"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYANOVA, V.V.

Variability of the content of protein and nonprotein nitrogen in the vegetative organs and grain of some Phaseolus species. Trudy po khim. prirod. soed. no.3:41-55 '60. (MIRA 16:2)

1. Kishinevskiy gosudarstvennyy universitet. Laboratoriya khimii belka.

(Beans) (Plants--Chemical analysis) (Nitrogen)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYANOVA, V.V.; BEREZOVIKOV, A.D.; BARANOVA, T.A.

Variability in the protein and nonprotein nitrogen content during the ripening of the seeds of some bean species. Trudy po khim. prirod. soed. no.5:63-68 '62. (MIRA 16:11)

1. Laboratoriya khimii belka Kishinevskogo gosudarstvennogo universiteta.

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

RAGOZIN, B., kand. tekhn. nauk; SAYAPIN, B.

Organizing rapid passenger lines on the Ob'. Rech. transp. 22 no.10:9-10 O '63. (MIRA 16:12)

1. Nachal'nik passazhirskogo otdela Obskogo parokhodstva (for Sayapin).

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

ACC NR: AP7001578 SOURCE CODE: UR/0421/66/000/006/0115/0116

AUTHOR: Sayapin, G. N. (Moscow)

ORG: none

TITLE: Investigation of the peculiarities of hypersonic flow of a nonequilibrium gas around blunt bodies

SOURCE: AN SSSR. Izvestiya. Mekhanika zhidkosti i gaza, no. 6, 1966, 115-116

TOPIC TAGS: hypersonic flow, nonequilibrium flow, flow characteristics

ABSTRACT: The hypersonic flow of a nonequilibrium gas around a sphere is considered. A simplified model of a diatomic gas is assumed with constant specific heat coefficient of the inert phase and a constant relaxation time (τ = const). The equations for this case are stated with the appropriate boundary conditions and solved numerically in spherical coordinates as proposed by G. F. Telenin (S. M. Gilinskiy, G. F. Telenin, and G. P. Tinyakov. Metod rascheta sverkhzvukovogo obtekaniya zatuplennykh tel s otoshedshey udarnom volnoy. Izv. AN SSSR, Mekhanika i mashinostroyeniye, 1964, No. 4). Computer results of the temperature, pressure, and density distributions along two rays of the coordinate system ($\theta = 0$ and $\theta = 0.3125$) are presented for various relaxation time constants. The author thanks O. Yu. Polyanskiy for his constant attention to this work. Orig. art. has: 5 figures and 9 formulas.

SUB CODE: 20/ SUBM DATE: 21Apr66/ ORIG REF: 004/ OTH REF: 001

Card 1/1

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYAPIN, I.

In Soviet Tajikistan. Pozh.delo 5 no.9:12 S '59.
(MIRA 13:1)

1. Nachal'nik otdela Gosplana Tadzhikskoy SSR.
(Tajikistan--Fire prevention)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYAPIN, N.I.

AID P - 3229

Subject : USSR/Electricity

Card 1/1 Pub. 29 - 14/30

Authors : Sayapin, N. I., and P. M. Karpenko, Foremen

Title : Production of tubular manometric springs

Periodical : Energetik, 8, 14-15, Ag 1955

Abstract : At one of the hydroelectric power stations, 30- and 100-at manometric springs were produced according to the authors' designs. The authors describe the production procedure. Four drawings.

Institution : None

Submitted : No date

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

1. SAYAPIN, V.

2. USSR (600)

4. Automobiles - Bodies

7. Causes of some defects in the GAZ-MN automobile. MTS 13, No. 4, 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953. Unclassified.

