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L 8591-65 EWT(d); IJP(c)/ASD(a)-5/AFTC(p)/ESD(t)/RAEM(t)
ACCESSION NR: AT4046527 S/2976/64/000/004/0156/0163

AUTHOR: Gakhariya, K. K.

16 3

TITLE: Numerical methods for solving wave function boundary problems on a double variable plane

SOURCE: Moscow. Vy*ssheye tekhnicheskoye uchilishche. Vy*chislitel'naya tekhnika, no. 4, 1964, 156-163

TOPIC TAGS: boundary problem, boundary value problem, wave function, double variable function, double number, analytical function, Cauchy formula, Poisson formula

ABSTRACT: A formula is derived which expresses the value of a function, belonging to a class of wave functions, at any point lying within the region bounded by conjugate equiaxial hyperboli through the values of the given wave function and its conjugate on the boundary of the region. For the solution of this problem, formulae are derived which are similar to those of the theory of the analytical functions of a complex variable. It is well known that the theory of analytical functions solves boundary problems of mechanics for the Laplace equation in the plane. In this article, the author poses and solves a problem of similar nature for a wave equation in a plane by means of double-variable analytical functions. In the

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course of this analysis, he defines double numbers and their modulus, argument, norm and parameter, discusses the theory of double-variable functions, and derives Cauchy and Poisson formulas for the integration of these functions. Orig. art. has: 5 figures and 8 formulae.

ASSOCIATION: Moskovskoye vysshaye tekhnicheskoye uchilishche (Moscow School of Higher Technical Education)

SUBMITTED: 00 ENCL: 00 SUB CODE: MA

NO REF SOV: 002 OTHER: 000

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHENSON, B. S.

USSR/Engineering - Caterpillar Track

Card 1/1

Authors : Sarkisyants, E. A., and Gakhenson, B. S.

Title : A new design of a cast, repairable caterpillar track

Periodical : Avt. Trakt. Prom. Ed. 1, 6-8, January 1954

Abstract : A description is presented on a newly designed caterpillar track, and a comparison is made of the above track with that of the C-80 tractor. The new caterpillar track is still in the experimental stage, and it is expected to be mass produced in the near future. Drawings.

Institution : ....

Submitted : ....

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHENSON, B. S.

USSR/Engineering - Tractor Steering Mechanism

Card 1/1

Authors : Gakhenson, B. S.

Title : A planetary mechanism for tractor steering facilitates the driver's work

Periodical : Avt. Trakt. Prom. Ed. 1, 20-21, January 1954

Abstract : Presentation of calculations of the planetary mechanism for tractor steering, and the description of its operation. Symbols, designating the specific functions and moments utilized for the calculation of the above mechanism, and the turning radius of a steering wheel are presented. Formulas.

Institution : ....

Submitted : ....

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHENSON, B.S.

Coupling joints with elastic rubber parts. Avt. i trakt. prom. no.8:18-19 Ag'55. (MIRA 8:11)

1. Altayskiy traktornyy zavod
(Tractors--Transmission devices)

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHENSON, B.S.

Experimental KDT-70 tractor with four drive wheels. Trakt. i sel'khozmash. no.5:5-8 My '59. (MIRA 12:6)

1.Altayskiy traktornyy zavod.
(Tractors)

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHENSON, B.S.

The T-4 general-duty crawler tractor. Biul. tekh.-ekon. inform. no.10:58-59 '59. (MIRA 13:3)
(Crawler tractors)

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHENSON, Boris Semenovich, dotsent; ZORIN, Stanislav Pavlovich, inzh.; VORONIN, M.I., inzh., red.; MIKHAYLOVA, L.G., red. izd-va; SHIBKOVA, R.Ye., tekhn. red.

[The TDT-75 timber skidding tractor) Trelevochnyi traktor TDT-75. Pod obshchei red. M.I.Voronina, Moskva, Goslesbumizdat, 1962. 292 p. (MIRA 16:6)
(Tractors) (Lumber--Transportation)

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHNIIAN, R.; NIKOLOVA, M.; DRUMEV, D.

Some considerations on the effect of Aesculus hippocastanum and Sorbus aria preparations. Izv. inst. fiziol. 5:307-319 '62.

(AESCULUS pharmacol)
(PLANTS MEDICINAL pharmacol)

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

KOSTOV, V.; GAKHNILIAN, R.

Studies on anti-bacterial properties of some vitamin P-like substances. Izv. mikrobiol. inst. (Sofiia) 16:25-30 '64

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GAKHOKIDZE, A.M.

PROCESSES AND PROPERTIES INDEX

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**Isomerization of hydroxy aldehydes. VI. Saccharic acid regrouping of monoses.** S. N. Danilov and A. M. Gakhokidze. *J. Gen. Chem.* (U. S. S. R.) 6, 704-19 (1936); cf. *C. A.* 28, 1664[1].—By analogy with the transposition of α-Br and α-HO aldehydes into satd. monobasic acids previously studied, monoses substituted in the 1- and 1,2-positions with halogens are capable of the saccharic-acid type rearrangement. Thus, 2-chloroacetylglucose (I) reacts with $Pb(OH)_2$, giving directly *glucodesonic acid* (II), called here orthosaccharic acid. 2-Chlorotrimethylglucose (III) gives under these conditions *trimethylglucodesonic acid* (IV). Pentaacetylglucose, m. 128-30°, prepd. by heating glucose with $Ac_2O$ and NaOAc, was treated for 2 hrs. with HBr satd. in AcOH at 0°. The reaction product in $CHCl_3$ was pptd. with petr. ether and recrystd. from AmOH at 0°, giving 70% β-bromotetraacetylglucose, m. 86-7°. This (50 g.) in 500 cc. of 50% AcOH was gradually treated, with shaking, with 100 g. Zn dust at 15-25° for 3-3.5 hrs. The filtrate was concd. at 30-5° and 12 mm. pressure and then extd. with $Et_2O$. After washing the ext. with $NaHCO_3$ and $H_2O$ and distg. off the $Et_2O$, the sirup was allowed to crystallize in a desiccator for a few days, giving 83% triacetylglucal (V), m. 54-5° (alc.), $[\alpha]_D^{18}$ −14.4° (25% alc.). V, treated with Br in $CHCl_3$ at 0° and the $CHCl_3$ distd. off *in vacuo*, gave 90% 1,2-dibromotriacetylglucal, $(O.CHBr.CHBr.[CH(OAc)]_2.CHCH_2OAc)$ (VI), $[\alpha]_D^{18}$ 13.7°. V with Cl in $CHCl_3$ gave 65% 1,2-dichlorotriacetylglucal (VII), m. 89-92° ($Et_2O$), $[\alpha]_D^{18}$ 198.4°. VI (15 g.) in 100 cc. $CHCl_3$ shaken with moist $Ag_2O$ (25 g.) gave 2-bromotriacetylglucal, $[\alpha]_D^{18}$ 90.4°. VII (20 g.) in $CHCl_3$ with 30 g. $Ag_2O$ + $H_2O$ gave 70% I, $[\alpha]_D^{18}$ 62.5° ($CHCl_3$). The mono- and dihalotriacetylglucoses, treated with $Pb(OH)_2$, cleave the Ac groups and give II $(HO_2.CCH_2[CH(OH)]_2CH_2OH)$. E. g., I (30 g.) in 300 cc. $H_2O$ with 50 g. of freshly prepd. $Pb(OH)_2$ was stirred on a water bath first at 20-5° for 5 hrs. and then at 50°, 60-75° and 85-90° for 25, 25 and 5-10 hrs., resp. The filter cake was dissolved in $H_2O$ and the Pb salt compd. with $H_2S$. The filtrate was concd. *in vacuo*, the sirup dild. with $H_2O$ and again concd. The operation was repeated until all the AcOH was expelled. The sirup was digested with an excess of $BaCO_3$ in $H_2O$, the filtrate boiled with animal charcoal and the filtrate concd., giving 78% Ba glucodesonate, $[\alpha]_D^{18}$ 9.4°. This, decompd. with $H_2SO_4$, gave 13.6 g. II, m. 165°, $[\alpha]_D^{18}$ 4.99°. The phenylhydrazide of II m. 170°. II, treated with $Ac_2O$ and NaOAc at 70-80° for 10 hrs. and then at 96-100°, gave 3,4,5,6-tetraacetylglucodesonic acid, m. 110°; its phenylhydrazide m. 143°. II, treated with MeI in the presence of $Ag_2O$ at 40° for 36 hrs., gave 78% Et 3,4,5,6-tetramethylglucodesonate (VIII), m. 81.5°, $[\alpha]_D^{18}$ 84.2°. VIII, sapond. with $Ba(OH)_2$, gave the acid (IX), m. 92-4°; its phenylhydrazide m. 113°. The synthesis of IV from III was studied to show that in the formation of II from the halogen derivs. of V with $Pb(OH)_2$ no other isomeric saccharic acids are formed. Glussl. m. 60°.

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$[\alpha]_D^{20}$ −67.3°, was prepd. by mtg. 15 g. V in 150 cc. MeOH with dry $NH_3$ at 0° and letting it stand at room temp. for 24 hrs. After concg. the mixt. *in vacuo*, the sirup was distd. at 105° and reduced pressure until it was freed from $AcNH_2$. Glucal, digested with a large excess of MeI and AgOAc for 20 hrs., gave 3,4,6-trimethylglucal, $[\alpha]_D^{20}$ 21.4°. This (10 g.) in 10 cc. $CHCl_3$, treated with Cl at 0° and the $CHCl_3$ distd. off *in vacuo*, gave 9.1 g. 1,2-dichlorotrimethylglucal, $[\alpha]_D^{20}$ 121.1° ($CHCl_3$). This in $CHCl_3$, shaken with moist $Ag_2O$, gave III. III in $H_2O$, heated gently with $Pb(OH)_2$, gave 60% IV; its phenylhydrazide m. 122–5°. IV was converted with EtI into VIII and this into IX.

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GAKHOKIDZE, A. M.

"The Isomerization of Oxyaldehydes," Part VII. "The Regrouping of Galactose into Galactodesonic Acid," Zhur. Obshch. Khim., 10, Nos., 5-6, 1940. Laboratory of Chemistry, Tbilisi Pedagogical Institute.

Report U-1526, 24 Oct 1951

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GAKHOKIDZE, A. M.

"The Isomerization of Oxyaldehydes" Part VIII. "The Conversion of l-Arabinose into l-Arabosaccharinic Acid," Zhur. Obshch. Khim., 10, Nos., 5-6, 1940. Laboratory of Chemistry, Tbilisi State University.

Report U-1526, 24 Oct 1951.

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CA

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**Synthesis of 2-glucosidoglucose.** A. M. Gakhokidze. *J. Gen. Chem.* (U. S. S. R.) 11, 117-20(1941).—The purpose of the work was the synthesis of 2-glucosidoglucose. Glucose pentaacetate (I) was converted into 1-bromotetraacetylglucose, and the latter into 2,3,4,6-tetraacetylglucose (II), m. 110-21°, by the action of $Ag_2CO_3$ in $Et_2O$ with addn. of $H_2O$; yield 25%. Treatment of I with $PCl_5$ gave 30-45% *1-chloro-2-(trichloroacetyl)-3,4,6-triacetylglucose*, $[\alpha]_D^{20}$ 6.41° (in benzene). The latter treated with $NH_3$ at 0° gave 58% *1-chloro-3,4,6-triacetylglucose*, m. 159-60°, $[\alpha]_D^{20}$ 19.1° (in EtOAc). The latter treated with $Ag_2CO_3$ gave 1,3,4,6-tetraacetylglucose (III), m. 138°, in 50% yield. Equimol. proportions of II and III treated in $CHCl_3$ with $ZnCl_2$ and then with $P_2O_5$ gave *2-(2,3,4,6-tetraacetylglucosido)-1,3,4,6-tetraacetylglucose*, II and III. The latter were present in traces and were removed by soln. in $H_2O$. The disaccharide acetate m. 189° (from MeOH), $[\alpha]_D^{20}$ −40.5°. It was treated with MeONa in $CHCl_3$ to yield *2-(1,5-glucosido)-1,5-glucose* (IV), m. 176-8° (from EtOH), $[\alpha]_D^{20}$ 27.5° (in water). III and the 1-Br deriv. of II condensed by $Ag_2O$ in $CHCl_3$ gave octaacetyl-2-glucosidoglucose, m. 180-90°, in 65% yield. IV yields a *phenylhydrazone*, m. 178°, in 60% yield, sol. in $H_2O$ and EtOH. The disaccharide on oxidation by Br-$CaCO_3$ in water yielded a bionic acid, which hydrolyzed upon heating with 5% $H_2SO_4$ into glucose and gluconic acid. The bionic acid upon methylation by $Me_2SO_4$, followed by MeI and $Ag_2O$, gave upon hydrolysis with 7% HCl in $CHCl_3$, 3,4,5,6-tetramethylgluconic acid and 2,3,4,6-tetramethylglucose, m. 85°. The disaccharide treated with $NH_4OH$ in EtOH-$H_2O$, followed by $Ac_2O$-AcONa at 110°, gave *octaacetyl-2-(1,5-glucosido)-2-glucononitrile* in 45% yield, m. 149-51°, sol. in $CHCl_3$, $Me_2CO$, EtOAc, hot MeOH and EtOH. The octaacetate treated with EtONa followed by $Ag_2CO_3$ yielded glucosidopentose, which, when acetylated, gave glucosidoarabinose octaacetate, m. 168-80°, $[\alpha]_D^{20}$ −21.5° (in $CHCl_3$). G. M. Kosolapoff

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

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**Chemical composition of Georgian petroleum. II Aromatic hydrocarbons of Supsa petroleum.** Kh. I. Areshidze and A. M. Gakhokidze. *J. Applied Chem.* (U.S.S.R.) 17, 529-32(1944)(English summary).—Aromatic hydrocarbons of Supsa petroleum were studied, with the identification of: $C_6H_6$, toluene, propylbenzene, isopropylbenzene, and *o*-, *m*-, and *p*-xylenes. G. M. K.

