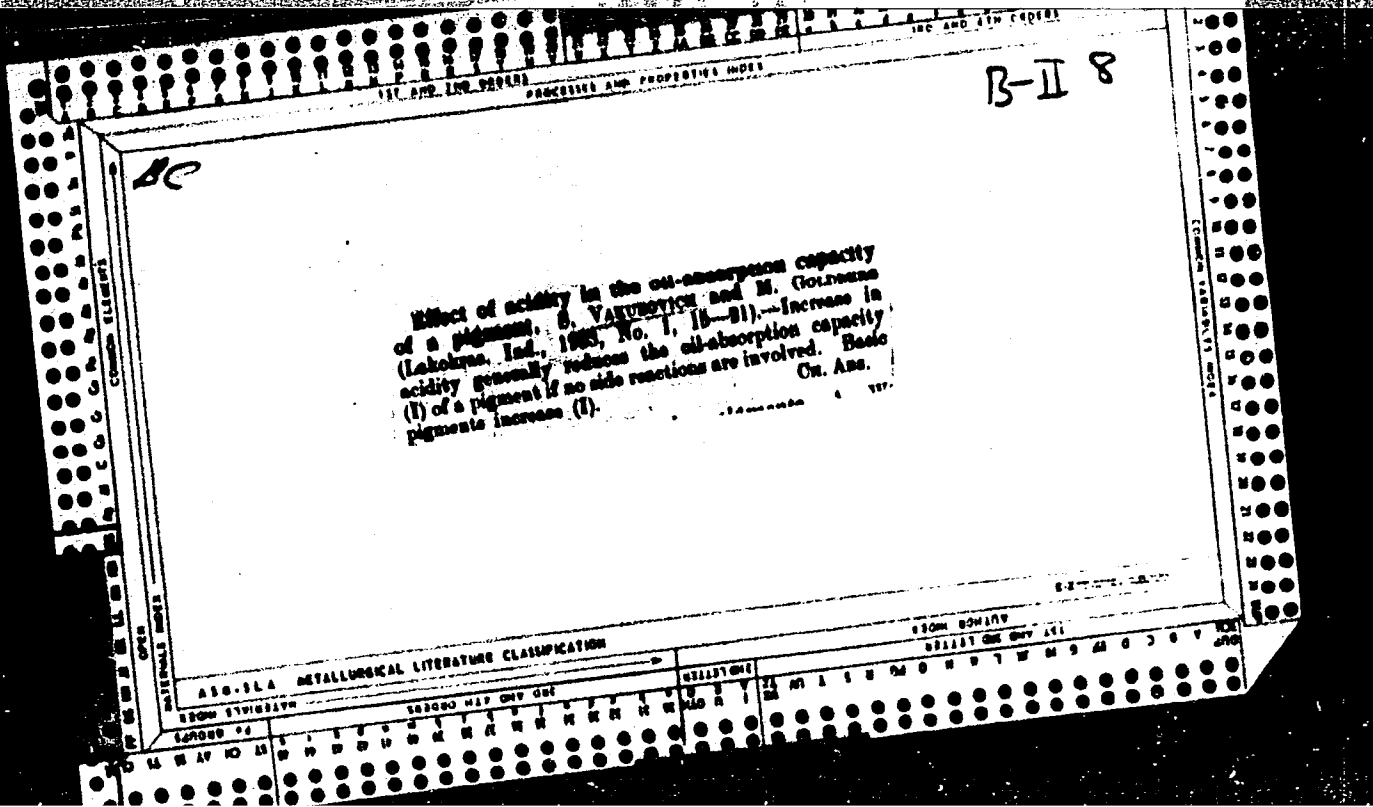
(MAGYAR KEMIKUSOK LAPJA, Budapest, Vol. 10, no. 2, Feb, 1955.)

SC: Monthly list of East European Accessions, (EEAL), LC, Vol. 4, no. 1, Jan 1955,  
Uncl.