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

AUTHORS: Sayapin, V., Toshchev, A. SOV/107-58-11-29/40

TITLE: An Amplifier Without an Output Transformer (Usilitel' bez vykhodnogo transformatora)

PERIODICAL: Radio, 1958, Nr 11, pp 45-46 (USSR)

ABSTRACT: The article describes an amplifier intended for use in an acoustic unit containing 16 1GD-9 loudspeakers connected in series. The maximum power of the amplifier is about 20 w with a nonlinear distortion coefficient not greater than 1.5 %. Its power consumption is 200 w and its frequency characteristics at a level of 1db begin at 40 cycles and can reach 60 cycles, depending on how it is installed. The wide band pass is explained by the absence of an output transformer. Figure 1 is a circuit diagram of the amplifier. The first stage is a cathode follower, the second the usual voltage amplification, and the third, based on a 6Zh2P pentode, has negative feedback dependent on the frequency. The fourth stage is a phase inverter with cathode coupling, the fifth two-cycle stage, based on 6P6 valves amplifies the voltage up to 75 v. The final stage has two 6N5S dual triodes. The background noise in the amplifier is equal to 50db. The cabinet of the acoustic unit is shown in Figure 2, and the

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

amplifier is adjusted by first adjusting the valves according to the information in Table 1. The rectifier of the amplifier power supply unit is described and shown in Figure 3, and details of the windings are given in Table 2. There are 2 circuit diagrams, 2 tables, and 1 diagram.

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

POZHARSKIY, F.T.; SAYAPIN, V.G.; MARTSOKHA, B.K.

Halogenation of indazole and its derivatives by complex compounds of halogens with dioxane. Zhur. ob. khim. 34 no.8:2777-2778 Ag '64. (MIRA 17:9)

1. Rostovskiy-na-Donu gosudarstvennyy universitet.

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

L 16026-66 EWT(m) RM

ACC NR: AP5024145 SOURCE CODE: UR/0075/65/020/009/1016/1018

50
B

AUTHOR: Pavlova, N. N.; Sayapin, V. G.

ORG: Central Laboratory of Applied Geochemistry of the Geological-Geochemical Trust, Moscow (Tsentral'naya laboratoriya prikladnoi geokhimii Geologo-geokhimicheskogo tresta)

TITLE: Conditions of extraction of butylrhodomine C fluoroniobate

SOURCE: Zhurnal analiticheskoy khimii, v. 20, no. 9, 1016-1018

TOPIC TAGS: qualitative analysis, photometry, tantalum, columbium

ABSTRACT: Simultaneous extraction of butylrhodomine C fluoroniobate was observed during the development of the extraction-photometric determination of tantalum, using butylrhodomine C as a solvent (N. I. Pavlova and I. A. Blyum. Zavodskaya laboratoriya, 28, 1305, 1962). This property of the dye was used in the development of the extraction-photometric determination of niobium. The

Card 1/3 UDC: 543.70

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

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L 16026-66

ACC NR: AP5024145

optimal conditions of extraction were determined and the calibration curve was plotted for niobium determination under these conditions: H_2O 12 ml., benzene 20 ml., concentration of H_2SO_4 10 N, that of fluoride 0.014 g./ml., and that of butylrhodomine C 0.04%. Fifteen ml. of extract were mixed with 10ml. of acetone to stabilize the color of the benzene extraction. The optical density was measured in the photocolorimeter FEK-N-57 with the light filter No 6 (584 m) at a layer thickness of 5 cm. A comparison of the curves on dependence of the optical densities of extracts on the concentration of the dye in aqueous solution and on that of the flourine ion in the solution, plotted during these experiments, with those obtained during tantalum determination, showed that the tantalum could be extracted satisfactorily at a considerably lower concentration of the dye. This difference could be used for the determination of niobium in the presence of tantalum, or for a simultaneous determination of tantalum and niobium from the same solution. For this purpose (1) the tantalum was extracted from one aliquot part of the same solution under conditions used for tantalum determination, i.e. at a lower concentration of dye, and (2) both elements were extracted from the other aliquot part under conditions for the extraction of niobium described above. The content of tantalum and niobium was then

Card 2/3

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

L 16026-66

ACC NR: AP5024145

determined by comparing the results of measurements of density for the first and second case. Orig. art. has: 4 figures and 1 table.