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**Isomerization of hydroxy aldehydes.** 1A. **Isomerization of D-xylose into D-xylo6rthosaccharinic acid.** A. M. Gakhokidze (Thilissi Pedagog. Inst.). *J. Gen. Chem.* (U.S.S.R.) 15, 530-8(1945)(English summary); cf. C.A. 34, 7857[9]. D-Xylose (30 g.), 200 cc. $Ac_2O$, and 20 g. NaOAc were heated on a water bath for 5 hrs. with frequent shaking; after slow pouring into ice water, extn. with $CHCl_3$ and evapn. of the latter there was obtained β-D-*tetraacetylxylose*, m. 122-4°, $[\alpha]_D^{18}$ −21.8°; the above (20 g.) in 70 cc. HBr (satd. at 0°) soln. in AcOH was allowed to stand for 2 hrs., dild. with 200 cc. $CHCl_3$ and poured into 1.5 l. ice water, after which the org. layer was concd. and treated with petr. ether to give 81% *acetobromo-D-xylose*, m. 103° (from EtOAc), $[\alpha]_D^{18}$ 207°. This (25 g.) in 300 cc. 50% AcOH was treated with 50 g. Zn dust and shaken for 3 hrs.; after filtration, concn., and addn. of a little water there was obtained 80% oily *diacetyl-D-xylal*, m. 40-2° (from EtOAc and $CCl_4$), $[\alpha]_D^{18}$ −318.5°, which (20 g.) in 100 cc. dry $CHCl_3$ was treated with cold EtONa (from 2 g. Na) with shaking and then with ice water to give D-*xylal*, m. 50-1° (concn. of alc. layer, neutralization by AcOH, and addn. of 30 cc. abs. EtOH (81%). Treatment of this with 5% $H_2SO_4$ gave 70% 2-*deoxy-D-xylose*, m. 93-4°, initial $[\alpha]_D^{18}$ −27.8°, final $[\alpha]_D^{18}$ −1.7°; boiling of 1.8 g. of this in EtOH with $PhNHNH_2$ gave the *phenylhydrazone*, m. 105-6°, while treatment of 3.5 g. with 4 g. Br and 15 g. $CaCO_3$ in 120 cc. water with shaking gave, after decompn. of the Ca salt by the calcd. amt. of $(CO_2H)_2$, D-*xylodesonic acid lactone*, m. 137-8°; *phenylhydrazine deriv.*, m. 170-1°. Diacetyl-D-xylal (10.5 g.) in 150 cc. AcOH was treated with O contg. 4.5% $O_3$ at room temp.; after dilu. with $H_2O$ and treatment with 100 g. Zn dust, the mixt. was heated for 5 hrs. on a steam bath and then evapd. *in vacuo* to yield 80% *diacetyl-D-threose*, m. 139-40° (from EtOH), $[\alpha]_D^{18}$ 84.9°; *phenylhydrazone*, m. 148° (from EtOH); hydrolysis by $Ba(OH)_2$ at 0-5° gave D-*threose* (70%), m. 130°, $[\alpha]_D^{18}$ 25.9°; *osazone*, m. 161°; *1,2-monoacetone deriv.*, m. 83°; heating with $Ac_2O$ and NaOAc gave *triacetyl-D-threose*, m. 118°, $[\alpha]_D^{18}$ 35.9°; D-*threose* (5.0 g.) in 100 cc. water was treated with 15 g. Br and allowed to stand in the light with shaking, followed by neutralization by $CaCO_3$ to yield the Ca *salt* of D-*threonic acid* by addn. of abs. EtOH; decompn. of the Ca salt by $(CO_2H)_2$ gave an uncrystallizable *lactone of D-erythronic acid*, m. 157-8°. 3,4-*phenylhydrazone* of D-*threonic acid*, m. 157-8°. Diacetyl-D-xylal (15 g.) in 200 cc. dry $CHCl_3$ was treated at 0° with dry Cl to yield, on evapn. and treatment with hot $Et_2O$, 91% 1,2-*dichloro-3,4-diacetyl-D-xylose*, m. 90-8°, $[\alpha]_D^{18}$ 81.4°; this (10 g.) in 300 cc. dry $Et_2O$ was treated with 20 g. moist $Ag_2CO_3$, and the mixt. was shaken with cooling for 10 hrs. and evapd. after filtration to yield, on prolonged evacuation, hygroscopic 2-*chloro-3,4-diacetyl-D-xylose*, m. 120°, $[\alpha]_D^{18}$ 40.0°; 20 g. of this in 100 cc. $CHCl_3$ was mixed with 500 cc. water and 70 g. fresh Pb oxide, and the mixt. was heated with shaking on a steam bath for 5 days, after which it was filtered and evapd. *in vacuo* to a sirup. This sirup was heated with org. solvents (unspecified) to remove reducing substances, dissolved in water, and freed of Pb by $H_2S$, followed by vacuum evapn. and treatment with $BaCO_3$, with 6 hrs. heating on a water bath, to yield, on evapn. and decolorization, 61% Ba *salt* of D-*xylo6rthosaccharinic acid*; treatment with the calcd. amt. of $H_2SO_4$ gave the *lactone* of D-*xylo6rthosaccharinic*

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GAKHOKIDZE, A. M.

"The Isomerization of Hydroxyaldehydes. X. Isomerization of d-Arabinose into d-Arabo-Ortho-Saccharinic Acid." Gakhokidze, A. M. (p. 539)

SO: Journal of General Chemistry (Zhurnal Obshchei Khimii) 1945, Volume 15, no. 6.

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**Saccharic rearrangement of biosea. I. Isomerization of lactose into ortholactosaccharic acid.** A. M. Gakhokidze (Tbilissi Pedagog. Inst.). *J. Gen. Chem.* (U.S.S.R.) 16, 1907-13(1946).—*Hexaacetyllactal* (I) (Fischer and Curme, Jr., *C.A.* 8, 3040), prepd. in 67% yield from acetobromolactose (m. 144°, $[\alpha]_D^{20}$ 107.4° ($CHCl_3$)), m. 112°, $[\alpha]_D^{20}$ −15.4° ($CHCl_3$). Hydrolysis by EtONa gave 80% *lactal*, m. 190-1°, $[\alpha]_D^{20}$ 25.7° ($H_2O$). I (6.5 g.) in 100 cc. glacial AcOH was treated with cooling with O contg. 3-5% $O_2$; after completion of the reaction (Br test), the soln., dild. with 450 cc. $Et_2O$, was shaken and heated with 100 g. Zn dust. The $Et_2O$ layer was sepd., washed with $NaHCO_3$, $H_2O$, and evapd.; the residue in the min. amt. of dil. EtOH deposited on standing 70% *hexaacetyl-3-galactosidoarabinose*, m. 154°, $[\alpha]_D^{20}$ −80.8° (EtOH). This (4 g.), treated in 70 cc. dry MeOH with cooling with MeONa from 1.2 g. Na and 50 cc. MeOH, then shaken 1 hr., poured into 200 cc. cold $H_2O$, neutralized with AcOH, and evapd. *in vacuo*, gave *3-galactosidoarabinose* (87%; from $H_2O$-abs. EtOH), m. 165°, $[\alpha]_D^{20}$ −55.1° ($H_2O$); *osazone* m. 240°. I (10.5 g.) in 250 cc. dry $CHCl_3$ was treated with dry Cl, with cooling, until it gave a neg. reaction with Br; after evapn. and addn. of hot $Et_2O$, 85% *1,2-dichlorohexaacetyllactose*, m. 175°, $[\alpha]_D^{20}$ 120.8°, was obtained; this (9.8 g.), shaken 10 hrs. in 100 cc. dry $CHCl_3$ with 8 g. $Ag_2CO_3$ and 1 g. $H_2O$, then filtered and evapd. *in vacuo*, yielded *2-chlorohexaacetyllactose*, m. 140°, $[\alpha]_D^{20}$ 70.4° (in $CHCl_3$), sol. in $CHCl_3$, pyridine, alcs., $Me_2CO$, and $CCl_4$. This (7.5 g.) in 40 cc. $CHCl_3$ was treated with 300 cc. water and 30 g. fresh Pb oxide, heated on a steam bath with shaking 20 hrs., filtered, and sepd.; the aq. layer was freed of reducing substances by treatment with org. solvents ($CHCl_3$, $Et_2O$, $Me_2CO$, EtOH) and evapd.; the residue was again treated with org. solvents, then dissolved in 500 cc. water, treated with $H_2S$, filtered, and evapd. *in vacuo*; the residue was repeatedly evapd. with $H_2O$ *in vacuo*, then dissolved in 300 cc. water, decolorized, and heated with $CaCO_3$; after filtration and evapn. to a small vol., followed by addn. of abs. EtOH, *Ca ortholactosaccharate* was obtained; the *Ba salt* was obtained similarly. With $(CO_2H)_2$ or $H_2SO_4$, resp., the salts gave on evapn. the noncrystg. *ortholactosaccharic acid*, $[\alpha]_D^{20}$ 15.5° (in $H_2O$); *phenylhydrazide* m. 194°. Boiling the acid with 5% $H_2SO_4$ 1 hr. gave *orthoglucosaccharic acid*, isolated as the *Ba salt* (from $H_2O$-EtOH), after the sepn. of which the mother liquor gave with $PhNHNH_2$, *galactosazone*, m. 190-5°. Ca ortholactosaccharate (5.5 g.) in 25 cc. $H_2O$ was treated with 40 g. $Me_2SO_4$ and heated to 70-80° while being treated with 30% NaOH, keeping the soln. alk., then heated to 100° 2 hrs.; after extn. with $CHCl_3$ and evapn. of the latter, the residue was heated with 20 g. MeI and 3.2 g. $Ag_2O$, filtered, and evapd. to yield *Me heptamethylortholactosaccharate*, $n_D^{20}$ 1.4913, d. 0.9686. This (6.2 g.) in 20 cc. $CHCl_3$ was treated with 100 cc. 4% $H_2SO_4$ and heated to 100° with stirring 10 hrs.; neutralization with $BaCO_3$, filtration, evapn., and extn. with hot $CHCl_3$, gave *2,3,4,6-tetramethylgalactose*, m. 70°, $[\alpha]_D^{20}$ 118.5° (in $H_2O$); the soln. from the above was evapd. to a small vol. and treated with abs. EtOH to give *Ba 3,5,6-trimethylorthoglucosaccharate*;

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pptn. of the Ba by $H_2SO_4$ and treatment of the soln. with $CaCO_3$ gave a flocculent *Ca salt* of the above acid; decompn. of either the Ba or Ca salt with $H_2SO_4$ or $(CO_2H)_2$, resp., and evapn. gave the *γ-lactone* of *3,5,6-trimethylortho-glucosaccharic acid*, m. 99-100°, $[\alpha]_D^{20}$ 59.8°, while methylation of the Ca salt gave *Me 3,4,5,6-tetramethylortho-glucosaccharate*, m. 79-81°, $[\alpha]_D^{20}$ 84.1°. II. **Isomerization of cellobiose into orthocellobiosaccharic acid.** *Ibid.* 1914-22.—*Cellobiose α-octaacetate*, prepd. in 30% yield from pure cotton and $Ac_2O$ in the presence of $H_2SO_4$ at 40-50°, m. 229°, $[\alpha]_D^{20}$ 41.6° (in $CHCl_3$). The above (100 g.) with AcOH satd. with HBr gave 67% *α-acetobromocellobiose*, m. 182°, $[\alpha]_D^{20}$ 91.5° ($CHCl_3$). This (66 g.) gave 41.5 g. (57%) *hexaacetylcellobial* (by Zn dust in AcOH), m. 138°, $[\alpha]_D^{20}$ −20.3° (tetrachloroethane); hydrolysis of the latter according to Bergmann and Schotte (C.A. 15, 3620) or Fischer and Fodor (C.A. 8, 3048) gave 80% *cellobial*, m. 173-5°, $[\alpha]_D^{20}$ 2.18° ($H_2O$). Hexaacetylcellobial (8.4 g.) in 130 cc. AcOH was treated with O contg. 3-5% $O_3$ (Br water test), then dild. with 500 cc. $Et_2O$, treated with 120 g. Zn dust, and heated with shaking; the org. layer, after washing with $NaHCO_3$ and water, was dried and evapd.; the residue on mixing with EtOH gave 74% *hexaacetyl-3-glucosidoarabinose*, m. 150° (from EtOH), $[\alpha]_D^{20}$ 54.0°; this (5.2 g.), treated in 100 cc. cold abs. MeOH with MeONa from 1.5 g. Na in 80 cc. MeOH, shaken 1 hr., then poured into 200 cc. cold $H_2O$, neutralized with AcOH, and evapd. *in vacuo*, yielded 70% *β-3-glucosidoarabinose*, m. 161° (from dil. EtOH), $[\alpha]_D^{20}$ −90.4°; *phenylosazone* m. 204°. Cellobial (2.2 g.) in 200 cc. 3% $H_2SO_4$ was allowed to stand 2 days; rapid evapn. *in vacuo* gave 70% *2-desoxycellobiose*, m. 215°, $[\alpha]_D^{20}$ 21.6° ($H_2O$); *phenylhydrazone* m. 194°; treatment with $Ac_2O$ and NaOAc gave *heptaacetyl-2-desoxycellobiose*, m. 179°; the latter (1.5 g.), shaken 5 hrs. in 100 cc. dry $Me_2CO$ with 2.5 g. moist $Ag_2CO_3$, yielded *hexaacetyl-2-desoxycellobiose*, m. 194-5°, $[\alpha]_D^{20}$ −17.0° ($CHCl_3$). 2-Desoxycellobiose (1.2 g.) in 200 cc. $H_2O$ was treated with 4.1 g. Br and allowed to stand in the light 5 days with gradual addn. of 10 g. $CaCO_3$; filtration, evapn., and treatment with EtOH gave *Ca 2-desoxycellobionate*, which after decompn. with $(CO_2H)_2$, filtration, and evapn., gave the *lactone* of *2-desoxycellobionic acid* (I), m. 174°, $[\alpha]_D^{20}$ 34°. Hexaacetylcellobial (5.5 g.) in 200 cc. dry $CHCl_3$ was treated cold with Br in $CHCl_3$ until a color appeared; after standing 3 days, with addn. of Br to preserve a small excess, the soln., evapd. and treated with petr. ether, yielded 78% *1,2-dibromohexaacetylcellobiose*, m. 172° (from EtOH-AmOH), $[\alpha]_D^{20}$ 60.4° (tetrachloroethane); the latter (4.6 g.) in 100 cc. dry $CHCl_3$ was treated with 2.4 g. dry $Ag_2CO_3$ and 0.9 g. $H_2O$ and shaken 6 hrs.; after filtration and evapn., the residue, treated with petr. ether, yielded 70% *2-bromohexaacetylcellobiose*, m. 191° (from EtOH), $[\alpha]_D^{20}$ 35.5°. Hexaacetylcellobial (5.3 g.) in 200 cc. dry $CHCl_3$ was treated with dry Cl until reaction was complete and was allowed to stand for 2 days (Cl added when necessary); evapn. and addn. of petr. ether gave 74% *1,2-dichlorohexaacetylcellobiose*, m. 166° (from EtOH-AmOH), $[\alpha]_D^{20}$ 75.8° (tetrachloroethane); the latter (4 g.) in 100 cc. dry $CHCl_3$ was shaken 5 hrs. with 1.5 g. dry $Ag_2CO_3$ and 0.8 g. $H_2O$, filtered, and evapd.; addn. of petr. ether gave 74% *2-chlorohexaacetylcellobiose*, m. 182° (from EtOH), $[\alpha]_D^{20}$ 41.8° (tetrachloroethane). The latter (8.4 g.), or 8.8 g. Br deriv., and 10.5 g. 1,2-dichlorohexaacetylcellobiose (or di-Br deriv.) in 70 cc. $CHCl_3$ were mixed with 500 cc. $H_2O$ and 30 g. fresh Pb oxide and heated to 100° 30 hrs. with stirring; after filtration, the aq. layer was extd. with org. solvents to remove reducing substances, then evapd. and again treated with org. solvents; the residue in 500 cc. $H_2O$ was freed of Pb with $H_2S$ and the residue, after repeated evapn. with $H_2O$, was taken up in 100 cc. $H_2O$, decolorized, and heated with $CaCO_3$; after filtration and evapn., the residue with EtOH yielded *Ca orthocellobiosaccharate* (60%); use of $BaCO_3$ in the above gave the *Ba salt*. Decompn. of these with $(CO_2H)_2$ or $H_2SO_4$, resp., gave on evapn. *in vacuo* the *lactone* of *orthocellobiosaccharic acid*, m. 173-4°, $[\alpha]_D^{20}$ 35.8° (in $H_2O$), identical with I; *phenylhydrazide* m.