TOLSTOV, S.P.; KES', A.S., kand.geograf.nauk; ITINA, M.A., kand.istor.nauk; ANDRIANOV, B.V., kand.istor.nauk; ZHDANKO, T.A., kand.istor.nauk; VISHNEVSKAYA, O.A., nauchnyy sotrudnik; ~~YAKTURS KAYA, N.N., kand.istor.nauk. Primali uchastiye LEVINA, L.A., aspirantka; TRUDNOVSKAYA, S.A.; DAVIDOVICH, Ye.A., kand.istor.nauk; ANDRIANOV, B.V., red.izd-va; LEBEDEVA, L.A., tekhn.red.~~

[The lower reaches of the Amu Darya, the Sarykamysh and the Uzboy; history of their formation and settlement] Nizov'ia Amu-Dar'i, Sarykamysh, Uzboi; istoriia formirovaniia i zaseleniia. Pod obshchei red. S.P.Tolstova. Moskva, 1960. 346 p. (Materialy Khorezmskoi ekspeditsii, no.3) (MIRA 14:2)

1. Akademiya nauk SSSR. Institut etnografii.
2. Chlen-korrespondent AN SSSR (for Tolstov).
3. Institut etnografii AN SSSR (for Levina).
4. Akademiya nauk Tadzhikskoy SSR (for Davidovich).  
(Amu Darya Valley)



VARUIA, I., gvardii mayor; STAROSTIN, N., kapitan; CHERNIGOVSKIY, I., kapitan.

Record of the combat training of a company; discussion of Colonel  
V.Sviderskii's article. Voen.vest.35 no.5:47-50 My '55. (MIRA 9:7)  
(Russia--Army--Infantry)

MERKULOV, Aleksey Grigor'yevich; VAKULA, I.V., otv.red.; RYAZANTSEVA,  
M.M., red.; MARKOCH, K.G., tekhn.red.

[Variable equalizers] Peremennye vyravnivateli. Moskva,  
Gos.izd-vo lit-ry po voprosam svyazi i radio, 1960. 65 p.  
(MIRA 13:5)

(Telecommunication)

(Electric lines)



5 (2), 5 (4)  
AUTHORS:

Voyutskiy, S.S., Vakula, V.L.

SOV/74-28-6-3/5

TITLE:

Modern Views on the Adhesion of High Polymers (Sovremennyye  
vzglyady na adgeziyu vysokopolimerov)

PERIODICAL:

Uspekhi khimii, 1959, Vol 28, Nr 6, pp 701 - 740 (USSR)

ABSTRACT:

It is the object of the present paper to give a survey, as complete as possible, of the papers on the adhesion of high polymers. Principal attention is paid to the adhesion of high polymers to high polymers, as this problem is most important from the standpoint of national economy. Table 1 indicates various adhesives with a short description of their purpose. The data are taken from reference 1. The term "adhesion" usually refers to the adherence of 2 different contacting substances. Adhesion is divided into 2 types: 1) the specific or real adhesion representing a force of attraction between the adhesive and the adhesive surface, and 2) the mechanical adhesion where the adhesive enters the pores of the adhesive material and is kept there mechanically in a hardened state. The first type occurs in case of perfectly smooth and compact surfaces and is caused by the specific interaction between adhesive and substrate molecules. The second type is characteristic for porous or crack-

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Modern Views on the Adhesion of High Polymers

SCV/74-28-6-3/5

ed surfaces and is caused by mechanical factors. The part played by the mechanical factors in sticking porous materials was discussed in detail in the papers (Refs 20-22). The determination of adhesive power consists of two processes: 1) Establishing a contact between adhesive and substrate surface; 2) separating these surfaces, and determining the force required for the separation (Ref 23). Depending on the kind of destruction of the connection, 3 types of separation are distinguished: 1) adhesion separation when a complete separation into layers takes place between adhesive and substrate, 2) cohesion separation when the crack either runs through the adhesive or through the substrate, and 3) mixed separation when the separation of the two materials occurs partly in the place of the original contact, partly through the adhesive or substrate. The quantitative determination of adhesion can only be carried out on the basis of adhesion separation as otherwise the cohesiveness of one of the components would be determined. The quantitative determination of adhesion of polymers can be carried out - just as in case of "autohesion" (autogeziya) - by means of separation, or separation into layers. The methods of determining the adhesive power were described in references 1,

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Modern Views on the Adhesion of High Polymers