SUB CODE: 07, 11 SUBM DATE: 22May64/ ORIG REF: 001

Card 3/3

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

CHEREMOVSKIY, Yuriy Ivanovich; SAYAPIN, V.I., kand.tekhn.nauk, retsenzent; KHARITONCHIK, Ye.M., prof., red.; KUZ'MOV, N.T., inzh., red.; YERMAKOV, N.P., tekhn.red.

[The S-80 and S-100 tractors; working principle and operation] Traktory S-80 i S-100; ustroistvo i ekspluatatsiia. Izd.5., perer. i dop. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit. lit-ry, 1959. 439 p. (MIRA 12:12)

(Tractors)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYAPIN, V.I., kand.tekhn.nauk; POZIN, B.M., inzh.

Resistance of crawler tractors to turning. Trakt.i sel'khozmash. 31 no.8:10-12 Ag '61. (MIRA 14:7)

1. Chelyabinskiy politekhnicheskiy institut (for Sayapin).
2. Chelyabinskiy traktornyy zavod (for Pozin).
(Crawler tractors)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYAPIN, V.I., kand.tekhn.nauk

Errors in the analysis of the effect of the speed on the traction efficiency of a tractor. Trakt. i selkhozmash. 32 no.3:16-17 Mr '62. (MIRA 15:2)

1. Chelyabinskiy politekhnicheskiy institut.
(Tractors--Testing)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYAPIN, Ye.

SAYAPIN, Ye., inzhener; LISOVSKIY, N., inzhener; YEVDOKIMOVA, V.

Work out storage processes for grain products in asphalt floored warehouses. Muk.-elev.prom. 20 no.2:9-10 F '54. (MLRA 7:7)

1. Krasnoyarskaya kontora Zagotzerno (for Sayapin and Lisovskiy)
2. Groznenskaya baza Zagotzerno (for Yevdokimova)
(Grain--Storage) (Flour--Storage)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SHEVCHENKO, N.V., inzh.; SAYAPIN, Yu.A., inzh.

New ways of providing transportation services for industrial enterprises. Zhel.dor.transp. 43 no.10:81 O '61. (MIRA 14:9)
(Railroads--Joint use of facilities)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYAPIN, YU. I., ENG.; KRASIL'NIKOV, I. YE., ENG.; KADYKOV, V.P., ENG.

Electric Power

Electric energy consumption in the preparation of reinforcements for hydrotechnical conrete, Gidr. stroi. 21 no. 7, 1952.

9. Monthly List of Russian Accessions, Library of Congress, December 1952~~XXXXX~~1953, Uncl.

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

1. BALKAREY, I. YU., Eng.; SAYAPIN, YU. I., Eng., SHREBRYANYY, M. N., Eng.

2. USSR (600)

4. Windlass

7. Modernization of the tractor winch D-148v, Mekh. stroi., 10, No. 1, 1953.

9. Monthly List of Russian Accessions, Library of Congress, April, 1953, Uncl.

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

PAVLOV, S.M., inzh.; FREYGOFER, Ye.F., inzh.; SAYAPIN, Yu.I., inzh.; ZHDANOV, L.G., inzh.; BARYNINA, Ye.Yu., kand.tekhn.nauk

Fully mechanized aggregate yards for year-round large concrete plants. Prom.stroi. 37 no.8:26-34 Ag '59. (MIRA 12:11)

1. Nauchno-issledovatel'skiy institut organizatsii, mekhanizatsii i tekhnicheskoy pomoshchi stroitel'stvu (for Pavlov). 2. Gidroproyekt (for Sayapin, Freygofer, Zhdanov). 3. Nauchno-issledovatel'skiy institut stroitel'noy promyshlennosti (for Barynina).
(Concrete plants--Equipment and supplies)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

KHOKHLOV, P.L., inzh.; DUBROV, V.S., inzh.; SLEPTSOV, N.I., inzh.; SAYAPIN, Yu.V.

Operation of water-cooler cupola furnaces. Stal' 22 no.3:286-287 Mr '62. (MIRA 15:3)

(Cupola furnaces--Cooling)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

KHOKHLOV, P.L.; DUBROV, V.S.; SLEPTSOV, N.I.; SAYAPIN, Yu.V.