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191°. The acid (2.1 g.), boiled 1 hr. in 200 cc. 5% $H_2SO_4$ and neutralized with $BaCO_3$, gave, after filtration and evapn. and addn. of EtOH, *Ba orthoglucosaccharate*, while the mother liquor on heating with $PhNHNH_2$ gave the *glucosazone*, m. 205°. I, methylated with $Me_2SO_4$ in the presence of NaOH, then with MeI, yielded 72%. *Me ester of the hepta-MeO deriv.*, $n_D^{20}$ 1.4048, $d_4^{20}$ 0.9743, $[\alpha]_D^{20}$ −82.02° ($CHCl_3$); hydrolysis by boiling with dil. $H_2SO_4$, followed by neutralization with $BaCO_3$, followed by concn. and extn. with $CHCl_3$, gave *2,3,4,6-tetramethylglucose*, m. 83°, $[\alpha]_D^{20}$ 83.4° (in EtOH), while the mother liquor, on evapn. and addn. of EtOH, gave *Ba 3,4,6-trimethylorthoglucosaccharate*, which after decompn. with $H_2SO_4$, filtration, and evapn., gave the *γ-lactone of 3,5,6-trimethylorthoglucosaccharic acid*, m. 98°, $[\alpha]_D^{20}$ 58.6°. Methylation of the latter (no method given) gave *Me 3,4,5,6-tetramethylorthoglucosaccharate*, m. 80–1°, $[\alpha]_D^{20}$ 84.2° (in EtOH). G. M. Kosolapoff



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B

**Condensation of Ketones with Esters of the Organic Acids. I. Condensation of Acetone with the Esters of Formic, Acetic, Propionic, and Butyric Acids.** A. M. Gakhokidze. **II. Condensation of Acetone with Malonic Acid Esters.** A. M. Gakhokidze and A. P. Guntsadze. (In Russian.) *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 17(79), July 1947, p. 1327-1331; Sept. 1947, p. 1640-1642.

20 references.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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PROCESSES AND PROPERTIES INDEX

CA

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**Pigments of Gleditsia triacanthos.** A. M. Gakhokidze and N. D. Kutkize (Tbilisi Pedagog. Inst.). *J. Applied Chem.* (U.S.S.R.) 20, 899-903(1947)(in Russian).—Air-dried pods of *G. triacanthos* (12 kg.), boiled 0.5 hr. with 9 l. 2% NaOH 6 times, and the alk. exts. acidified by 20% $H_2SO_4$, yielded 97.4 g. (0.81%) pigment mixt. Extn. with hot abs. EtOH sepd. about 1% insol. matter; the ext. was evapd. and the residue, repptd. from EtOH by $H_2O$, gave 51.8 g. solids, which were extd. in a Soxhlet app. with EtOAc and the residue was similarly extd. with $Me_2CO$. Evapn. of the EtOAc ext. gave pigment I, while evapn. of the $Me_2CO$ ext. gave pigment II. Both were repeatedly pptd. from EtOH by $H_2O$, then were absorbed on $Al_2O_3$ from EtOH; I was eluted by EtOAc, II by $Me_2CO$, to give pure products. I, named *acrammerin*, obtained in 21.6-g. yield, brown plates, m. 335-40°; compn., $C_{21}H_{18}O_8$. Acetylation gave the *pentaacetate*, m. 231-2°; methylation gave a *hexa-MeO* compd. (III), m. 254-6° (I has 1 MeO group). Fusion of III with KOH gave trimethylgallic acid, m. 164-5°, trimethylpyrogallol, m. 48-50°, and 1,2,5-trimethoxy-3-hydroxybenzene, m. 130-40°. Fusion of I with KOH gave AcOH, pyrogallol, 2,4,6-$(HO)_3$-$C_6H_2OMe$, and gallic acid. I is believed to be 3',6',5,5',7-*pentahydroxy-8-methoxyflavone*. G. M. K.

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

CA

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**Synthesis of acrammerin.** A. M. Gakhokidze (Tbilisi Pedagog. Inst.). *J. Applied Chem.* (U.S.S.R.) 20, 904-7 (1947)(in Russian).—*Acrammerin* was synthesized as follows: 2,5,1,3-$(MeO)_2C_6H_2(OH)_2$ (10.4 g.) and 35 g. AcCl, allowed to stand 2 days in 150 cc. $Et_2O$, filtered, and the ppt. washed with hot $H_2O$, gave 2,4-dihydroxy-3,6-dimethoxyacetophenone, m. 142-3° (from hot $H_2O$). This (6.8 g.) heated 10 hrs. to 170-85° with 26.4 g. K trimethylgallate and 28.5 g. trimethylgallic anhydride and dissolved in 200 cc. EtOH, treated with 80 cc. 20% KOH, evapd. to dryness, the residue taken up in 150 cc. $H_2O$, filtered, satd. with $CO_2$, again filtered, and the clear filtrate acidified by HCl, gave the crude product, which was combined with the $CO_2$ ppt. and the combined material (11.4 g.) was mixed with 200 cc. HI (d. 1.70) and heated 2 hrs. to 130-40°; 400 cc. 15% $H_2SO_3$ was added and the ppt. was collected and extd. with water in a Soxhlet app. The residue was ppted. with $H_2O$ from EtOH soln., then chromatographed on $Al_2O_3$ from EtOH and eluted with EtOAc; the reppta. from EtOH by $H_2O$ was repeated 5 times to give 1.4 g. pure acrammerin, $C_{18}H_{16}O_6$, m. 348-50°. Its Ac and MeO derivs. did not depress the m.pt. of the corresponding derivs. of the authentic pigment. G. M. K.

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GAKHOKIDZE, A. M.

Gakhokidze, A. M. "Condensation of an acetone, methyl-ethyl ketone and acetophenone with esters of succinic acid," Trudy Tbilis. gos. ped. in-ta im. Pushkina, Vol. V, 1948, p. 41-47 - Resume in Georgian language - Bibliog: 11 items

SO: U-3264, 10 April 1953, (Letopis 'Zhurnal 'nykh Statey, no. 3, 1949).

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GAKHOKIDZE, A.M.; GUNTSADZE, A.G.

Magnesium organic synthesis of saccharinic acid from d-xylose. Soob. AN Gruz.SSR 9 no.2:115-119 '48. (MIRA 9:7)

1.Akademiya nauk Gruzinskoy SSR, Khimicheskiy institut, Tbilisi. Predstavleno deystvitel'nym chlenom Akademii I.G.Kutateladze.
(Xylose) (Saccharinic acids)

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GAKhokidze, A. N.

Chem

Synthesis of galactoside-2-glucose. A. M. Gakhokidze (Chem. Pharm. Inst., Tiflis). *Soobshcheniya Akad. Nauk Gruzin. S.S.R.* 9, No. 9/10, 561-6(1948).—1-Bromotetraacetylgalactose, m. 92-3° (from galactose pentaacetate) (30 g.) in 150 ml. dry $Et_2O$ was treated with 10 g. fresh, dried $Ag_2CO_3$ and 0.5 ml. $H_2O$ and shaken 2-3 hrs. Evapn. of the org. layer and extn. with warm $Et_2O$ gave *2,3,4,6-tetraacetylgalactose* (I), 69%, m. 107°, $[\alpha]_D$ 21.5° (EtOH). Heating 19.5 g. pentaacetylglucose with 52 g. $PCl_5$ 8 hrs. on a steam bath, followed by vacuum distn. of low-boiling materials gave 30-45% *1-chloro-2-trichloroacetyl-3,4,6-triacetylglucose*, m. 140°, $[\alpha]^{18}_D$ 6.41° ($C_6H_6$) (from AmOH and $Et_2O$); the product reduces Fehling soln. and gives a ppt. with $AgNO_3$. This (15 g.) in 250 ml. dry $Et_2O$ satd. with $NH_3$ at 0° shaken while soln. took place, followed by sepn. of crystals, gave after evapn. of the solvent 58% *1-chloro-3,4,6-triacetylglucose*, m. 159-60°, $[\alpha]^{18}_D$ 10.1° (EtOAc), which reduces Fehling soln. when hot. This (10 g.) in 300 ml. dry $Et_2O$ was treated with 10.6 g. dry AgOAc and shaken 2 hrs. in the cold, giving 69% *1,3,4,6-tetraacetylglucose*, m. 138° (from EtOH), which (17.4 g.) with 17.1 g. I in 300 ml. dry $CHCl_3$ with 4 g. $ZnCl_2$ was shaken 5 hrs., filtered from $ZnCl_2$, treated with 35 g. $P_2O_5$ and shaken 20 hrs., filtered and evapd., yielding a mixt. of 3 substances. The initial acetates were removed by heating with a little $H_2O$ in which they dissolved; the residual matter was treated 3-4 times with hot $H_2O$, yielding finally *2,3,4,6-tetraacetylgalactoside-2(1,3,4,6-tetraacetylglucose)*, m. 169°, $[\alpha]^{18}_D$ −12.3° (MePh) (from MeOH). This (13 g.) in 30 ml. $CHCl_3$ was chilled to −20°, treated with 2 g. Na in 70 ml. MeOH, cooled 20 min., treated with 45 ml. cold $H_2O$, shaken well, neutralized with AcOH, evapd. and treated with EtOH, yielding *(1,5)-galactoside-2(1,6)glucose*, m. 173-4° $[\alpha]^{18}_D$ −12.5° ($H_2O$) (from EtOH). The product contains 1 mole $H_2O$, lost *in vacuo* at 80°.

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CA

**Saccharinic rearrangement of bioses. III. Isomerization of maltose to orthomaltosaccharic acid.** A. M. Gakhokidze (Tbilissi Pedagog. Inst.). *J. Gen. Chem. (U.S.S.R.)* 18, 60-7(1948)(in Russian); cf. *C.A.* 41, 6206b, 6209a.—Maltose, m. 109°, $[\alpha]_D^{18}$ 139.8° ($H_2O$), acetylated in the presence of $ZnCl_2$ gave *maltose α-octaacetate*, m. 127° (from EtOH), $[\alpha]_D^{18}$ 122.1° ($CHCl_3$), which with AcOH satd. with HBr gave *acetobromomaltose*, m. 113-14°, $[\alpha]_D^{18}$ 180.4° ($CHCl_3$). This (35.5 g.) in 500 ml. 50% AcOH shaken with 85 g. Zn dust with cooling 2 hrs., and the dild. soln. extd. with $CHCl_3$ gave, on evapn. of the ext., 70% *hexaacetylmaltal*, m. 132-6° (from EtOH), $[\alpha]_D^{18}$ −22.5° ($CHCl_3$). This (6.2 g.) treated in 100 ml. $CHCl_3$, with strong cooling, with 0.8 g. Na in 70 ml. MeOH, shaken in the cold 1 hr., poured into ice water, the aq.-alc. layer sepd. from the $CHCl_3$ layer, neutralized by AcOH, evapd. *in vacuo*, and the residue dild. with a little $H_2O$ and pptd. with abs. EtOH, gave 72% *maltal*, m. 176°, $[\alpha]_D^{18}$ 1.16° ($H_2O$). Hexaacetylmaltal (4.4 g.) in 100 ml. AcOH was ozonized, giving 62% *α-glucosido-3-arabinose hexaacetate*, m. 153°, $[\alpha]_D^{18}$ −42° ($CHCl_3$), which was hydrolyzed by Zemplen's method to *α-glucosido-3-arabinose*, m. 172°, $[\alpha]_D^{18}$ 16.5° ($H_2O$); *phenylosazone*, m. 196°. Maltal (2.8 g.) in 250 ml. 3% $H_2SO_4$ allowed to stand 2 days, then warmed to 80-90°, freed of $SO_4$ by addn. of $BaCl_2$, filtered, and rapidly evapd. *in vacuo*, gave 72% *2-desoxymaltose*, m. 182° (from $H_2O$), $[\alpha]_D^{18}$ 30.4°; *phenylhydrazone*, m. 201°; *hepta-Ac deriv.* (after acetylation in the presence of NaOAc), m. 167°, gives *hexaacetyl-2-desoxycellobiose*, m. 183°, with moist $AgCO_3$. 2-Desoxymaltose (1.5 g.) in 250 ml. $H_2O$ treated with 3 g. Br, kept in sunlight with occasional shaking and addn. of $CaCO_3$, filtered, and the filtrate concd and treated with abs. EtOH, gave *Ca 2-desoxymaltobionate*, which was filtered off and dried, treatment of this with the calcd. amt. of $(CO_2H)_2$ and evapn. of the filtrate gave the *lactone of 2-desoxymaltobionic acid*, m. 143°, $[\alpha]_D^{18}$ 21.4°. Hexaacetylmaltal (12.4 g.) in 250 ml. $CHCl_3$ treated with Cl until a sample no longer reacted with Br, let stand overnight, again treated with a little Cl, and evapd., gave 70% *1,2-dichlorohexaacetylmaltal*, m. 159°, $[\alpha]_D^{18}$ 43.4° (tetrachloroethane). This (9.2 g.), shaken in 120 ml. $CHCl_3$ 5 hrs. with 1.6 g. $AgCO_3$ and 1 ml. $H_2O$, gave, on filtration and evapn., 69% *2-chlorohexaacetylmaltal*, m. 107° (from $CHCl_3$-petr. ether), $[\alpha]_D^{18}$ 24.8° (in tetrachloroethane). This (5.2 g.) shaken at 50-70° in 50 ml. $CHCl_3$ with 500 ml. $H_2O$ and 20 g. fresh Pb oxide and then at 80-90° until the soln. was free of Cl, the filtered soln. freed of reducing substances by extn. with org. solvents (unstated), the evapd. soln. dried *in vacuo*, and the residue taken up in $H_2O$, treated with $H_2S$, filtered, and evapd., gave the *Ca salt of orthomaltosaccharic acid*, which on treatment with the calcd. amt. of $(CO_2H)_2$, filtration, and evapn., gave 60% *lactone of orthomaltosaccharic acid*, m. 168°, $[\alpha]_D^{18}$ 28.6° ($H_2O$); *phenylhydrazide*, m. 184°; the *Ba* and *Ag salts* were prepd. The acid (1.3 g.) in 200 ml. 5% $H_2SO_4$ boiled 1 hr., neutralized by $CaCO_3$, and evapd., gave, on treatment with EtOH, *Ca orthoglucosaccharate*, which with $(CO_2H)_2$ gave the *lactone of orthoglucosaccharic acid*, m. 147°, $[\alpha]_D^{18}$ 30.8°. Ca orthomaltosaccharate (4.4 g.) and 150 ml. $Me_2SO_4$ treated with 70 ml. 20% NaOH, the product extd. with $CHCl_3$, the ext. evapd., heated with 35 g. MeI in the presence of $AgCO_3$, extd. with $CHCl_3$, and the ext. evapd. gave *methylated orthomaltosaccharic acid*, 69%, $n_D^{18}$ 1.4987, $d_4^{18}$ 0.9849, $[\alpha]_D^{18}$ −47.1° ($CHCl_3$), which on hydrolysis gave *3,5,6-trimethylorthoglucosaccharic acid* (isolated as the Ca salt) and *2,3,4,6-tetramethylglucose* (isolated as the anilide, m. 136°, $[\alpha]_D^{18}$ 232.4° (in $Me_2CO$)). 2-Desoxymaltobionic acid was found to be identical with orthomaltosaccharic acid.

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GAMBOKIDZE, A. N.

26219 Sintez oksikislot. Soobshch. Akad. nauk Gruz. SSSR, 1940, 4, s. 193-96

SO: LETOPIS' NO. 35, 1949

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GAKHOKIDZE, A.