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8,14,23-39. For the case of a contact between two liquids, the theory of adhesion has been nearly perfectly developed. For the case of a contact between solids and liquids, different authors suggested different methods of determination (Refs 40-43). In determining adhesion between two solids, the nonequilibrium adhesion function is determined by ordinary methods of separation, and separation into layers. It has been attempted recently (Ref 44) to determine the equilibrium adhesion function between solids indirectly. Former papers on adhesion (Refs 45-50) have a purely empiric character, and are of little importance to the theoretical understanding of specific adhesion of high polymers. The adsorption theory of adhesion has been widely spread abroad. This theory explains adhesion by Van der Waals interaction between molecules of adhesive and substrate (Refs 52-61). This theory was further developed in the papers (Refs 8,26,38,57-74). To explain the facts which do not fit into the frame of the adsorption theory, Deryagin and Krotova (Refs 8,73,74) suggested the electric adhesion theory. Many circumstances point to the presence of electrical phenomena at the separation of sticked surfaces (Refs 25,33,73-82). Although the electric adhesion theory is superior in some points to the adsorption

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Modern Views on the Adhesion of High Polymers

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theory, it can be applied to the case of adhesion of high polymers with restriction only (Refs 8,83-88). In recent years, the diffusion theory has been suggested (Refs 18,83,88). It is based on the essential peculiarities of high polymers, on the chain structure and elasticity of macromolecules, whereby the latter can change their configuration due to thermal motion. Other papers concerned with this theory are references 18,27, 78,83-101. The investigation of the effect exerted by the conditions of formation of the jointing seam on the adhesion of high polymers, the testing of the jointing seam, the dimensions, shape and polarity of the macromolecules, as well as a number of technological factors, confirm the correctness of the diffusion theory. In considering the effect exerted on adhesion by the conditions for the formation of the jointing seam, the following factors are taken into consideration: the contact time between adhesive and substrate (Refs 83,102), the pressure (Refs 31,84,102), the temperature of adherence or of the thermal treatment of the sticking seam (Refs 59,61,83), the content of solvent in the adhesive (Ref 103), the thickness of adhesive layer (Refs 8,21,31,51,104-113), the surface relief of

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Modern Views on the Adhesion of High Polymers

SOV/74-28-6-3/5

the adhesive (Ref 8). In investigating the effect exerted on adhesion by the testing conditions, the following factors are considered: the effect of the separation rate (Refs 8,23,26,114), of the temperature (Refs 8,147), of the exposure to the action of X- and gamma rays (Ref 8), of the geometric dimensions of the sticking surface (Refs 115,31). In investigating the effect exerted on adhesion by the character of the adhesive and of the substrate (Refs 54,59,116), the molecular weight (Refs 57,59,116), the form of molecules (Refs 16,57,59,17), and the polarity of molecules (Refs 57,59,116) are considered. Besides, some technological factors play a decisive part: application of one solvent common to the adhesive and the substrate (Ref 118), introduction of plasticizers into the adhesive (Refs 8,58,9,84,114), introduction of fillers into the adhesive (Ref 84), comparison of adhesion and co-vulcanization (Refs 1,9,102,120,121), the storage of rubber mixtures before doubling (Refs 28,84,102). There are 8 figures, 7 tables, and 121 references, 59 of which are Soviet.

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Modern Views on the Adhesion of High Polymers

SOV/74-28-6-3/5

ASSOCIATION: Moskovskiy in-t tonkoy khimicheskoy tekhnologii im. M. V.  
Lomonosova (Moscow Institute of Fine Chemical Technology imeni  
M. V. Lomonosov)

Card 6/6

VOYUTSKIY, S.S.; VAKULA, V.L.

Adhesion of high polymers. Part 5: Adhesion of synthetic rubbers to various high molecular weight substrates. Vysokom. soed. 2 no.1:51-60 Ja '60. (MIRA 13:5)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii ineni M.V.Lomonosova.  
(Rubber, Synthetic) (Polymers) (Adhesion)

83812  
S/190/60/002/005/002/015  
B004/B067

15.1124 also 2209

11.2211  
AUTHORS:

Vakula, V. L., Khe Yun'-tszuy, Gul', V. Ye., Voyutskiy.  
S. S.

TITLE:

Adhesion of Polymers. VI. Effect of the Molecular Weight of Butadiene Acrylonitrile Copolymers of Different Polarity on Adhesion to Polar and Apolar Substrate

PERIODICAL:

Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 5, pp. 636-645

TEXT: The purpose of this paper was to study the influence exerted by the molecular weight at constant polarity, as well as the influence of polarity at constant molecular weight and the influence of temperature on adhesion. For this purpose, commercial butadiene acrylonitrile copolymers (rubbers) of the types CKH-18 (SKN-18), CKH-26 (SKN-26), and CKH-40 (SKN-40) were isolated from benzene solutions by means of methanol fractions. Table 1 gives the molecular weights and the acrylonitrile content of the fractions determined from the nitrogen content. The fractions were glued onto a polar polyamide (caprone) film Perfol of the type PK-4 (PK-4) or onto apolar polybutylene (molecular weight 118,000) at room temperature.