Analysis of cupola performance with various methods of water cooling. Lit.proizv. no.7:36-37 Jl '62. (MIRA 16:2)
(Cupola furnaces--Cooling)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

KOGAN, D.A., professor; PILOVITSKAYA, V.N., mladshiy nauchnyy sotrudnik; SAYAPINA, L.I.

Antitoxic hepatic function in fractures of the long bones as affected by some physical factors. Ortop., travm. i protez. 17 no.3:68 My-Je '56 (MIRA 9:12)

1. Iz Uzbekskogo nauchno-issledovatel'skogo instituta ortopedii, travmatologii i protezirovaniya (dir. - kandidat meditsinskikh nauk A.Sh.Shakirov)
(LIVER) (FRACTURES) (PHYSICAL THERAPY)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

TROPKINA, A.; SAYAPINA, N.N., otv. red.

[Chemical industry of the U.S.S.R.; its importance and developmental prospects. Lecture for correspondence students] Khimicheskaia promyshlennost' SSSR; ee znachenie i perspektivy razvitiia. Lektsiia dlia uchashchikhsia - zaochnikov. Moskva, Zaochnyi tekhnikum sovetskoi torgovli, 1963. 21 p. (MIRA 18:4)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, YU. S.

Mathematical Reviews
Vol. 15 No. 1
Jan. 1954
Mathematical Physics

Sayasov, Yu. S. The phenomenon of a strong disturbance of characteristic electromagnetic oscillations in cylindrical regions for an insignificant violation of the cylindricity. Doklady Akad. Nauk SSSR (N.S.) 90, 163–166 (1953). (Russian)

The author discusses the influence on the characteristic electromagnetic oscillations of small deformations of the side surfaces of long, perfectly conducting, cylindrical resonators. He asserts that the perturbation of the field is proportional not only to the relative deformation of the side surfaces, but also to an additional factor which depends on the square of the ratio of the length of the cylinder to its transverse dimension; if this ratio is large, a small deformation leads to a large perturbation field.

To support this assertion he examines in detail a special case where the unperturbed region is a circular cylinder and the perturbed region is formed by circumscribing the cylinder with a conical surface which passes through one of the end circles of the cylinder and with two spherical surfaces which pass through the two end circles of the cylinder. The surfaces which enclose the unperturbed and perturbed regions are the "natural" surfaces of cylindrical and spherical coordinate systems respectively, and, therefore, the field components of both regions are exactly represented in terms of well-known solutions of Maxwell's equations.

For this special case the author's assertion is indeed true, but one must proceed with caution in drawing generalizations regarding small arbitrary deformations.

C. H. Papas (Pasadena, Calif.).

6/23/64

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, Yu. S.

USSR/Chemistry Physical chemistry

Card : 1/1

Authors : Sayasov, Yu. S.

Title : Nature of the third limit of chain combustion in $H_2 + O_2$ mixtures

Periodical : Zhur. fiz. khim. 28, Ed. 6, 1043 - 1054, June 1954

Abstract : The role of the reaction of oxygen atom destruction in the chain oxidation of H, at pressures close to atmospheric, is explained. Calculation of this reaction facilitates the determination of the temperature boundary below which the third limit of chain combustion does not exist. Calculation of the reaction also facilitates the determination of the T-boundary, for the curve representing the limits of nonlinear chain combustion, taking place during the reaction as result of water vapor accumulation. The temperature range and kinetics of nonlinear combustion are outlined. Seven USSR and 2 USA references. Graph.

Institution : Acad. of Sc. USSR, Institute of Chemical Physics, Moscow

Submitted : September 3, 1953

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, YU. S.

SAYASOV, Yu.S.

"Internal Boundary Problems of Electrodynamics in a System of Coordinates of an Elongated Spheroid." Cand Phys-Math Sci, Inst of Chemical Physics, Acad Sci USSR, Moscow, 1955. (KL, No 16, Apr 55)

SO: Sum.No. 704, 2 Nov 55 - Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (16).