24034 GAKHOKIDZE, A. Issledovaniye krasitelya tungovykh semyan. Trudy Tbilis. Gos. Ped. IN-TA im. Pushkina, T. VI, 1949, S. 303-06. - Rezyume na Gruz. Yaz.

SO: Letopis, No. 32, 1949.

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GAKHOKIDZE, A. M.

23940 GAKHOKIDZE, A. M. Opredeleniye Stroyeniya Melibiozy. Trudy Tbilis. GOS. Ped. IN-TA IM. Pushkina, T. VI, 1949, S. 307-13. -- Rezyume Ma.

SO: Letopis, No. 32, 1949.

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GAKHOKIDZE, A. M.

23939 GAKHOKIDZE, A. M. Opredeleniye Stroyeniya Gentsiobiozy. Trudy Tbilis. Gos. PED. IN-TA IM. Pushkina, T. VI, 1949, S. 315-20. --Rezyume Na Gruz. Yaz.

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CA

**Mechanism of formation of organic acids in plants.** A. M. Gakhokidze (Chem.-Pharm. Inst., Thillisi). *Soobshcheniya Akad. Nauk Gruzinskoi S.S.R.* 10, No. 1, 25-31 (1949).—In formation of citric acid the sugar mol. is oxidized through gluconic and 5-ketogluconic acids to acetonedicarboxylic acid and $HCO_2H$, and the last 2 acids condense to form citric acid. Other org. acids also form through 5-ketogluconic acid, which is split between the 4th and 5th C atoms. This mechanism is supported by formation of tri-Et citrate from $CO(CH_2CO_2Et)_2$ and $HCO_2Et$ in the presence of powd. KOH, and by formation of citric acid from $CO(CH_2CO_2H)_2$ and $HCO_2H$ by *Aspergillus niger* cultures. 5-Ketogluconic acid can be also cleaved at the 4-5 positions yielding tartaric and glycolic acids, the latter then going to $(CO_2H)_2$. G. M. Kosolapoff

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ALEXANDER, A.M.

Synthesis of galactosido-3-glucose. Soobshcheniya Akad. Nauk Gruzinskoy S.S.R. 10, No.2, 85-90 '49. (MLRA 4:7)
(CA 47 no.14:6875 '53)

1. Chem.Pharm.Inst., Tiflis.

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**Saccharic rearrangement of bioses. IV. Isomerization of glucosido-3-glucose into biosaccharic acid.** A. M. Gakhokidze. *Zhur. Obshchei Khim.* (J. Gen. Chem.) 19, 2082-7 (1949); cf. C.A. 42, 4948i. Acetobromoglucosido-3-glucose (30.5 g.) shaken 2 hrs. with 200 ml. 60% AcOH and 40 g. Zn dust gave upon dilu. and extn. with $CHCl_3$ 78%, *hexaacetylglucosido-3-glucal* (I), m. 109° (from EtOH), $[\alpha]_D^{20}$ 18.1° ($CHCl_3$). I (6.5 g.) ozonized in AcOH and refluxed with $Et_2O$ and 60 g. Zn dust gave 69%, *hexaacetyl-α-glucosido-2-arabinose*, m. 142° (from EtOH), $[\alpha]_D^{20}$ 25.8° ($CHCl_3$), which (4.1 g.) treated in 100 ml. abs. EtOH with 1.1 g. Na in 100 ml. EtOH and shaken 1 hr., dild. with $H_2O$, neutralized with AcOH, evapd. *in vacuo*, and let stand 3 days with excess Br water in light gave *Ca glucosido-2-arabonate* (from dil. EtOH). Glucosido-3-glucal (6.1 g.) by hydrolysis of I in 300 ml. 3% $H_2SO_4$ let stand 2 days, neutralized with $BaCO_3$, and evapd. gave 77%, *glucosido-3-(2-desoxy)-glucose*, m. 188° (from dil. EtOH), $[\alpha]_D^{20}$ 22.6° (*phenylhydrazone*, m. 180-1°), which heated with $Ac_2O$-NaOAc gave *heptaacetylglucosido-3-(2-desoxy)glucose*, m. 175-6°, while treatment with Br water for 2 days gave on neutralization with $CaCO_3$ the *Ca glucosido-3-(2-desoxy)-gluconate*, the *free acid*, from the Ca salt with $(CO_2H)_2$, forms a *lactone* (II), m. 131-2°, $[\alpha]_D^{20}$ 42.4° ($H_2O$). Bromination of I in $CHCl_3$ (3 days) gave 73%, *1,2-dibromohexaacetylglucosido-3-glucose*, m. 150° (from EtOH-AmOH), $[\alpha]_D^{20}$ 10.09°, which darkens in air, losing HBr. Chlorination of hexaacetylglucosido-3-glucose in cold $CHCl_3$ gave 79%, *1,2-dichlorohexaacetylglucosido-3-glucose*, m. 161-2° (from EtOH-AmOH), $[\alpha]_D^{20}$ 54.2° ($C_6H_5CH_3$-$CHCl_3$); this (10.8 g.) shaken with 5.8 g. moist $Ag_2CO_3$ in $CHCl_3$ 5 hrs. gave 75%, *2-chlorohexaacetylglucosido-3-glucose*, m. 109° (from EtOH), $[\alpha]_D^{20}$ 39.8° ($CHCl_3$). This (7.6 g.) in 50 ml. $CHCl_3$, heated with 30 g. Pb oxide and 400 g. $H_2O$ 30.5 hrs. at 60-100° (gradually rising temp.), filtered, freed of Pb with $H_2S$, and treated with $CaCO_3$ gave 79%, *Ca glucosido-3-glucosaccharate* (from dil. EtOH), which with $(CO_2H)_2$ gave II, its *phenylhydrazide*, m. 178-80°. The Ca salt (10.4 g.) with $Me_2SO_4$ in the presence of alkali gave 8.0 g. (68%) *methylated acid*, $C_{20}H_{34}O_{11}$, $n_D^{20}$ 1.4987, $[\alpha]_D^{20}$ 12.5° ($CHCl_3$), which with boiling dil. $H_2SO_4$ gave *2,3,4,6-tetramethylglucose*, m. 91-3°, and *methylated orthoglucosaccharic acid*, isolated as the *Ba salt*, $(C_9H_{17}O_8)_2Ba$.

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**Determination of structure of disaccharides.** I. **Determination of structure of α-(1,3)glucosido-3-(1,3)-glucose.** A. M. Gakhokidze. *Zhur. Obshchei Khim.* (J. Gen. Chem.) 16, 2100-3(1949). —Octaacetylglucosido-3-glucose gives, on standing 3 hrs. in AcOH satd. with HBr, 78%, *α-bromoglucosido-3-glucose*, m. 162°, $[\alpha]_D^{20}$ 11.8°, which, shaken 2 hrs. with Zn dust in 60% AcOH, gives 80%, hexaacetylglucosido-3-glucal, m. 100°, $[\alpha]_D^{20}$ 18.1° (from EtOH); this (42.1 g.) in $CHCl_3$ shaken with 100 ml. 2% EtONa 2 hrs. gave *glucosido-3-glucal*, m. 160-2°, $[\alpha]_D^{20}$ 34.8°, oxidized by 8% $KMnO_4$ at room temp. to *glucosido-2-arabonic acid*, isolated as the Ca salt. This (11.8 g.) and 100 g. $MeSO_4$ in the presence of 25% NaOH gave 75% *Me heptamethylglucosido-2-arabonate*, syrup, which on brief boiling with 5% $H_2SO_4$ gave *3,4,5-trimethyl-D-arabonic acid* (81%), isolated as Ca salt, converted by $H_2O_2$ in the presence of Fe acetate, followed by Br water, to Ca *trimethylerythronate* (from dil. EtOH).

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**Determination of the structures of disaccharides. II. Structure of maltose.** A. M. Gakhokidze. *Zhur. Obshchei Khim.* (J. Gen. Chem.) 20, 116-19(1950); cf. *C.A.* **44**, 3013*f*. Maltose is (1,5)-glucosido-4-(1,5)-glucose, as shown by the following. Maltal (84.5 g.; from maltose, via the octaacetate, acetobromomaltose, and hexaacetylmaltal) in 400 ml. $H_2O$ and 150 ml. 5% $K_2CO_3$ was treated slowly at 30-50° with 4% $KMnO_4$ until the color persisted; evapn., taking up in 200 ml. $H_2O$, addn. of basic Pb acetate, treatment of the ppt. with $H_2S$, filtration, and neutralization with $CaCO_3$ gave 60% *Ca glucosido-3-arabonate*, amorphous flakes (from $H_2O$). This (63.6 g.) boiled 10 min. in 700 ml. $H_2O$ with 5.6 g. $BaCO_3$ and 3.2 g. $Fe_2(SO_4)_3$ in 60 ml. $H_2O$, filtered, cooled, treated with 80 ml. 30% $H_2O_2$, followed by an addnl. 20 ml. after 3 hrs., filtered, and evapd. gave 79% *glucosido-2-erythrose*, m. 141°, $[\alpha]_D^{20}$ 87.5° ($H_2O$); *hexa-Ac deriv.* (by NaOAc-$Ac_2O$), m. 127°. Shaking 19.2 g. glucosido-2-erythrose with 300 ml. Br water, letting stand 3 days in sunlight, neutralizing with $CaCO_3$, boiling 10 min., evapg., and adding abs. EtOH gave 77% *Ca glucosido-2-erythronate*, flakes; this (15.1 g.) in 250 ml. $H_2O$, freed of Ca by $(CO_2H)_2$, boiled with 100 ml. 5% $H_2SO_4$ 20 min., neutralized with $CaCO_3$, concd., and treated with EtOH, gave *Ca D-erythronate*, flakes, which, after removal of the Ca by $(CO_2H)_2$, gave *erythronic acid γ-lactone*, m. 101-2°, $[\alpha]_D^{20}$ −78.3° ($H_2O$); *phenylhydrazide*, m. 128-30°; the mother liquid yielded glucose. Ca 3,4-dimethyl-D-erythronate (4.6 g.) in 50 ml. $H_2O$ treated with 2 g. $BaCO_3$ and 1.2 g. $Fe_2(SO_4)_3$ in 10 ml. $H_2O$, and, after filtration, with 25 ml. 30% $H_2O_2$, then 100 ml. Br water, and neutralized with $CaCO_3$, yielded *Ca 2,3-dimethylglycerate*, flakes (from aq. EtOH), which with $Me_2SO_4$ in the presence of alkali gave *Me 2,3-dimethylglycerate*, b.p. 78.9°, $d_4^{20}$ 1.0508, $n_D^{20}$ 1.4581. III. **Structure of lactose.** *Ibid.* 120-3. It was shown that the 4th C atom of the reducing part of the disaccharide is involved in the linkage. Lactal (76.8 g.) with 4% $KMnO_4$ in 5% $K_2CO_3$ yielded *galactosido-3-arabonic acid*, isolated as the *Ca salt*, flakes (from dil. EtOH), in 45% yield after purification through the *insol. Pb salt*. The product upon oxidation with $H_2O_2$-Fe below room temp. yielded 60% *β-galactosido-2-erythrose*, m. 151.5°, $[\alpha]_D^{20}$ 22.5° ($H_2O$); *hexaacetate*, m. 138-40°. Oxidation of this with Br water in sunlight for 4 days gave *galactosido-2-erythronic acid*, isolated as the *Ca salt* (from dil. EtOH) in 64% yield; this, freed of Ca by $(CO_2H)_2$ and boiled with 5% $H_2SO_4$, gave *D-erythronic acid*, isolated as the *Ca salt* and as the *lactone*, m. 103-4°, $[\alpha]_D^{20}$ −60.9° ($H_2O$); *phenylhydrazide*, m. 128-31°. The mother liquor yielded galactose. Ca galactosido-2-erythronate (10.6 g.) with 100 ml. $Me_2SO_4$ and 25% NaOH gave 71% *Me hexamethylgalactosido-2-erythronate*, sirup, $n_D^{20}$ 1.4674. This (10.7 g.) boiled 20 min. with 250 ml. 5% $H_2SO_4$ and neutralized with $CaCO_3$ gave *Ca 3,4-dimethyl-D-erythronate*, which with $H_2O_2$-Fe, then with Br water in the light (3 days), gave *Ca 2,3-dimethylglycerate*, flakes (from dil. EtOH), yielding with $Me_2SO_4$-NaOH *Me dimethylglycerate*, b.p. 78-80°, $d_4^{20}$ 1.0643, $n_D^{20}$ 1.4610.

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**Determination of the structures of disaccharides. IV. Determination of the cellobiose structure.** A. M. Gak-hokidze. *Zhur. Obshchei Khim.* (J. Gen. Chem.) 20, 289-293(1950); cf. *C.A.* 44, 5819c.—The O bridge in cellobiose is in the 1,4-positions and the disaccharide is *(1,5)glucosido - 4 - (1,5)glucose.* Cellobial (m. 173-5°, $[\alpha]_D^{20}$ 1.2°) (70 g.) in 500 $H_2O$ and 200 ml. 5% $K_2CO_3$ treated with 5% $KMnO_4$ with warming, then filtered and treated with basic Pb acetate, gave Pb glucosido-3-arabonate, which on treatment with $H_2S$, filtration, heating in the presence of $CaCO_3$, and addn. of EtOH gave 71% *Ca glucosido-3-arabonate;* this (56.7 g.), 5 g. $Ba(OAc)_2$, and 2.5 g. $Fe_2(SO_4)_3$ in 800 $H_2O$ boiled 15 min., filtered, and treated with 100 ml. 30% $H_2O_2$ at room temp. and concd. gave 58% *β-glucosido-2-erythrose,* m. 140-50° (from $H_2O$), $[\alpha]_D^{20}$ 30.8° (*acetylated product,* m. 128-31°); this (22.5 g.) oxidized with Br water in sunlight for 4 days gave 71% *Ca glucosido-2-erythronate* (from dil. EtOH), which on treatment with $(CO_2H)_2$ and boiling with 5% $H_2SO_4$ gave *d-erythrono-γ-lactone,* m. 105-7° (from EtOH), $[\alpha]_D^{20}$ −71.4° (*phenylhydrazide,* m. 128-30°), and glucose. Methylation of Ca glucosido-2-erythronate with $Me_2SO_4$ and 25% NaOH gave a sirupy *methylation product,* $C_{11}H_{20}O_{10}$, $[\alpha]_D^{20}$ −42.6°, apparently the *Me ester of the hexamethyl deriv.,* which boiled 2 hrs. with 5% $H_2SO_4$ gave 68% *Ca 2,3(and 2,4)-dimethyl-d-erythronate* (from $H_2O$) which oxidized by $H_2O_2$ in the presence of Fe (as above) gave *2,3-dimethoxypropanoic acid (dimethylglyceric acid),* isolated as the *Ca salt,* flakes (from dil. EtOH), and its *Me ester,* $b_{10}$ 78°, $d_4^{20}$ 1.0021, $n_D^{20}$ 1.4596.