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S/190/60/002/005/002/015  
B004/B067

Adhesion of Polymers. VI. Effect of the  
Molecular Weight of Butadiene Acrylonitrile  
Copolymers of Different Polarity on Adhesion  
to Polar and Apolar Substrate

temperature according to the method described in Ref. 8. Some samples were heated to 50 - 200°C for 30 min under load and, after they had cooled the layers were separated by means of a dynamometer of the TsNIKZ (Central Scientific Research Institute of the Leather-footwear Industry). The experimental data are given in Figs. 1-5 and Table 2. The results interpreted in terms of the diffusion theory are given. With increasing molecular weight the adhesion of each of the copolymers decreased to a certain limit of the molecular weight (300,000 - 350,000). With still higher molecular weight it remained approximately constant. With increasing temperature, adhesion of the fractions increased and attained almost the cohesion stability of the polymer fraction. The temperature at which this stability was attained was lower with lower molecular weight. If the glued sample was not heated, adhesion of the copolymers to the polyamide depended only little on the polarity of the copolymer. Heated glued samples were dependent on polarity. With decreasing content of polar groups adhesion increased. The weaker adhesion of the more strongly polar copolymers to the strongly polar polyamide is explained by a purely kinetic effect, i. e., by the low flexibility of the macromolecules

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83812

Adhesion of Polymers. VI. Effect of the Molecular Weight of Butadiene Acrylonitrile Copolymers of Different Polarity on Adhesion to Polar and Apolar Substrate S/190/60/002/005/002/015 B004/B067

of such polymers and the intensive cross-linking that suppresses diffusion. The adhesion of commercial butadiene acrylonitrile copolymers which are not separated into fractions, to polyamide in non-heated glued samples did not depend on the content of polar groups but on the content of fractions of different molecular weight. At higher temperatures, adhesion depended on polarity. The adhesion of the copolymers to the apolar substrate (polyisobutylene) is low and depends neither on polarity and molecular weight nor on temperature. There are 5 figures, 2 tables, and 18 references: 15 Soviet and 3 British. ✓

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova  
(Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov)

SUBMITTED: December 30, 1959

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15 9300

S/190/60/002/011/013/027  
B004/B060

42210

AUTHORS: Voyutskiy, S. S., Vakula, V. I., Smel'sya, N. I.,  
Tutorskiy, I. A.

TITLE: Adhesion of Polymers. VII. Adhesion of Carboxylated Polymers  
to Different Types of Substrates

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 11,  
pp. 1671 - 1677

TEXT: The authors studied the effect of the carboxyl group on the  
adhesion of styrene rubbers to polar polyamide (Perfol type PK-4 (PK-4))  
and to nonpolar polyethylene. In tire cord impregnated with carboxylated  
butadiene-styrene latex a stronger bond was observed between rubber and  
cord than is provided by impregnation with ordinary butadiene-styrene  
latex. The joint between copolymer and substrate was prepared by a method  
described in Ref. 10. The quantitative determination of adhesion was made  
at room temperature and a constant separation rate of 0.3 cm/sec by means  
of an "adhesiometer" of TsNIKZ. Resistance in g/cm (opposed by the joint  
to separation) was taken as the measure of adhesion. 1) The effect of the

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Adhesion of Polymers. VII. Adhesion of Carboxylated Polymers to Different Types of Substrates

S/190/60/002/Q:1/0:3/027  
B004/B060

carboxyl group content on adhesion to polyamide was first examined on butadiene-styrene rubber with 1.25, 3.5, and 7% methacrylic acid, the result being shown by Fig. 1.

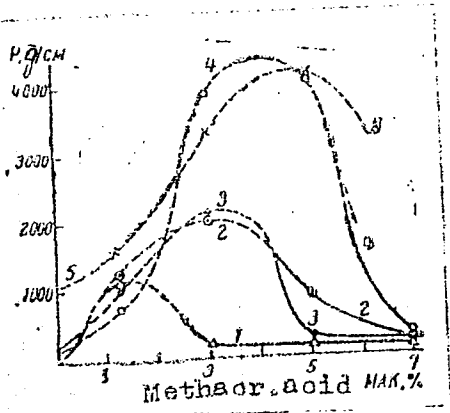


Fig. 1: Resistance P to separation of joint between polyamide and copolymer of butadiene with styrene and methacrylic acid at 30% styrene content and varying methacrylic acid content  
1, initial joints; 2, joints after 30-min heating up to 75°C; 3, heat treatment up to 100°C; 4, to 125°C; 5, to 125°C.