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, Yu. S.

FD-3119

USSR/Physics - Resonators

Card 1/1 Pub. 153 - 18/24

Author : Kompaneyets, A. S.; Sayasov, Yu. S.

Title : Theory of electromagnetic resonators that are close in shape to conical

Periodical : Zhur. tekh. fiz., 25, No 6 (June), 1955, 1124-1131

Abstract : The authors investigate the oscillations of electrical type in an electro-magnetic resonator formed from a spheroid and from a two-branch hyperbola cofocal with the spheroid in case of small ratios of focal distance to wave length. He modifies the ordinary method of the theory of perturbations so that consideration is taken of the strong deviation of the field in the resonator of the studied type from the field in the conical resonator close to the apices of cones. That is, the authors' aim is the strict investigation of the so-called spheroidal resonator under the assumption that the gap (the interval between the vertices of the hyperboloids) is sufficiently small. Five references, including one USSR: L. M. Ryzhik and I. S. Gradshteyn, Tablitsy integralov, GTTI, 1951.

Institution :

Submitted : April 3, 1954

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

Sayasov, Yu. S.

The basis of the quasistationary concentrations method of Semenov-Bodenstein and the conditions for its applicability
Yu. S. Sayasov and A. F. Vasil'eva (M. V. Lomonosov

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, Yu.S.

Kinetics of successive reactions of various order. Zhur.fiz.khim. 30 no.6:1404-1406 Je '56. (MLRA 9:10)

1. Akademiya nauk SSSR, Institut khimicheskoy fiziki, Moskva.
(Chemical reaction, Rate of)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

PA - 2919

AUTHOR: SAYASOV, YU.S., YENIKOLOPYAN, N.S.

TITLE: Note on the Diffusion of Active Centres in the Case of a Quadratic Stripping of Chains in the Volume. (O diffusii aktivnykh tsentrov pri kvadratichnom obryve tsepey v ob'yeme, Russian)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 1, pp 130 - 133 (U.S.S.R.)

Received: 5 / 1957 Reviewed: 6 / 1957

ABSTRACT: The present paper furnishes a solution of the problem of the spatial steady distribution of the forming heterogeneous active centers on the assumption, that they are destroyed in the case of mutual collisions on the surface and in the interior (i.e. in the case of quadratic stripping of the chains). This problem arises e.g. in the case of a mixture of hydrogen with chlorine without admixtures of oxygen. Let the velocity of heterogeneous generation be much greater than the velocity of the homogeneous generation. The reaction is assumed to take place in a container with plane-parallel walls with a distance of 2l between the walls (one-dimensional problem). In that case the spatial distribution of the active centers is described by the differential equation $D(d^2n/dx^2) - k_p(M)n^2 = 0$. Here $n(1/cm^3)$ denotes the concentration of the active centers, $k_p(cm^6/sec)$ the coefficient of recombination, (M) $(1/cm^3)$ the total concentration of the mixture and of the pro-

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

Note on the Diffusion of Active Centres in the Case of a Quadratic Stripping of Chains in the Volume. PA - 2919

ducts, x(cm) - the coordinate measured from the center of the container, D(cm^2/sec) - the diffusion coefficient of the active centers. The boundary conditions are also given.

The solution of this differential equation can be represented by the elliptic function of WEIERSTRASS: $s = \wp(u)$. In the case of small velocities of the heterogeneous generation only few chains form at the walls, and therefore the probability of an interaction in the volume is small. Subsequently the equilibrium of the process of generation and destruction of the active centers is determined. If, however, a great number of chains form at the walls in unit time, $\overline{W}$ is determined from the equality of the velocity of generation and destruction of the active centers in unit volume of the container. Furthermore the case is investigated in which the concentration n of the active centers varies considerably in the interior of the container. With the help of the method of the WEIERSTRASS function described here, the diffusion of the active centers for different conditions can be investigated (in which case the quadratic stripping of chains plays an important part. (1 illustration)

Card 2/3

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

PA - 2919

Note on the Diffusion of Active Centers in the Case of a Quadratic Stripping of Chains in the Volume.