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**Synthesis of olmelin.** A. M. Gakhokidze. *Zhur. Prikkl. Khim.* (J. Applied Chem.) 23, 559-60(1950). *Olmelin*, identical with the natural coloring matter of *Gladiolus tranianthus*, was synthesized as follows. *p*-MeOC$_6$H$_4$CH$_2$CN (12.0 g.) and 15.7 g. phloroglucinol in 150 ml. dry Et$_2$O were satd. with dry HCl, let stand at 0° 30 hrs., the combined Et$_2$O and CHCl$_3$ extts. treated with 60 ml. H$_2$O, and the aq. layer heated 2 hrs. on a steam bath, giving 11.9 g. (13%) *2,4,6-trihydroxyphenyl 4-methoxybenzyl ketone*, m. 250-1°; its *acetylation product*, m. 160-2°; *methylation product*, C$_{17}$H$_{18}$O$_5$, m. 182-3°. The ketone (9.1 g.) and 8.5 g. EtO$_2$CH heated with 2.1 g. powd. Na in a sealed tube to 60-70° until clear and 2.5 hrs. after that, then concd., and the residue heated with 40 ml. concd. HCl and 50 ml. EtOH 3 hrs. on a steam bath, dild. with H$_2$O, and extd. with CHCl$_3$, then with Et$_2$O, gave an oil, $b_{0.1}$ 310-55°, which crystd. on standing; this (1.31 g.; 47%) was pure *olmelin*, m. 289-91°; *acetylated deriv.*, C$_{19}$H$_{16}$O$_7$, m. 165-7°; *methylated deriv.*, C$_{18}$H$_{16}$O$_6$, m. 274-5°. The olmelin gave no m.-p. depression with an authentic sample and gave the correct mol. wt. for C$_{17}$H$_{14}$O$_6$ required. G. M. Kosolapoff

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**Dye from *Gleditschia triacanthos*.** A. M. Gakhokidze (*J. appl. Chem. U.S.S.R.*, 1951, [illegible], 747—749).—It has been shown previously (*ibid.*, 1947, [illegible]) that *Gleditschia triacanthos* contains two dyes. The first (akramarine), extracted with EtOAc, is 5 : 7 : 3' : 4' : 5'-pentahydroxymethoxyflavone. Recently the second dye extracted with $CO_2Me_2$, and called olmeline, has been investigated by methylation, acetylation, and fusing with KOH. Olmeline is 5 : 7-dihydroxy-4'-methoxyisoflavone. By fusing with KOH, olmeline gives: $HCO_2H$, 2 : 4 : 6-trihydroxyphenyl (4'-methoxybenzyl) ketone, phloroglucinol, and *p*-methoxyphenylacetic acid.

J. B. J. Zara.

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**Synthesis of disaccharides. VI. Synthesis of glucosido-2-galactose.** A. M. Gukhokidze and N. D. Kutidze (Tbilissi and Sukhum Pedagog. Insts.). *Zhur. Obshchei Khim.* (J. Gen. Chem.) 22, 139-43(1952).—Pentaacetylgalactose (117 g.) and 200 g. $PCl_5$ heated 3 hrs. at 100°, distd. under 2 mm. (temp. not given), and the oily product treated with 10 ml. AmOH yielded 46% *1-chloro-2-(trichloroacetyl)-3,4,6-triacetylgalactose*, m. 150-6°, $[\alpha]_D^{20}$ 10.4° ($C_6H_6$). This (58 g.), in 400 ml. dry $Et_2O$ satd. at 0° with $NH_3$, kept 3 hrs. at room temp., chilled, filtered from the $NH_4$ salts, and evapd. gave 59% *1-chloro-3,4,6-triacetylgalactose*, m. 159-67° (from EtOH), $[\alpha]_D^{20}$ 29.1° (EtOAc). This (16.2 g.) in 200 ml. $Et_2O$ shaken 2 hrs. with 16.6 g. AgOAc, evapd., and the residue extd. with $CHCl_3$ and $Et_2O$, and the exts. evapd. gave 74% *1,3,4,6-tetraacetylgalactose*, m. 128°, $[\alpha]_D^{20}$ 11.7° (EtOH). This (12.5 g.) and 12.5 g. 2,3,4,6-tetraacetylglucose shaken 5 hrs. in $CHCl_3$ with 6 g. $ZnCl_2$, filtered, treated with 15 g. $P_2O_5$, and shaken 5 hrs., gave 81% β-(1,5)-*glucosido-2-(1,5)-galactose octaacetate*, m. 179° (from EtOH). This (20 g.) in 150 ml. $CHCl_3$ shaken 2 hrs. with 0.7 g. Na in 100 ml. MeOH, treated with 50 ml. $H_2O$, shaken, neutralized with AcOH, the aq. alc. layer evapd., the residue treated with 200 ml. MeOH and 200 ml. $Me_2CO$, filtered, evapd., and the residue extd. with the min. amt. of $H_2O$, and 40 ml. AcOH added, gave 81% β-(1,5)-*glucosido-2-(1,5)-galactose*, m. 171-2°, $[\alpha]_D^{20}$ 42.6° ($H_2O$); *phenylhydrazone*, m. 181°. Oxidation of the disaccharide with Br water gave *glucosido-2-galactonic acid*, isolated as the Ca salt (from dil. EtOH). Hydrolysis of this with 5% $H_2SO_4$ gave *galactonic acid*, isolated as the Ca salt (from $H_2O$). Oxidation of Ca glucosido-2-galactonate with 30% $H_2O_2$ in the presence of $Fe^{+++}$ gave *glucosido-L-lyxoside*, m. 139-41°, $[\alpha]_D^{20}$ 5.4° ($H_2O$); *heptaacetate*, m. 147-9°. *Glucosido-2-galactose* with $Me_2SO_4$ in 25% NaOH at 40-60° yields the *octa-Me ether*, $b_2$ unstated temp., $n_D^{20}$ 1.4712, $[\alpha]_D^{20}$ −22.7° ($CHCl_3$), after further treatment with MeI-$AgCO_3$. Hydrolysis of the methylated product 3 hrs. at 80-100° in 5% HCl gave *2,3,4,6-tetramethylglucose*, m. 93-5°, $[\alpha]_D^{20}$ 84.5°;

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*anilide*, m. 137–9°, while the filtrate, treated with Br water, with $Pb(OAc)_2$ and $CaCO_3$, gave *Ca 3,4,6-trimethylgalactonate*, converted to the *lactone* of the *free acid*, $[\alpha]_D^{20}$ 104.8°, changing to 24.8° in 2 min. in $H_2O$. Methylation of the lactone gave the *δ-lactone* of *3,3,4,6-tetramethyl-d-galactonic acid*, m. 109–1°; *amide*, m. 119–20°. VII. **Synthesis of mannoside-2-mannose.** *Ibid.* 247–51.—*1-Bromotetraacetylmannose*, m. 52–3° (30 g.), treated slowly in $Et_2O$ with 10 g. fresh dried $Ag_2O$ and 1.5 ml. $H_2O$ and the mixt. shaken 2 hrs. gave 72% *2,3,4,6-tetraacetylmannose* (I), m. 94°, $[\alpha]_D^{20}$ 25.5°. Pentaacetylmannose (75 g.) and 130 g. $PCl_5$ heated 3 hrs. at 100°, and the mixt. concd. *in vacuo* and treated with AmOH gave 56% *1-chloro-2-(trichloroacetyl)-3,4,6-triacetylmannose*, m. 134–6°, $[\alpha]_D^{20}$ 11.7° ($C_6H_6$). This (50 g.) treated with 300 ml. dry $Et_2O$ satd. with $NH_3$ and shaken 5 min. gave 88% *1-chloro-3,4,6-triacetylmannose*, m. 151–2° (from EtOH), $[\alpha]_D^{20}$ 17.1°, reduces hot Fehling soln. and gives a ppt. of AgCl with $AgNO_3$; shaken with dry AgOAc in $Et_2O$ 2 hrs. in the cold it yields 86% *1,3,4,6-tetraacetylmannose*, m. 131°. This (26.8 g.) and 20.8 g. I in dry $CHCl_3$ shaken 5 hrs. with 40 g. $ZnCl_2$ and 4 g. $SnCl_4$, filtered, and the filtrate shaken 10 hrs. with 30 g. $P_2O_5$, filtered, and concd. gave 81% *octaacetylmannoside-2-mannose*, m. 153° (from EtOH), $[\alpha]_D^{20}$ 19.2°. The product (36 g.) in dry $CHCl_3$ treated at 10° with 0.9 g. Na in 200 ml. dry MeOH, shaken 2 hrs., then treated with 100 ml. $H_2O$, neutralized with AcOH, and the aq.-alc. layer concd. gave 81% *(1,5)-mannoside-2(1,5)-mannose*, m. 141–3°, $[\alpha]_D^{20}$ 24.5° (from dil. AcOH). Oxidation of this with Br water 3 days in sunlight gave *mannoside-2-mannonic acid*, isolated as the *Ca salt* (from $H_2O$). This, oxidized with $H_2O_2$ in the presence of $Fe_2(SO_4)_3$ and $Ba(OAc)_2$ and treated with $Ac_2O$-AcONa, gave *heptaacetylmannoside-D-arabinose*, m. 147–9° (from EtOH); the deacetylated product does not react with Fehling soln. nor with Tollens reagent. *Mannoside-2-mannose* with $Me_2SO_4$ in 25% NaOH gave 54% *octa-Me deriv.*, distillable at 2 mm., $n_D^{20}$ 1.4661, $[\alpha]_D^{20}$ −13.6°. This, heated 3 hrs. in much 5% HCl and $CHCl_3$ gave *2,3,4,6-tetramethylmannose*, m. 50–1°, $[\alpha]_D^{20}$ 27.4°; *anilide*, m. 143–5°, $[\alpha]_D^{20}$ −8.0°. The mother liquor, after sepn. of the tetra-Me deriv., oxidized with Br water 3 days in sunlight, yielded *3,4,6-trimethylmannonic acid*, isolated as the *Ca salt* (from aq. EtOH), which with $(CO_2H)_2$ gave the *δ-lactone* of *3,4,6-trimethylmannonic acid*, m. 95–6°, whose *d*-rotation changes very rapidly in aq. soln.; *phenylhydrazide*, m. 139–40°.

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**Isomerization of disaccharides. I. Isomerization of glucosido-3-glucose.** A. M. Gakhokhidze and I. A. Gvelukashvili (Tbilisi Pedagog. Inst.). *Zhur. Obshchei Khim.* (J. Gen. Chem.) 22, 143-7(1952).—Shaking acetylated glucosido-3-glucose with ashanite in $CHCl_3$ 10 days in the cold yields *glucosido-3-mannose octaacetate*, m. 142-3°, $[\alpha]_D^{20}$ 35.6°. Hydrolysis yields the *free disaccharide*, m. 165°, $[\alpha]_D^{20}$ 27.9°. This, oxidized with Br water 5 days in sunlight, gave 81% *glucosido-3-mannonic acid*, isolated as the *Ca salt* (from $H_2O$); *free acid*, sirup, which, boiled with 5% $H_2SO_4$, gave *mannonic acid*, isolated as the *Ca salt* (from $H_2O$), and glucose, isolated as the phenylglucosazone, m. 204-6°. Oxidation of glucosido-3-mannonic acid with $H_2O_2$ in the presence of $Fe^{+++}$ gave *glucosido-3-D-arabinose*, 50%, m. 149-50°, $[\alpha]_D^{20}$ 29.5°; *phenylhydrazone*, m. 177-81°. Acetylation of this disaccharide gave the *heptaacetate*, m. 139-40°, $[\alpha]_D^{20}$ 46.6°. Boiling glucosido-3-mannonic acid with dil. $H_2SO_4$ gave glucose and *mannonic acid*, isolated as the *Ca salt*, which on acidification yielded the *lactone*, m. 149-50°, $[\alpha]_D^{20}$ 50.8°; *phenylhydrazide*, m. 213-14°, $[\alpha]_D^{20}$ 15.8°. *Tetraacetate of the lactone*, m. 119-20°, $[\alpha]_D^{20}$ 51.4°. Refluxing 20 g. *glucosido-3-glucose* with 10 g. NaOAc and 130 g. $Ac_2O$ 3 hrs. and treatment with cold $H_2O$ gave 78% *octaacetate*, m. 149-50°. II. **Isomerization of galactosido-3-glucose.** A. M. Gakhokhidze and E. G. Kobiashvili *Ibid.* 244-7.—Shaking 25.8 g. galactosido-3-glucose octaacetate in 350 ml. dry $CHCl_3$ with 100 g. dry Ascarite 10 days in the cold, warming to 70°, evapg., and chromatographing on $Al_2O_3$, gave *3-galactosidomannose*, m. 159°, $[\alpha]_D^{20}$ 34.8°, after hydrolysis of the corresponding *octaacetate*, m. 151-2°, $[\alpha]_D^{20}$ 41.2°. Oxidation of the new disaccharide with Br water 5 days in the light gave 78% *Ca 3-galactosidomannonate* (I). The free sirupy acid, heated with 5% $H_2SO_4$ and neutralized with $CaCO_3$, yields *Ca mannonate*, which with $(CO_2H)_2$ gives the *lactone of mannonic acid*, m. 149-50°, $[\alpha]_D^{20}$ 50.8°; *phenylhydrazide*, m. 213-14°, $[\alpha]_D^{20}$ −15.8°. The mother liquor after sepn. of the lactone, contains galactose, as shown by its reaction with $PhNHNH_2$ to yield the osazone, m. 194-6°. Oxidation of 5.1 g. I in 100 ml. $H_2O$ with 1.2 g. ferric sulfate, 1.6 g. $Pb(OAc)_4$, and 40 ml. 30% $H_2O_2$ gave 53% *galactosido-3-D-arabinose* (II), m. 143-4°, $[\alpha]_D^{20}$ 34.4°, which with $PhNHNH_2$ gave the *hydrazone*, m. 184-6° (from EtOH). Acetylation of II gave the *heptaacetate*, m. 139-42°, $[\alpha]_D^{20}$ 40.6°. Thus, the O bridge does not change location. G. M. K.

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GAKHOKIDZE, A.M.

USSR/Chemistry—Beta -Hydroxy Acids Apr 52

"The Problem of Preparing β-Hydroxyacids; Some Remarks on the Articles of A. M. Gakhokidze "Condensation of Ketones With Esters of Organic Acids,'" N. S. Vul'fson

"Zhur Obshch Khim" Vol XXII, No 4, pp 718-720

In repeating Gakhokidze's expts on producing β-hydroxy acids, his findings were not confirmed. The consts of the original maline ester cited by Gakhokidze do not agree with the consts of the diethyl and dimethyl esters of malonic acid. The consts of diethyl ester of isopropylidene malonic acid cited by the authors do not correspond to the

224T54

consts given for this compd. Gakhokidze and Guntsadze's suggested method for sepg hydroxy acids by saponification with alcoholic alkali was not applied, because these substances decomp easily.

224T54

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOKIDZE, A.M.

Contribution of Georgian scientists to the development of chemistry in the last 40 years. Zhur.ob.khim. 31 no.6:I-VI Je '61. (MIRA 14:6)

(Georgia—Chemistry)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOKIDZE, Akakiy Melitonovich

[Laboratory work in organic and biological chemistry] [Praktikum po organicheskoi i biologicheskoi khimii. Tbilisi, Gos.izd-vo "TSodna,"] 1963. 210 p. [In Georgian] (MIRA 17:4)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOKIDZE, Akakiy Melitonovich; IVANOV, Boris Vladimirovich

[Organic and biological chemistry] [Organicheskaia i biologicheskaia khimiia. Tbilisi, Ganatleba] 1965. 458 p. [In Georgian] (MIRA 18:7)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, A.G., inzh.

Discussion of the proposed new version of "Norms on electric lighting." Svetotekhnika 8 no.2:26 F '62. (MIRA 15:1)

1. TSentral'nyy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva nechernozemnoy zony SSSR.
(Electric lighting--Standards)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, A.G.