A second series of measurements was made (at 30% styrene content) with methacrylic acid content between 0 - 10%; Fig. 3.

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Adhesion of Polymers. VII. Adhesion of Carboxylated Polymers to Different Types of Substrates

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B004/B060

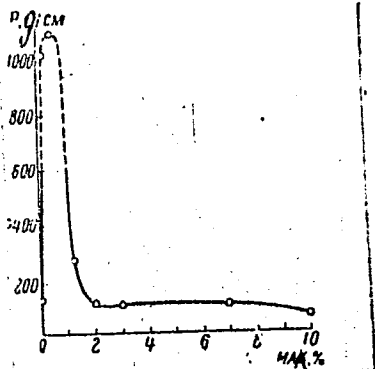


Fig. 3: P as a function of methacrylic acid content, for 30% styrene content in the copolymer. Adhesion to polyamide.

Furthermore, the styrene content was varied between 0 and 50% at a constant methacrylic acid content of 1.25%. 2) Adhesion to polyethylene was studied under equal conditions (varying the methacrylic acid content from 0 to 10%, the styrene content likewise from 0 to 50%). The results interpreted in the light of the diffusion theory are as follows: 1, The best adhesion between butadiene-styrene-methacrylic acid copolymer and polyamide was observed at a methacrylic acid content of 0.3 to 1.25%. When the joint is heated, the maximum shifts toward higher methacrylic acid contents. A good initial compatibility was observed between polar rubber and the polyamide, but it deteriorated with increasing methacrylic acid content due to

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Adhesion of Polymers. VII. Adhesion of Carboxylated Polymers to Different Types of Substrates S/190/60/002/011/013/027 B004/B060

stiffening of the chain and consequently reduced diffusion. 2, Increase of styrene content to above 10% reduces the adhesion values due to stiffening of the molecular chain. 3, Adhesion to nonpolar polyethylene is low, except for samples with small methacrylic acid and styrene contents. The adhesion is independent of the polar component content or styrene content and of heating temperature. The low values are caused here by the incompatibility of the polar rubber and the nonpolar polyethylene. The authors thank B. A. Dolgoplosk and V. N. Reykh for having supplied the rubber samples. There are 4 figures, 2 tables, and 10 references: 7 Soviet, 2 US, and 2 British.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova (Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov)

SUBMITTED: May 9, 1960

Card 4/4

AUTHORS: Voyutskiy, S. S., Vakula, V. L.

S/153/60/003/01/051/058  
B011/B005

TITLE: Adhesion<sup>1</sup> of Synthetic Rubbers to Different High-molecular  
Substrata

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya  
tekhnologiya, 1960, Vol 3, Nr 1, pp 186-189 (USSR)

TEXT: The authors report on determination results with respect to the  
adhesion of a greater number of caoutchoucs of various kinds to polar and non-  
polar substrata: films of cellophane, polyamides, and polyethylene, and to  
2 elastomers: polar caoutchouc SKN-40 and nonpolar polyisobutylene. Adhesion  
was expressed by the resistance P to layer separation of the films in g/cm. A  
dynamometer of type TsNIKZ (Tsentral'nyy nauchno-issledovatel'skiy institut  
zameniteley kozhi (Central Scientific Research Institute of Leather Substitutes))  
(Refs 2, 3) was used to separate the layers at room temperature and at a separation  
velocity of 0.3 cm/sec. A table (p 188) lists the results obtained. These data  
may be divided into 3 groups concerning: 1) a purely cohesive layer separation  
(these data characterize the cohesive strength of caoutchouc, K); 2) a purely  
adhesive layer separation (these data characterize the binding strength - adhesion,  
A); 3) a mixed type of layer separation (S). Type K comprises nearly all luted  
samples with sodium-butadiene caoutchouc and most samples with SKBM-50 butadiene