ASSOCIATION: Institute for Physical Chemistry of the Academy of Science of the U.S.S.R.
PRESENTED BY: V.N.KONDRAT'YEV, Member of the Academy
SUBMITTED: 18.10.1956
AVAILABLE: Library of Congress

Card 3/3

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

PA - 3139

AUTHOR: SAYASOV, Yu. S.

TITLE: On the Probability of the Capture of Electrons by Neutral Atoms in the Case of Triple Collision.
(O veroyatnosti zakhvata elektronov neytral'nymi atomami pri troynykh stolknoveniyakh. Russian).

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 3, pp 548 - 549 (U.S.S.R.)
Received: 6 / 1957 Reviewed: 7 / 1957

ABSTRACT: The present paper deals with the computation of the capture coefficient α of the electrons of the process $e + H + H_2 = H^- + H_2$ from the data on the cross sections of the process $H^- + H_2 = H + H_2 + e$. From the uniformity necessary at equilibrium of the total number of the collisions within the time interval there follows: $\alpha(e)(H)(H_2) = \alpha^*(H^-)(H_2)$. Here the concentrations H^- and H are assumed to be small compared to the concentrations H_2. From this relation, and if the ionization coefficient α^* is known, the capture coefficient α may be computed: $\alpha = \alpha^*(H^-) / (e)(H) = \alpha^* K(T)$. Here K(T) denotes the constant of the equilibrium $H^- \rightleftarrows H + e$; $\Delta E = 0{,}747$ eV - the ionization energy of H^-, m - the mass of the electron; $\theta = T^oK/1000$; $h=1{,}05 \cdot 10^{-27}$ erg./sec. The quantity α^* can be derived from the data of a previous work by means of a method discussed by the author. By means of this method $\alpha^* = \sigma_o v_r (4/\sqrt{\pi}) \int_0^\infty e^{-x/c - c^2} c^3 dc$. is obtained.

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On the Probability of the Capture of Electrons by Neutral Atoms in the Case of Triple Collision.

Here $\sigma_0 = \sigma/e^{-\Delta Ea/2\pi h v}$, a and v denote the effective measurements and relative velocity of the colliding particles respectively; $v_T = (2kT/\mu)^{1/2}$; $\mu = (2/3)m_H$,- the reduced mass of H^- and H_2; $c = v/v_r$; $\varkappa = 5{,}7 \cdot 10^6/v_T$. At $\varkappa \gg 1$ the integral in the formula mentioned above can easily be computed by means of the saddle value method. The function $(\varkappa/c) + c^2$ may be developed in a series $3(\varkappa/2)^{2/3} + 6(c-c_m)^2 + \ldots$, and therefore the final expression is obtained for $\alpha^* = \sigma_0 v_m (1/\sqrt{3}) \cdot \varkappa e^{-3(\varkappa/2)^{2/3}} = 5{,}50 \cdot 10^{-10} e^{9{,}6/\theta^{1/3}}$; $\alpha = 1{,}8 \cdot 10^{30} \theta^{3/2} e^{-9{,}6/\theta^{1/3} + 8{,}7/\theta}$ cm^6/sec. The values of α corresponding to the various values of θ are shown together in a table. The values of α mentioned here give an approximated idea about the order of magnitude of the capture coefficient of electrons by various atoms under participation of a third particle. (1 table).

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PA - 3139

On the Probability of the Capture of Electrons by Neutral Atoms in the Case of Triple Collision.