Development of lighting engineering norms. Svetotekhnika 9 no.8:27 Ag '63. (MIRA 16:8)

1. TSentral'nyy nauchno-issledovatel'skiy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva nechernozemnoy zony SSSR.
(Electric lighting—Standards)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F.D.

**Gahov, F. D.** On Riemann's boundary problem for a system of $n$ pairs of functions. Doklady Akad. Nauk SSSR (N.S.) 67, 601–604 (1949). (Russian)

Let $L$ be a system of simple closed, suitably smooth, curves, bounding a connected domain $S^+$ and the complementary region $S^-$. The Riemann problem is: to find functions $\varphi_i^+(z)$, $\varphi_i^-(z)$ $(i=1, \cdots, n)$, analytic in $S^+$, $S^-$, respectively, such that (1) $\varphi_i^+=\sum_j a_{ij}\varphi_j^-+b_j$ (on $L$), the $a_{ij}$ and $b_j$ being assigned of a Hölder class on $L$; $\det|a_{ij}|\neq 0$ (on $L$). With the aid of vector and matrix notation (1) is written as (1′) $\varphi^+=A\varphi^-+b$. The fundamental problem is to construct a canonical solution, whose determinant is not 0 for $z$ finite and the sum of whose orders at $\infty$ is equal to the order (at $\infty$) of $|A|$. The author solves the Riemann problem when $A$ is the product of matrices $\Omega^+$, $\Omega^-$, consisting of boundary values of functions analytic in $S^+$ and $S^-$, respectively: (2) $\varphi^+=\Omega^+\Omega^-\varphi^-$. A typical result is as follows. Let $\operatorname{ind}|\Omega^+(t)|=m$ (that is, $|\Omega^+(z)|$ has $m$ zeros in $S^+$); then $\Omega^+=X^+Q$, where the elements of $X(z)$ are of the same character as in $\Omega^+$, while $Q(z)$ is a polynomial matrix, the zeros of $|Q(z)|$ being coincident with those of $|\Omega^+(z)|$. The particular indices are the orders at infinity of the solutions of the canonical system, with signs reversed. After a canonical system $X(z)$ is found, the general solution of the homogeneous equation $\varphi=XP$ can be constructed; here $P$ is a vector whose elements are polynomials with powers equal to the particular indices, diminished by unity (when $\kappa_j-1<0$, the polynomial is identically zero). The general solution of the nonhomogeneous problem is given by $\varphi(z)=X(z)[(2\pi i)^{-1}\int[X^+(t)]^{-1}b(t)(t-z)^{-1}dt+P(z)]$.

*W. J. Trjitzinsky* (Urbana, Ill.).

Source: Mathematical Reviews, Vol 11 No. 3

Kazan' State Univ.

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F.D.

Gahov, F. D. On a case of Riemann's boundary problem for systems of $n$ pairs of functions. Izvestiya Akad. Nauk SSSR. Ser. Mat. 14, 549-568 (1950). (Russian)

This is a detailed account of the results announced in an earlier paper [Doklady Akad. Nauk SSSR (N.S.) 67, 601-604 (1949); these Rev. 11, 169]. A somewhat more general case is considered insofar as the matrix $\Omega^-$ is assumed to consist of boundary values of functions that are analytic in the finite part of $S^-$ but may have poles at infinity. Correspondingly, the solutions are permitted to have poles at infinity. The author also considers the case where the determinant of the coefficient matrix has zeros on the boundary. The solution of the problem is based on a transformation of the boundary conditions to a canonical form, which is similar to the transformation of the basis of an algebraic field to normal form as used in the theory of algebraic functions.

*M. Golomb* (Lafayette, Ind.).

Source: Mathematical Reviews, Vol 12 No. 6

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

191T100

USSR/Mathematics - Bibliography Sep/Oct 51

"Criticism and Bibliography," S. G. Mikhlin, F. D. Gakhov, M. A. Naymark

"Uspekh Matemat Nauk" Vol VI, No 5 (45), pp 206-210

Following 3 books reviewed: (1) V. D. Kupradze, "Boundary-Value Problems of the Theory of Oscillations and Integral Equations," 1950, 4,000 copies, 12.60 rubles; (2) N. P. Vekua, "Systems of Singular Integral Equations and Certain Boundary-Value Problems," Gostekhizdat, 1950, 252 pp, 9.50 rubles; (3) F. R. Gantmakher and M. G. Kreyn, "Oscillational Matrices and Kernels and Small Oscillations

191T100

USSR/Mathematics - Bibliography (Contd) Sep/Oct 51

of Mechanical Systems," 2d Ed, Gostekhizdat, 1950, 359 pp, 16.50 rubles.

191T100

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F.D.

Gahov, F. D. On singular cases of Riemann's boundary problem. Doklady Akad. Nauk SSSR (N.S.) 80, 705–708 (1951). (Russian)

This paper continues the work of some earlier papers of the author on the same problem [same Doklady 67, 601–604 (1949); these Rev. 11, 169; Izvestiya Akad. Nauk SSSR. Ser. Mat. 14, 549–568 (1950); these Rev. 12, 402]. It extends the solution to the case where the elements of the matrix $A$ become infinite of some integral order and where the determinant of $A$ may vanish, both at a finite number of points on $L$. By a transformation of $A$ to a canonical form similar to that used in the preceding papers the author finds that the number of linearly independent solutions of the homogeneous problem is not affected by the existence of zeros of $|A|$ but diminished according to the number of "poles" of the matrix elements, and that the integrability conditions for the nonhomogeneous problem are correspondingly changed. *M. Golomb* (Lafayette, Ind.)

Source: Mathematical Reviews, Vol 13 No. 6

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

USSR/Mathematics - Bibliography May/Jun 52

"Review of I. I. Privalov's Book 'Boundary Properties of Analytical Functions,'" F. D. Gakhov

"Uspekh Matemat Nauk" Vol VII, No 3 (49), pp 185-187

Reviewed book is the 2d edition, considerably revised and supplemented, under the editorship of A. I. Markushevich; published by the Gostekhizdat (State Tech Press), Moscow/Leningrad, 1950, price 11.85 rubles, 336 pp, 5,000 copies. The revision of Privalov's book was carried out by a collective of authors chapter by chapter, so that the book is

218T75

USSR/Mathematics - Bibliography May/Jun 52
(Contd)

essentially news. Reviewer criticizes its main deficiency: the absence of a living connection with the soln of practical boundary-value problems in the theory of analytical functions; otherwise the book is excellent.

218T75

GAKHOV, F. D.

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

USSR/Mathematics - Boundary-Value Problem Jul/Aug 52

"Boundary-Value Problem of Riemann for a System of n Pairs of Functions," F. D. Gakhov

"Uspekhi Matemat Nauk vol VII, No 4 (50), pp 3-54

Discusses historical knowledge of subject problem, basic facts flowing from the reducibility of a boundary-value problem to a system of Fredholm integral eqs, theory of linear transformations, canonical system of solns, general soln of a boundary-value problem, special case of zero determinant, boundary-value problem with discontinuous coeffs, open contours, coeffs from the field of algebraic functions, generalized boundary-value problem analogous to Riemann's problem, systems of singular integral eqs, singular functional eqs, and systems of singular integrodifferential eqs.

225T57

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

**Gahov, F. D. Concerning a note of I. C. Gohberg.** Uspehi Matem. Nauk (N.S.) **7**, no. 6(52), 181–182 (1952). (Russian)

The author criticises the paper of Gohberg [Uspehi Matem. Nauk (N.S.) **7**, no. 2(48), 149–156 (1952); these Rev. **14**, 54 which see for notations], and calls attention to his 1941 dissertation [Izvestiya Kazan. Fiz.-Mat. Obšč. (3) **14**, 75–159 (1949); unavailable for review], to the work of D. I. Šerman [Akad. Nauk SSSR. Prikl. Mat. Meh. **12**, 423–452 (1948); **15**, 75–82 (1951); these Rev. **10**, 305; **12**, 832] and the (unavailable) dissertation of L. A. Čikin [Singular cases of Riemann's boundary problem and of singular equations, Kazan, 1952]. He states without proof a result that the singular operator $A$ is regularisable if $A\varphi(t)=g(t)$ is soluble, and this he considers a less restrictive result than Gohberg's that the non-vanishing of $a^2(t)-b^2(t)$ was not only sufficient but necessary when the regularising operator $M$ was to be bounded on $L_2$ into $L_2$. On the other hand, Gohberg did not require solubility, a term not precisely defined in the note under review. *F. V. Atkinson.*

SOV. MATHEMATICAL REVIEW (Unclassified)
Vol XIV No 8, September 1953, pp 713-830

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

1 Oct 52

USSR/Mathematics - Inverse Boundary Problems

"Inverse Boundary-Value Problems," F. K. Gakhov, Kazan State

DAN SSSR, Vol 86, No 4, pp 649-52

Considers boundary-value problem originating in theory of jet flow of fluids which was originally formulated as problem of determining the contour of a region according to values given on it, of function u, harmonic in the region, and according to its normal derivative du/dn. States that inverse boundary-value problems have found immediate technical application, mainly in hydrodynamics and elasticity theory. Improves M. T. Nuzhin's statement of problem. Investigates conditions governing functional character which are imposed on given functions and sesired contour. Proves the solvability of so called exterior problem. Presented by Acad M. V. Keldysh 12 Jul 52.

252T68

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

USSR/Mathematics - Boundary-Value Problem, Riemann's — Mar/Apr 52

"Singular Cases of Riemann's Boundary-Value Problem for Systems of n Pairs of Functions," F. D. Gakhov, Kazan State U imeni Lenin

"Iz Ak Nauk SSSR, Ser Matemat" Vol XVI, No 2, pp 147-156

Considers the cases where the elements of the matrix of coeffs of the boundary-value problem are converted into infinity or its determinant is converted into zero. As a general tendency it is established that the presence of poles in the elements

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USSR/Mathematics - Boundary-Value Problem, Riemann's (Contd) — Mar/Apr 52

of the matrix decreases the number of linearly independent solns or increases the number of conditions of soly of the problem, but the presence of zeros in the determinant does not change these quantities. The variation in the number of linearly independent solns is exactly established in the simplest cases. Submitted by Acad M. V. Keldysh 14 Jul 51.

206T71

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

**Gahov, F. D.; and Čhrikov, L. I. On Riemann's boundary problem for the case of intersecting contours.** Kazan. Gos. Univ. Uč. Zap. 113, no. 10 (1953), 107–110. (Russian)

Let $L$ be a contour in the $z$-plane consisting of a finite collection of closed and open piecewise smooth arcs having a finite number of common points and let $g(t)$, $G(t)$ be functions given on $L$ satisfying a Hölder condition and $G(t)\neq 0$. Let it be required to find a piecewise holomorphic function $\Phi(z)$ which has right and left hand limits on $L$ satisfying $\Phi^+(t)=G(t)\Phi^-(t)+g(t)$ except at points of intersection and at endpoints of $L$ where $\Phi(z)$ may become infinite of order $<1$ and of infinitely small order, respectively. The solution of this Riemann-Hilbert problem is obtained by quadratures from the "canonical solution" $X(z)$ which is a particular solution of $X^+(t)=G(t)X^-(t)$ vanishing at no ordinary point of $L$ and of highest possible order at $\infty$. The authors construct $X(z)$ as follows: Let $t_k$ be an arbitrary point on the closed curve $L_k\subset L$ or an endpoint of the open $L_k$; let

$$\log G(t_k-0)-\log G(t_k+0)=2\pi i\chi_k;$$

$$\Gamma(z)=\frac{1}{2\pi i}\int_L \frac{\log G(\tau)}{\tau-z}\,d\tau.$$

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

Gahov, F. D.

Then $X(z)=\Pi(z-t_k)^{-\varkappa_k}e^{\Gamma(z)}$. This is a simpler expression for $X(z)$ than that found by Kveselava [Akad. Nauk Gruzin. SSR. Trudy Tbiliss. Mat. Inst. Razmadze 17 (1949), 1–27; MR 13, 135]. *M. Golomb.*

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

~~GAKHOV~~, F. D.

GAKHOV, F. D.

**Gahov, F. D.: Riemann's boundary problem for a system of $n$ pairs of functions.** Uspehi Matem. Nauk (N.S.) **7**, no. 4(50), 3–54 (1952). (Russian)

In this comprehensive study the work on the Riemann boundary value problem for systems of analytic functions of a complex variable done by the author, by Mushelišvili, Vekua, Magnaradze and others [see, e.g., these Rev. **6**, 272; **10**, 439; **11**, 169] is summarized and extended in various directions. The basic problem is as follows: Let $L$ be a system of disjoint closed smooth curves bounding a bounded region $D^+$ and the complementary region $D^-$. A "piecewise analytic" vector $\varphi(z)$ with components $\varphi_i^+(z)$ analytic in $D^+$ and $\varphi_i^-(z)$ analytic in $D^-$ $(i=1, 2, \cdots, n)$ is to be found such that $\varphi^+=A\varphi^-+b$ on $L$. Here $\varphi^+(t)$, $\varphi^-(t)$ are the limits of $\varphi(z)$ as $z$ approaches $t$ on $L$ from within $D^+$, $D^-$ respectively, $A(t)=(a_{ij}(t))$ is a matrix and $b(t)=(b_i(t))$ a

SO: MATHEMATICAL REVIEWS (unclassified)
Vol. 14, No. 7, July-Aug. 1953, pp.609-712.

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

PA 243T83

USSR/Mathematics - Singular Integrals Nov/Dec 52

"Concerning the Note of I. Ts. Gokhberg," F. D. Gakhov

"Usp Matemat Nauk" Vol 7, No 6 (52), pp 181-182

Gokhberg's note "An Application of the Theory of Normed Rings to Singular Integral Equations" ("Usp Matemat Nauk," Vol 7, No 2) deals with the following theorem: In order that the operator $a(t)f(t) + \frac{b(t)}{\pi i}\int \frac{f(s)ds}{s-t} + Tf$, where T is completely continuous operator, should admit

243T83

regularization, it is necessary and sufficient that the following condition should hold $a^2(t)-b^2(t) \neq 0$. Gakhov takes exception to the condition, since regularization is independent of the condition.

243T83

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

Mathematical Reviews
Vol. 14 No. 7
July - August 1953
Analysis

**Gahov, F. D. On inverse boundary problems.** Doklady Akad. Nauk SSSR (N.S.) 86, 649–652 (1952). (Russian)

Soient: $L_w$, la courbe fermée, simple, assez régulière du plan de la variable complexe $w=u+iv$, définie au moyen des équations paramétriques $u=u(s)$, $v=v(s)$, $0\leq s\leq l$, où $u(s)$ et $v(s)$ admettent la période $l$; $D_w^+$, $D_w^-$ les domaines intérieur et extérieur de $w$, limités par $L_w$; $L_z$, $D_z^+$, $D_z^-$, des éléments analogues du plan $z=x+iy$ ($D_z^+$ pouvant être multiplement connexe). L'A. se propose d'associer à $L_w$ un contour $L_z$, de manière que $u(s)+iv(s)$ soit la valeur frontière de la fonction analytique, réalisant l'application conforme de $D_z^+$ (ou $D_z^-$) sur $D_w^+$ ou $D_w^-$. On constate que le problème intérieur a toujours une solution et une seule—moyennant, bien entendu, quelques hypothèses de régularité. Pour le problème intérieur, l'unicité n'a lieu que moyennant une condition supplémentaire dont la discussion reste à faire. *J. Kravtchenko* (Grenoble).