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B011/B005


caoutchouc. The high adhesion of SKB-50-sodium-butadiene caoutchouc is probably due to the relatively low molecular weight and the scarce and sufficiently long branchings of its macromolecules. The lower adhesion of sodium-butadiene caoutchouc to polyethylene is due to the crystallinity and high density of the molecular packing of polyethylene. Therefore, the macromolecules of the adhesive cannot diffuse into the depth of the substratum. The data of the table contradict the current opinion that the adhesive properties of sodium-butadiene caoutchouc are bad. As is known, the molecules of SKBM-50-butadiene caoutchouc are little branched. Therefore, its adhesion is weaker than that of SKB-50. For all pairs of substances luted together with the same adhesive, which show a destruction of type K, the resistance to layer separation is nearly equal and independent of the nature of the substratum (exception: SKB-50 with cellophane). Among the luted samples, which are destroyed according to type A, isoprene caoutchouc shows a higher adhesion to all substrata than natural caoutchouc. The weak adhesion of natural caoutchouc is the more astonishing as it possesses excellent adhesion to itself. Butadiene-styrene caoutchouc with low styrene content (SKS-30) shows a much lower adhesion than pure butadiene caoutchouc. In the copolymer SKS-30, the molecular chains become much stiffer under the influence

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of phenyl side groups, and diffusion is inhibited. A higher styrene content (above 30%) reduces adhesion even more. An increase in methyl-styrene groups in butadiene-methyl-styrene caoutchouc weakens their adhesion. The introduction of methyl groups into the polymer reduces adhesion in most cases, obviously by decreasing flexibility of the chain. Polyisobutylene shows a higher adhesion to all substrata than natural caoutchouc but a lower adhesion than SKB-50 and SKBM-50. Polar butadiene acrylonitrile caoutchouc SKN-40 shows a comparatively high adhesion to polar substrata, and a very weak adhesion to nonpolar ones. This is explained by the mutual solubility of adhesive and substratum in the former case, and their insolubility in the latter. Nonpolar adhesives generally show good adhesion to polar and nonpolar substrata. A very bad adhesion of polymers to polyethylene film is striking. There are 1 table and 9 references, 6 of which are Soviet. 

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im.  
M. V. Lomonosova; Kafedra kolloidnoy khimii  
(Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov;  
Chair of Colloid Chemistry)

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Adhesion of Synthetic Rubbers to Different High-molecular Substrata

S/153/60/003/01/051/058  
B011/B005

SUBMITTED: April 24, 1959

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15 1123  
5 6400

<sup>31897</sup>  
S/643/61/000/000/002/007  
EO40/E485

AUTHORS: Voyutskiy, S.S., Vakula, V.L., Gul', V.Ye.,  
Ho Yun-tsui

TITLE: Effect of molecular weight, polydispersiveness and  
polarity of high polymers on their adhesion to high-  
molecular substrata

SOURCE: Konferentsiya po poverkhnostnym silam. Moscow, 1960.  
Issledovaniya v oblasti poverkhnostnykh sil; sbornik  
dokladov na konferentsii. Moscow, Izd-vo AN SSSR, 1961.  
At head of title: Akademiya nauk SSSR. Institut  
fizicheskoy khimii. 55-65

TEXT: Because in previous studies of the adhesive properties of  
high polymers, no differentiation was made of the effects on  
adhesion of the two individual factors on which it depends, i.e.  
molecular weight and polarity, an investigation was carried out at  
the Moscow Institute of Fine Chemical Technology imeni  
M.V.Lomonosov on the effect of the molecular weight at constant  
polarity, of the effect of the polarity at a constant molecular  
weight, as well as of the effects of other factors on the adhesion  
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EO40/E485

Effect of molecular weight ...

of polymers to polar and non-polar substrata. Furthermore, the results obtained were compared with data obtained for polydisperse products. The investigation was made on specimens of butadiene-acrylonitrile copolymers with various concentrations of the polar component in the macro-molecule (nitrile rubbers CKM-18 (SKN-18), CKM-26 (SKN-26) and CKM-40 (SKN-40)). Molecular weight was determined by the light dispersion method, while the acrylonitrile content, which varied from about 19 to 40%, was calculated from the nitrogen content. A polyamide substratum was used in the tests designed to elucidate the effect of molecular weight on adhesion and a polybutylene substratum was used in examining the effect of polarity. Adhesion between the various polymer fractions and the substrata was determined at a constant rate of separation (0.3 cm/sec) using an apparatus designed at the TsNIKZ (Ref.9: S.S.Voyutskiy, V.M.Zamaziy, Kolloidn. zh., 1953, v.15, 407 and Ref.11: A.I.Shapovalova, S.S.Voyutskiy, A.P.Pisarenko. Kolloidn. zh., 1956, v.18, 485). Test specimens were prepared as described previously by two of the present authors (Ref.3: Vysokomolekul. soyedineniya, 1960, v.2, 51). Some specimens were also cured under load at the temperatures of  
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EQ40/E485

Effect of molecular weight ...

50, 100, 150, 175 and 200°C for 30 minutes, cooled to room temperature and then tested for the dependence of adhesion on the specimen temperature. It was found that the adhesion of butadiene-acrylonitrile copolymers to polyamide substrata diminishes with rising molecular weight of the copolymer and then remains constant for molecular weights exceeding 300 to 350 thousand. The adhesion of all specimens was found to be considerably improved with rising curing temperature. This applies especially to the lower molecular weight fractions (transition from adhesive to cohesive bond type). Curves were plotted for the variation of adhesion of butadiene-acrylonitrile copolymers to polyamide substratum as a function of the concentration of the polar groups (acrylonitrile). It was found that, at room temperature, the strength of adhesion depends little on the polar groups. However, if the temperature of the contact is raised to 150°C, adhesion drops sharply with increasing polarity and, conversely, the strength of adhesion rises rapidly with curing temperature as the polarity of the specimens is decreased. A theoretical explanation is given of this dependence. Adhesion data from tests

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on polyamide base of various fractions of butadiene-acrylonitrile copolymers were compared with those obtained in parallel tests of the adhesion of non-fractionated products (polydisperse). It was found that, in the first case, adhesion of contacts at room temperature is practically independent of polarity but that, in the second case of polydisperse fractions, the strength of adhesion diminishes with increasing content of the polar acrylonitrile group. At elevated temperatures, the effect of polarity on adhesion is identical for non-fractionated products and the fractions with molecular weight of about 320000. An examination of the influence of the nature of substrata on the adhesion of polymers of different molecular weights and polarities showed that the adhesion of polar adhesives to non-polar substrata is rather low and is independent of the molecular weight and polarity of the adhesive and the temperature of the contact. V.I.Tsvetkov and V.Petrova are mentioned in the article in connection with their contributions in this field. There are 8 figures, 2 tables and 32 references: 22 Soviet-bloc, 3 Russian translations from non-Soviet-bloc publications and 7 non-Soviet-bloc. The four most recent references to English language publications read as follows:  
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X

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S/643/61/000/000/002/007  
E040/E485

Effect of molecular weight ...

Ref.13: W.G.Forbes, L.A.McLeod. IRI Transactions, v.34, 1958, 154;  
Ref.16: A.Aitken, R.M.Barrer. Trans. Faraday Soc., v.51, 1955, 116;  
Ref.19: F.Bueche. J. Chem. Phys., v.20, 1952, 1959;  
Ref.30: J.Rutzler. Adhesives Age, 1959, v.2, no.6, 39; 1959, v.2,  
no.7, 28.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii  
im. M.V.Lomonosova (Moscow Institute of Fine Chemical  
Technology imeni M.V.Lomonosov)

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15. 1124 1581, 1436, 2209

22569

S/190/61/003/005/012/014  
B110/B220

11, 2210

AUTHORS: Vakula, V. L., Tutorskiy, I. A., Smelaya, N. I., Smelyy, Z.,  
Voyutskiy, S. S.

TITLE: Adhesion of polymers. VIII. Adhesion to polyamide of graft  
and modified polymers obtained from carboxylic butadiene  
styrene rubbers and  $\epsilon$ -caprolactam and its derivatives

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 5, 1961, 775-782

TEXT: B. A. Dogadkin et al. (Kolloidn. Zh. 20, 43, 1958) proposed an in-  
termediate polymer as binding agent in order to increase the binding  
strength between natural and butadiene styrene. The diffusion of the  
chains of the natural rubber of the graft polymer into the natural rubber  
and the diffusion of the butadiene styrene rubber chains into the butadiene  
styrene rubber would give a firm bond. Correspondingly, the graft polymers  
produced by V. A. Kargin, Kh. U. Ustanov, and B. I. Aykhodzhayev from  
styrene and viscose showed a strong adhesion to rubber. Thus, graft and  
modified polymers on the basis of carboxylic butadiene styrene rubbers  
(CBSR) and  $\epsilon$ -caprolactam and its derivatives would be able to increase the