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

On Inverse Boundary Value Problems
Uch. Zap. Kazansk. un-ta, Vol 113, No 10, 1953, pp 9-20

The author develops, corrects, and supplements an article which was published earlier in Dok Ak Nauk SSSR, Vol 86, No 4, 1952, pp 649-652. The internal and external problems are formulated and a number of theorems are proved on the existence and uniqueness of their solutions. The abstractor, S. N. Andrianov, states that the question of the uniqueness of the solution of the external problem is left open. (RZhMat, No 5, 1955)

SO: Sum. No. 639, 2 Sep 55

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F.D.; KHAPLANOV, M.G.; AL'PER, S.Ya.

"Brief outline of mathematical analysis." A.IA.Khinchin. Reviewed by F.D.Gakhov, M.G.Khaplanov, S.IA.Al'per. Usp.mat.nauk 9 no.4: 266-275 '54. (MLRA 8:1)
(Calculus) (Khinchin, Aleksandr IAkovlevich, 1894- )

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F.D.

"Theory of functions of real variables." N.A.Orlov. Reviewed by F.D.Gakhov. Usp.mat.nauk 9 no.4:277-280 '54. (MLRA 8:1)
(Functions of real variables) (Orlov, N.A.)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

Gahov, F. D.; and Cerskii, Yu. I. Special integral equations of convolution type and an area problem of the type of Riemann's problem. Kazan. Gos. Univ. Uč. Zap. 114 (1954), no. 8, 21–33. (Russian)

The contents of this paper represent a special case of the analytical results presented in the paper reviewed below. Using the notations of the latter review, the present paper solves the homogeneous equations (1) and (2) for Case I.a. and II.b. respectively. *J. F. Heyda.*

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKOV, F. D.

USSR/Mathematics - Integral equations

Card 1/1 Pub. 22 - 3/40

Authors : Gakhov, F. D., and Cherskiy, Yu. I.

Title : Integral equations of a special type ("svertka")

Periodical : Dok. AN SSSR 99/2, 197-199, Nov 11, 1954

Abstract : Solutions of integral equations of the following type: $f(x) + \frac{1}{\sqrt{2\pi}}\int_0^{\infty} k_1(x-t)f(t)dt + \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{0} k_2(x-t)f(t)dt = g(x)$, $-\infty < x < \infty$; and $f(x) + \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} k_1(x-t)f(t)dt = g(x)$, $0 < x < \infty$, $f(x) + \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} k_2(x-t)f(t)dt = g(x)$, $-\infty < x < 0$ are sought. It was believed that those equations can be solved only by Fourrier's transform which would reduce them to the problem of finding boundary conditions of the theory of analytical functions. Five different cases of the boundary problem are analyzed. Three USSR references (1949-1953).

Institution : Rostov on the Don River State University im. V. M. Molotov

Presented by: Academician V. I. Smirnov, July 9, 1954

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

USSR/Mathematics - Singular integrals FD-1424

Card 1/1 : Pub. 64 - 2/9

Author : Gakhov, F. D. (Rostov), and Chibrikova, L. I. (Kazan')

Title : Certain types of singular integral equations solvable in closed form.

Periodical : Mat. sbor., Vol. 35(77), pp 395-436, Nov-Dec 1954

Abstract : Gives the historical background and statement of the problem. Reduces the complete singular equation to a boundary value problem. Discusses finite groups of fractional-linear transformations and automorphous functions. Solves the Riemann problem for intersecting contours and gives the solution of the boundary value problem. Considers equations with kernels invariant during transformations of the group, and equations with kernel that acquire multiples during transformations of the group. Examples of these are given. Eight references.

Institution : ...

Submitted : June 18, 1953

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D

Gahov, F. D. On the inverse boundary problem of a multiply-connected domain. Rostov. Gos. Ped. Inst. Uč. Zap. no. 3 (1955), 19-27. (Russian)

Let (1) $\{u_k(s), v_k(s)\}$ $(k=0, 1, \cdots, n)$ denote $n+1$ pairs of continuous periodic functions with respective periods $l_k$. Let $L_{wk}$ denote the family of $n+1$ curves which (1) determines in the $w$-plane; suppose that each of the curves is simple, that no two of them intersect, and that the family of curves determines a finite domain $D_w$ of connectivity $n+1$.

The inverse boundary problem is this: to construct $n+1$ rectifiable closed curves $L_{zk}$ which define a finite domain $D_z$ (not necessarily single-sheeted) in the $z$-plane such that the complex-valued functions

$$w_k(s)=u_k(s)+iv_k(s),$$

with $s$ representing arc length on $L_{zk}$, give the boundary values of a function $w(z)$ which effects the conformal mapping of $D_z$ onto $D_w$. Under the hypothesis that the $u_k$ and $v_k$ are differentiable, the author obtains some necessary and some sufficient conditions on (1) for the existence of a solution of the problem. *G. Piranian.*

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9"

"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F-D

Gahov, F. D.; and Čerskiĭ, Yu. I. Singular integral equations of convolution type. Izv. Akad. Nauk SSSR. Ser. Mat. 20 (1956), 33–52. (Russian)

In this paper the authors solve the equation

$$(1)\quad f(x)+(2\pi)^{-1}\int_0^\infty k_1(x-t)f(t)\,dt+(2\pi)^{-1}\int_0^\infty k_2(x-t)f(t)\,dt=g(x)\quad(-\infty<x<\infty),$$

and also the dual equations

$$(2)\quad \begin{aligned} f(x)+(2\pi)^{-1}\int_{-\infty}^\infty k_1(x-t)f(t)\,dt&=g(x)\quad(0<x<\infty)\\ f(x)+(2\pi)^{-1}\int_{-\infty}^\infty k_2(x-t)f(t)\,dt&=g(x)\quad(-\infty<x<0)\end{aligned}$$

wherein, for the kernels involved, it is assumed that

$$(*)\quad k_j(x)e^{-yx}\in L(-\infty,\infty)\quad(a_j\le y\le b_j;\ j=1,2,\cdots),$$

and, for the solution function $f(x)$, that

$$f(x)=f_+(x)-f_-(x),$$

$$(**)\quad \begin{aligned} f_+(x)e^{-xy}&\in L^2(-\infty,\infty)\quad(y\ge\beta),\\ f_-(x)e^{-xy}&\in L^2(-\infty,\infty)\quad(y\le\alpha),\end{aligned}$$

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Gabov, F. D.; Cerskii, Yu. I.

where $f_+(x)$ and $f_-(x)$ are defined by $f_+(x)=\eta(x)f(x)$, $f_-(x)=-\eta(-x)f(x)$, $\eta(x)$ being the unit step function, $\eta(x)=0$ for $x<0$, $=1$ for $x>0$. Values of $\beta$ and $\alpha$ are determined so as to insure the widest possible class of functions in (**) consistent with the existence of the integrals appearing in (1) and (2). Denoting these values by $\bar{\beta}$ and $\bar{\alpha}$, it is found that for (1)

$$(1^*) \qquad \bar{\beta}=b_1, \ \bar{\alpha}=a_2,$$

and for (2)

$$(2^*) \qquad \bar{\beta}=\min(b_1, b_2)=b, \ \bar{\alpha}=\max(a_1, a_2)=a.$$

For equation (1) it is then found that the widest possible class for $g(x)$, in view of (*), (**), and (1*) is

$$(***) \quad \begin{cases} \left.\begin{array}{l} g_+(x)e^{-yx} \in L^2(-\infty, \infty), \ y \geqq b_1 \\ g_-(x)e^{-yx} \in L^2(-\infty, \infty), \ y \geqq a_2 \end{array}\right\} \text{when } b_1 \geqq a_2, \\ \left.\begin{array}{l} g_+(x)e^{-yx} \in L^2(-\infty, \infty), \ y \geqq a_2 \\ g_-(x)e^{-yx} \in L^2(-\infty, \infty), \ y \leqq b_1 \end{array}\right\} \text{when } b_1 < a_2. \end{cases}$$

The following cases are then established for solving (1) and (2). For (1): Case I.a. $b_1 \geqq a_2$; case I.b. $b_1 < a_2$. For (2): Case II.a. $b_1 < a_1$; case II.b. $b \geqq a$; case II.c. $b_2 < a_1$. The

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Gahov, F. D.; Čerskiĭ Yu. I.

cases corresponding to equality in I.a. and II.b. represent solutions obtained previously [see the paper reviewed below and I. M. Rapoport, Sb. Trud. Inst. Mat. Akad. Nauk Ukrain. SSR 12 (1949), 102–118].

The principal tool in the solution of (1) and (2) for the cases enumerated is the Riemann boundary problem for a complex contour consisting of two parallel lines. By suitably manipulating the given equations and then taking the Fourier transform, the given equations (1) and (2) can be restated in a form corresponding directly to the boundary problem, for which the solution is given. The inequalities characterizing the cases enumerated determine the positions of the parallel lines comprising the contour and hence delimit the regions of analyticity of the transformed functions.

The solution of (1) for case I.a. turns out to be

(3) $f(x)=$

$$(2\pi)^{-\frac{1}{2}}\int_{i\delta_1-\infty}^{i\delta_1+\infty}\Phi^+(\zeta)e^{-ix\zeta}d\zeta-(2\pi)^{-\frac{1}{2}}\int_{i\alpha_0-\infty}^{i\alpha_0+\infty}\Phi^-(\zeta)e^{-ix\zeta}d\zeta,$$

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Gabor, F. D.; Gerskiĭ, Ya. I.

where $\Phi(\zeta)$ is the solution of the Riemann boundary-value problem appropriate to this case. The function $\Phi(\zeta)$ is rather involved and will not be reproduced here.

*J. F. Heyda* (Indianapolis, Ind.).

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

Gakhov, F. D.

Call Nr: AF 1108825
(Cont.)

Transactions of the Third All-union Mathematical Congress Moscow, Jun-Jul '56, Trudy '56, V. 1, Sect. Rpts., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp.

Gabib-Zade, A. Sh. (Baku). Investigation of the Ramification Points of Non-linear Loaded Integral Equations With Various Parameters. 44-45

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Mention is made of Keldysh, M. V.

Gal'pern, S. A. (Moscow). Cauchy Problem for the Equations of S. L. Sobolev Type 47-48

There is mention of Petrovskiy, I. G.

There are 4 references, all of them USSR.

Gakhov, F. D. (Rostov-na-Donu). Chibrikova, L. I. (Kazan') "Some Types of Singular Integral Equations Solvable in Closed Form." 43-49

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

Gakhov, F. D.

Call Nr: AF 1108825

Transactions of the Third All-union Mathematical Congress (Cont.) Moscow, Jun-Jul '56, Trudy '56, V. 1, Sect. Rpts., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp.

Gagayev, B. M. (Kazan'). Some Properties of Orthogonal Functions. 77

Gakhov, F. D. (Rostov-na-Donu); Krikunov, Yu. M. (Kazan'). Topological Methods in the Theory of Function of a Complex Variable and Their Application for Solving Inverse Boundary Problems. 77-78

There is 1 reference, which is a translation into Russian.

Gel'fer, S. A. (Gor'kiy). On a Maximum Conformal Radius of the Fundamental Domain of a Given Group. 78

Mention is made of Lavrent'yev, M. A.

Geronimus, Ya. L. (Khar'kov). On Some Sufficient Convergence Conditions of the Fourier-Chebyshev Process. 78-79

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F.D.; KRIKUNOV, Yu.M.

Topological methods in the theory of functions of complex variables and their application in inverse boundary problems. Izv.AN SSSR. Ser.mat. 20 no.2:207-240 Mr-Ap '56. (MLRA 9:11)

1. Predstavleno akademikom M.A. Lavrent'yevym.
(Functions of complex variables) (Topology)

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GAKHOV, F.D.

GAKHOV, F.D.

Seminar on mathematical analysis and mechanics at the Rostov State University. Usp.mat.nauk 12 no.3:263-266 My-Je '57. (MIRA 10:10)
(Rostov--Mathematics) (Rostov--Mechanics)

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

16(1)

AUTHORS: Gakhov, F.D., and Mel'nik, I.M. (Rostov-na-Donu) SOV/41-11-1-3/12

TITLE: Singular Boundary Points in Reversion-Boundary Value Problems of the Theory of Analytic Functions

PERIODICAL: Ukrainskiy matematicheskiy zhurnal, 1959, Vol 11, Nr 1, pp 25-37 (USSR)

ABSTRACT: According to M.T.Nuzhin [Ref 1] the reversion problem consists in the determination of the boundary from the given values of an analytic function on this sought boundary. The given functions are chosen sufficiently smooth by the authors in order to avoid a nowhere smooth boundary as solution, but for the given functions single simple singularities are admitted so that the boundary becomes also singular in the corresponding points. The kind of these singularities is investigated with function geometrical and differential geometrical methods. The authors mention G.G.Tumashev.
There are 7 Soviet references.

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USSR / BOOK EXPLOITATION. SOV/3981

Issledovaniya po sovremennym problemam teorii funktsiy kompleksnogo peremennogo; sbornik statey (Investigation of Modern Problems in the Theory of Complex Variables; Collection of Articles) Moscow, Fizmatgiz, 1960. 544 p. 3,000 copies printed.

Ed. (title page): A. I. Markushevich; Eds. (Inside book): V. S. Vidunskiy and S. Ya. Khavinson; Tech. Ed.: S. Ya. Karzakova.

PURPOSE: This book is intended for specialists in the theory of functions of a complex variable. It may also be used by advanced university students, scientific workers, and specialists in other fields of mathematics.

COVERAGE: The book contains 43 papers originally read at the Third All-Union Conference on the Theory of Functions of a Complex Variable held at Kiev University from May 28 to June 1 1957. The articles treat problems in the modern theory of functions and its applications. The book is divided into 7 parts. The first part discusses the problem of univalency, power series, boundary and extremal properties. The second part discusses entire functions and interpolation and approximation problems. The third part discusses functions of many complex variables. The fourth part [illegible] conformal mappings and boundary-value problems. The [illegible] Riemann surfaces and the theory of distribution [illegible] discusses generalized analytic functions [illegible] miscellaneous problems.

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Batyrev, A. V. (Rostov-na-Donu). Conformal Mapping of Close Regions 358

Mandzhavidze, G. F. (Tbilisi). Approximate Solution of Boundary Value Problems of the Theory of Analytic Functions 363

Vil'mer, I. A. (Moscow). Problems of the Homographic Interpretation of a Function of a Complex Variable and the Cauchy Problem 371


PART V

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F.D.; LOZINSKIY, S.M.; TUMARKIN, L.A.

[Program in mathematical analysis for physicomathematics, and mechanics and mathematics faculties of state universities. Majors: mathematics and mechanics] Programma po matematicheskomu analizu dlia fiziko-matematicheskikh i mekhaniko-matematicheskikh fakul'tetov gosudarstvennykh universitetov. Spetsial'nosti: Matematika i mekhanika. Minsk, Izd-vo Gelgosuniv., 1958. 6 p. (MIRA 11:3)

1. Russia (1923- U.S.S.R.) Ministerstvo vysshego obrazovaniya. (Mathematics--Study and teaching)

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16(1) PHASE I BOOK EXPLOITATION SOV/2421

Gakhov, Fedor Dmitriyevich

Krayevyye zadachi (Boundary Value Problems) Moscow, Fizmatgiz, 1958. 543 p. Errata slip inserted. 4,500 copies printed.