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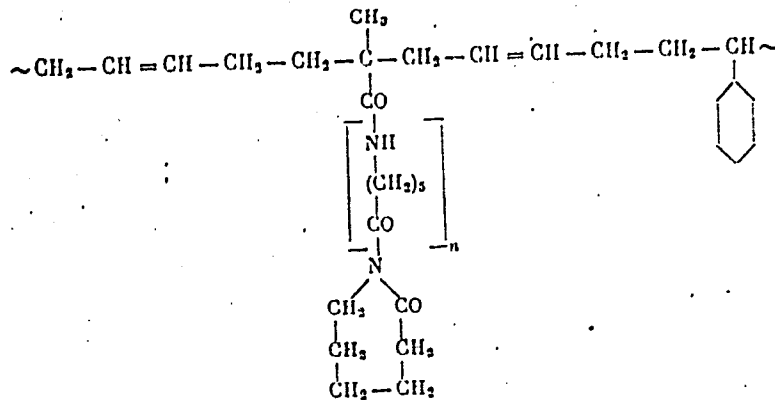
Adhesion of polymers...

adhesion of CBSR to polyamide considerably. The authors studied the adhesive properties of the above graft and modified polymers whose synthesis has been described previously by the second author (Ref. 3: Mezhdunarodnyy Simpozium po makromolekulyarnoy khimii (International Symposium of Macromolecular Chemistry), Moscow, June 1960, sektsiya III, p. 224). Their structure has been ascertained by means of infra-red spectrum and chemical determination of nitrogen and carboxyl. The films of the polymers and the polyamide were glued together and then submitted to a heat treatment of up to 100°C and tested for exfoliation by means of the dynamometer of TsNIKZ. Tables 1 to 3 show the results (A = adhesion, K = cohesion, C = miscellaneous character of destruction of the binding agent). The tested polymers of the structure

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showed various lengths of the polyamide chains graft at the carboxyl groups and various frequencies of their sequence in the length of the macromolecule. If all carboxyl groups of the CBSR are substituted by long

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polyamide chains (e.g. 12 caprolactam members), the adhesion to the polyamide is reduced. The introduction of groups of higher polarity (CONH) than the COOH group causes an increased rigidity and reduced diffusibility by starting intra- and intermolecular reactions. In case the chains are short (3 caprolactam members) for the same quantity of polyamide, the number of individual ends diffusing into the polyamide increases. Temperature rise increases the Brownian movement and, thus, the adhesion. The strongly polar CONH groups of the graft polymer have twice as much cohesive energy as the COOH groups of the CBSR; they cause a particularly close chain packing and enable the forming of hydrogen bonds. S-12 gave good binding results, since it contains a definite amount of bound monomers. Modified CBSR polymers containing still some methyl ester of the  $\alpha$ -amino caproic acid were studied. Also in this case, the cohesive power of these polymers surpasses that of the initial polymers, but their adhesion is independent of the amount of ester. The introduction of polyamide chains into CBSR containing more than 30% of styrene reduces the adhesion due to increasing rigidity. Increase of the contact temperature increases the adhesion and maintains the adhesive character of exfoliation. As compared to the initial polymers, the cohesion is also higher.

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The kinetic character of the adhesion results also from its increase with increasing temperature. Thus, adhesion is fundamentally dependent on polymers of similar polarity in highly elastic or viscous state, i.e. with sufficient molecular mobility. Polymers modified by the methyl ester of  $\epsilon$ -amino caproic acid (S-24 and S-25) (S-24 and S-25) are more adhesive than polymers with polyamide chains (S-17 and S-19) (S-17 and S-19). In the absence of styrene, a slight addition of caprolactam does not deteriorate the adhesive properties of rubber. The binding force between the rubber (SKS-ZOA) and ordinary material (0.5 kg/cm) increased for material impregnated with graft polymer from CBSR and polyamide to 0.95 kg/cm. For (SKB) rubber and caprone tissue impregnated with butadiene polymer modified by  $\epsilon$ -caprolactam monomer (polymer S-33 (S-33)), the binding force amounted to 0.8 kg/cm (0.4 kg/cm without impregnation). The specimens tested were produced by V. G. Rayevskiy in the NIIRP. There are 1 figure, 3 tables, and 9 Soviet-bloc references.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im.  
M. V. Lomonosova (Moscow Institute of Fine Chemical Technology  
imeni M. V. Lomonosov

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