Ed.: I. G. Aramanovich; Tech. Ed.: S. N. Akhlamov.

PURPOSE: This book is intended for senior mathematics students in universities, Aspirants, and others interested in the solution of problems of mathematical physics by the methods of theory of functions of a complex variable.

COVERAGE: The book studies boundary value problems of the theory of analytic functions and differential equations of elliptic type and their applications to singular equations with Cauchy kernel. It is based on a lecture course taught by the author at the Universities of Kazan' and Rostov, beginning in 1947. Because of the systematic presentation of the subject, the book may be used as a textbook. The topics covered in this book are not ordinarily found in any one book. The extent of the material presented and the historical information at the end of each chapter concerning the development

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of the topic under discussion makes the book a valuable monograph in the field of boundary value problems. The author thanks Docent V. S. Rogozhin and Aspirants T. A. Bachurina, A. A. Govorukhina, R. Kh. Zaripov, I. M. Mel'nik, L. G. Mikhaylov, G. S. Litvinchuk, I. A. Paradoksova, E. G. Khasabov, Yu. I. Cherskiy, and S. V. Yanovskiy. The author also thanks his academic colleague Docent L. A. Chikin, for his aid in writing the book, and Professor D. I. Sherman for critical comments on the manuscript. There are 96 references: 81 Soviet, 7 German, 5 French, 2 Italian, and 1 English.

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

AUTHOR: Gakhov, F.D. and E.G. Khasabov (Rostov) SOV/140-58-1-2/21

TITLE: The Boundary Value Problem of Hilbert for Multiply Connected Domains (Krayevaya zadacha Gil'berta dlya mnogosvyaznykh oblastey)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy Ministerstva vysshego obrazovaniya SSSR, Matematika, 1958, Nr 1, pp 12 - 23 (USSR)

ABSTRACT: § 1. Let D be a finite multiply connected domain, the boundary L of which consists of m + 1 disjoint closed Lyapunov curves $L_j$ $(j=0,1,\ldots,m)$. Let $L_o$ comprise all other $L_j$. A function $F(z) = u + iv$ analytic in D is sought which is continuous on D + L and satisfies on L the condition

$$(1) \qquad \mathrm{Re}\left\{\left[a(s) - ib(s)\right]F(t)\right\} = a(s)\,u(s) + b(s)\,v(s) = c(s)\,,$$

where a(s), b(s), c(s) are defined on L and are real and satisfy the condition of Hölder. $\varkappa = \mathrm{Ind}\left[a(s) + ib(s)\right] = \frac{1}{2\pi}\left\{\arg\left[a(s) + ib(s)\right]\right\}_L$ is called the index of the problem.

§ 2. If $\varkappa \geqslant 0$, then the homogeneous problem has, in the class

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of multivalent analytic functions, $2\varkappa + 1$ linearly independent solutions which are explicitely given. If $\varkappa < 0$, then the solution in the class of the analytic functions is impossible.

§ 3. Formulation of the results of Kveselava [Ref 3] and Vekua [Ref 4]. The boundary condition (1) can be written in the form

(2) $\mathrm{Re}\left[e^{-ih(s)}F^*(t)\right] = c^*(s)$,

where $h(s) = 0$ on $L_0$ and $h(s) = h_j = \text{const}$ on $L_j$. Let

(3) $\mathrm{Re}\left\{i\left[a(s) + ib(s)\right]t'(s)\varphi(t)\right\} = 0$

be the conjugate problem. Let $l$ and $l'$ be the number of the solutions of the homogeneous problem (1) and of the conjugate problem (3), then it is $l - l' = 2\varkappa + m - 1$.

§ 4. The function $a - ib$ is said to satisfy the uniqueness conditions, if in (2) it is $h(s) \equiv 0$. Now the authors consider solutions in the class of the schlicht functions.

If $\varkappa = 0$ and if the uniqueness conditions are satisfied for $a - ib$, then the homogeneous problem has a solution, while the inhomogeneous problem is solvable under fulfillment of $m$ conditions. If the uniqueness consitions are not satisfied, then the homogeneous problem has no nontrivial solution, while



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the inhomogeneous problem is solvable under fulfillment of m-1 conditions.

If $\varkappa = m - 1$ and if $(a + ib)t'$ satisfies the uniqueness conditions, then the homogeneous problem has m solutions and the inhomogeneous problem is solvable under fulfillment of one condition. If the uniqueness conditions are not satisfied, then the homogeneous problem has m - 1 solutions and the inhomogeneous problem is always solvable.

The two last theorems allow a complete solution for two- and threefold connected domains ($m = 1$, $m = 2$).

§ 5. The relation between the problem and the conformal mapping. The authors state that the number of solutions does not only depend on the coefficients but also on the form of the domain D.

§ 6. The problem investigated by Vekua [Ref 4] to find a solution $U = u + iv$ of the equation

$$\frac{\partial U}{\partial \bar{z}} = A\,\overline{U}\ ,\ \text{which is regular in D}$$

and continuous in D + L and satisfies the condition $\mathrm{Re}[(\alpha - i\beta)U] = \gamma$, is considered by authors (without using integral equations like in the paper of Vekua) with the aid of



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The Boundary Value Problems of Hilbert for Multiply Connected Domains SOV/140-58-1-2/21

the results of §§ 1 - 5. In this simpler way the authors succeed in obtaining all qualitative results of Vekua. There are 5 Soviet references.

ASSOCIATION: Rostovskiy gosudarstvennyy universitet (Rostov State University)

SUBMITTED: October 14, 1957

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GAKHOV, F.D.

16(0) PHASE I BOOK EXPLOITATION SOV/3177

Matematika v SSSR za sorok let, 1917-1957. tom 1: Obzornyye stat'i (Mathematics in the USSR for Forty Years, 1917-1957). Vol 1: Review Articles) Moscow, Fizmatgiz, 1959. 1002 p. 5,500 copies printed.

Eds: A. G. Kurosh, (Chief Ed.), V. I. Bityutskov, V. G. Boltyanskiy, Ye. B. Dynkin, O. Ye. Shilova, and A. P. Yushkevich; Ed. (Inside book): A. P. Lapko; Tech. Ed.: S. N. Akhlamov.

PURPOSE: This book is intended for mathematicians and historians of mathematics interested in Soviet contributions to the field.

COVERAGE: This book is Volume I of a major 2-volume work on the history of Soviet mathematics. Volume I surveys the chief contributions made by Soviet mathematicians during the period 1947-1957; Volume II will contain a bibliography of major works since 1917 and biographic sketches of some of the leading mathematicians. This work follows the tradition set by two earlier works: Matematika v SSSR za pyatnadtsat' let (Mathematics in the USSR for 15 Years) and Matematika v SSSR za tridtsat' let (Mathematics in the USSR for 30 Years). The book is divided into the major divisions of the field, i.e., algebra, topology, theory of probabilities, functional analysis, etc., and contributions and outstanding problems in each discussed. A listing of some 1400 Soviet mathematicians is included with references to their contributions in the field.


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ALIKHANOV, A.I.; GALAKTIONOV, Yu.V.; GORODKOV, Yu.V.; YELISEYEV, G.P.; LYUBIMOV, V.A.

Measuring the spiral characyer of the $\mu$-meson. Zhur.eksp.i teor. fiz. 38 no.6:1918-1920 Je '60. (MIRA 13:7)

1. Institut teoreticheskoy i eksperimental'noy fiziki Akademii nauk SSSR.

(Mesons)

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GAKHOV, F.D.

Seminar on mathematical analysis and mechanics at the Rostov State University. Usp. mat. nauk 15 no.4:239-243 Jl-Ag '60. (MIRA 13:9)

(Mathematical analysis) (Mechanics)

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AUTHORS: Gakhov, F. D. and Smagina, V. J.

TITLE: Exceptional cases of a convolutional type of integral equation and first kind equations

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 136, no. 6, 1961, 1277-1280

TEXT: The authors consider the integral equations

$$\lambda\varphi(x) + \frac{1}{\sqrt{2\pi}}\int_0^\infty k_1(x-t)\varphi(t)\,dt + \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{0} k_2(x-t)\varphi(t)\,dt = f(x) \quad (A)$$

$$-\infty < x < \infty;\ \lambda = \lambda_1 \text{ for } x > 0,\ \lambda = \lambda_2 \text{ for } x < 0$$

and

$$\lambda_1\varphi(x) + \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} k_1(x-t)\varphi(t)\,dt = f(x),\ 0 < x < \infty$$

$$\lambda_2\varphi(x) + \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} k_2(x-t)\varphi(t)\,dt = f(x),\ -\infty < x < 0. \quad (B)$$

The theory of these integral equations leads to the investigation of the corresponding Riemann boundary value problem. The normal

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case exists if the coefficient $G(x)$ of the Riemann problem possesses no zeros or poles on the entire limit curve. At first the authors treat the exceptional case, where $G(x)$ possesses zeros and poles of integer order on the x-axis. It is stated that the number of linearly independent solutions of the problem in the exceptional case is smaller by the number of poles of $G(x)$ than the number of these solutions in the normal case. Then the authors show that the problem (A) leads to the Riemann problem

$$\Phi^+(x) = \frac{\lambda_2+K_2(x)}{\lambda_1+K_1(x)}\,\Phi^-(x) + \frac{F(x)}{\lambda_1+K_1(x)}, \quad -\infty < x < \infty \tag{5}$$

and they assume that

$$\lambda_1 + K_1(x) = \prod_{j=1}^{s} (x-b_j)^{\beta_j} \prod_{k=1}^{t} (x-c_k)^{\gamma_k} K_{11}(x)$$

$$\sum_{k=1}^{t} \gamma_k = 1; \tag{7}$$

$$\lambda_2 + K_2(x) = \prod_{i=1}^{m} (x-a_i)^{\alpha_i} \prod_{k=1}^{t} (x-c_k)^{\gamma_k} K_{12}(x).$$



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The number of linearly independent solutions of (A) is then identical with the afore-mentioned number of solutions of the boundary value problem; however, the number of the solubility conditions is greater by 1; the constants occurring in the general solution cannot be used for satisfying the solubility conditions.

All the results for (A) hold also for the first kind equation

$$\frac{1}{\sqrt{2\pi}}\int_0^{\infty} k_1(x-t)\varphi(t)dt + \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{0} k_2(x-t)\varphi(t)dt = f(x), \quad -\infty < x < \infty \qquad (A_0)$$

which can be obtained from (A) for $\lambda \equiv 0$.

Problem B leads to the boundary value problem

$$\Omega^+(x) = \frac{\lambda_2+K_2(x)}{\lambda_1+K_1(x)}\Omega^-(x) + \frac{\lambda_2-\lambda_1+K_2(x)-K_1(x)}{\lambda_1+K_1(x)} \quad . \qquad (9)$$

The essential difference from problem (A) is that here the solubility conditions caused by the common zeros of $\lambda_1 + K_1(x)$ and $\lambda_2+K_2(x)$ can also be satisfied by the choice of the constants of the general



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Exceptional cases of a convolutional... C 111/ C 333

solution (consequently not only by restrictions for $F(x)$ as in case (5), where $F(x)$ must have zeros in all points $c_k$).

From (B) and (9) one can obtain an equation of the first kind for $\lambda_1 = \lambda_2 = 0$ just like in case (A).

J. M. Rapoport and I. A. Chikin are mentioned in the paper.

There are 9 Soviet-bloc references.

ASSOCIATION: Rostovskiy - na - Donu gosudarstvennyy universitet (Rostov - na - Donu State University)

PRESENTED: October 3, 1960, by V. J. Smirnov, Academician

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32466
S/044/61/000/010/032/051
C111/C222

16.4500

AUTHOR: Gakhov, F.D.

TITLE: On new types of integral equations being solvable in a closed form

PERIODICAL: Referativnyy zhurnal. Matematika, no. 10, 1961, 66, abstract 10 B 313. ("Probl. mekhaniki sploshn. sredy" M., AN SSSR, 1961, 101-113)

TEXT: It is shown that the method applied by Kheyns and Mak-Kami [Heyns and Mac Camy] (R Zh Mat, 1959, 4801) to the equation

$$\int_0^\infty k(|x - t|)\varphi(t)dt = f(x) ,$$

where $f(x)$ is an analytic function, $k(w) = P(w)\ln w + Q(w)$, P and Q are entire functions, can be applied to obtain closed solutions of much more general equations. Some new problems are formulated.

[Abstracter's note : Complete translation.]

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C111/C444

AUTHORS: Gakhov, F. D; Khasabov, E. G.

TITLE: On the Hilbert boundary value problem for a multiply connected domain

PERIODICAL: Referativnyy zhurnal, Matematika, no. 11, 1961, 13, abstract 11B50. ("Issled. po sovrem. probl. teorii funktsiy kompleks. peremennogo" M., Fizmatgiz, 1960, 340 - 345)

TEXT: Let $L_0, L_1, \ldots, L_m$ be closed curves of the Lyapunov type, where $L_0$ encloses all the others, and let be $L = L_0 + \ldots + L_m$. The connected domain, bounded by L, be D. Considered is the following boundary value problem: Determine in D an analytic function $F(z) = u + iv$, which is continuous up to the boundary L and satisfies on L the boundary condition

$$a(s)u(s) + b(s)v(s) = c(s) \qquad (1)$$

where a(s), b(s), c(s) are functions, given on L, satisfying the Hölder condition. This problem is well investigated, if D is a simply

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On the Hilbert boundary value problem...

connected domain. The investigation of the problem (1) in multiply connected domains started in the papers of D. A. Kveselava (Soobbeh. A. N. Gruz. SSR, 1946, 8, 581 - 590) and I. N. Vekua (Matem. sb., 1952, 31, 234 - 314). In the present article the investigation of the problem (1) is accomplished in the case of the index of the function a + ib, being either 0 or m - 1.

[Abstracter's note: Complete translation.]

Card 2/2

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"APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000614010019-9

GAKHOV, F. D.

"Lectures on the theory of functions of a complex variable. Part 1. Holomorphic functions" by G. Sansone, J. Gerretsen. Reviewed by F. D. Gakhov. Zhur. vych. mat. i mat. fiz. 2 no.5:956-957 S-O '62. (MIRA 16:1)

(Functions of complex variables)
(Sansone, G.)
(Gerretsen, J.)

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16.4500

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B125/B112

AUTHORS: Gakhov, F. D., Smagina, V. I.

TITLE: Exceptional cases of convolution-type integral equations and equations of the first kind

PERIODICAL: Akademiya nauk SSSR. Izvestiya, Seriya matematicheskaya, v. 26, no. 3, 1962, 361 - 390

TEXT: Integral convolution-type equations are singular equations having the normal form

$$a(t)\varphi(t) + \frac{b(t)}{\pi} \int_{-\infty}^{\infty} \frac{\varphi(\tau)}{\tau - t} d\tau = f(t)$$

according to Yu. I. Cherskiy (Uch. zapiski Kazanskogo gos. un-ta, v. 113 (1953), 43-55). The authors consider cases where the coefficient $G(x)$ of the corresponding Riemannian problem $\phi^+(x) = G(x)\phi^-(x) + g(x)$ disappears

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or becomes an infinite series of integrals. In particular, equations of the first kind are investigated for which G(x) is equal to zero or a pole in the infinite.

ASSOCIATION: Belorusskiy gos. universitet im. V. I. Lenina (Belorussian State University imeni V. I. Lenin)

SUBMITTED: October 10, 1960



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