ASSOCIATION: Chemical-Physical Institute of the Academy of Science of the U.S.S.R.
PRESENTED BY: Member of the Academy Kondrat'yev, V.N.
SUBMITTED: 22.11.1956
AVAILABLE: Library of Congress

Card 3/3

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

AUTHORS: Sayasov, Yu. S., Sinitsyna, Yu.V. 57-28-6-25/34

TITLE: On the Theory of Concave Waveguides (K teorii vognutykh volnovodov)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 6, pp. 1293 - 1300 (USSR)

ABSTRACT: In the present paper the propagation of waves of the TE type in a waveguide, the cross section of which is bounded by the ellipse and by co-focal hyperbolae (figure 1) is investigated for the case of short gaps between the points of the hyperbola. Formulae for the membrane function and corresponding eigenvalues were found. For the basic wave of the type TE_{oo} the dying-down coefficient γ_o was calculated as well. It was found that γ_o as the trigonometric function of the solution attains a minimum at $2\theta_o \simeq 9o^o$ between the asymptotes of the hyperbola $2\theta_o$. The final formula for γ_o which corresponds to the optimal values of the parameters $\frac{k}{a}$ and η_o, is:

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$$\gamma_0 = 2\sqrt{\frac{\omega k}{\sigma}}\,\frac{1}{a}\left(\frac{\xi_0}{\ln 2\xi_0}\right)^{1/2}$$

The results of the calculations given make it possible to draw interesting mathematical conclusions. The cross section of the waveguide (figure 1) may be considered to be the deformation of a circle with cut-out sectors which are enclosed by two straight lines passing through the center. The relative elongation of the surface σ on which the membrane function U was determined is slight and is of the order $\delta \sim \left(\frac{f}{a}\right)^2$. Nevertheless this deformation is of a special character because it leads to a modification of the coherence of the domain. Therefore, the disturbances to which the eigenvalues and eigenfunctions U of the equation $\Delta U + \alpha^2 U = 0$ are subjected on this occasion turn out to be of a much more complex nature than in the case of ordinary regular deformations of the boundaries of a domain, which lead to the transformation of α and U into quantities of the order δ. As may be seen from the calculations carried out when investigating the change of coherence of the

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domain, a whole spectrum of eigenfunctions and eigenvalues $U^{(2)}$ and $\alpha^{(2)}$ occurs in the first line, which does not exist in the limiting case of the circular domain (at $\delta = 0$). On the other hand, the eigenfunctions $U^{(1)}$ and the eigenvalues $\alpha^{(1)}$ in which transition to the circular domain takes place, are excited on the occasion of the latter's deformation into quantities of the order $\delta \ln^2 \delta$ and $\delta \ln \delta$ (formulae (12) and (13). It is very instructive to compare these conclusions with the results obtained by analogous calculations of the disturbed coherence of the three-dimensional domain (Reference 4). In conclusion it must be pointed out that it is possible, by means of the described methods, to find also the functions U, which correspond to the fields of the type TE_{ln} ($l \geqslant 1$). In this case, however, the results obtained are very voluminous and are therefore not given here. There are 2 figures and 6 references, 5 of which are Soviet.

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On the Theory of Concave Waveguide 57-28-6-25/34

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: August 14, 1957

1. Waveguides—Theory 2. Waves—Propagation
3. Mathematics

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5(4), 24(3)

AUTHOR: Sayasov, Yu. S. SOV/20-122-5-28/56

TITLE: On the Equilibrium Ionization Caused by Dust Particles (O ravnovesnoy ionizatsii, sozdavayemoy chastitsami pyli)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 5, pp 848 - 851 (USSR)

ABSTRACT: The present paper furnishes a mathematically complete solution of the problem mentioned in the title by means of the thoroughly investigated θ - functions, with which it is possible to express the equilibrium distribution of the electrons in a closed form. The formula thus obtained contains as limiting cases the formula by Sakh (which applies to sufficiently low temperatures) as well as a simple asymptotic expression (Refs 1,2) for sufficiently high temperatures. Besides, it is possible, by means of the formulae found here, to investigate the range of medium temperatures. The particles are at first assumed to be identical, and the conditions for the quasineutrality of the

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system and for the conservation of the total number of particles are given:

$$n_e = \sum_{m=1}^{\infty} m n_m^+ - \sum_{m=1}^{\infty} m n_m^-, \quad n = n_0 + \sum_{m=1}^{\infty} n_m^+ + \sum_{m=1}^{\infty} n_m^- .$$

Here n denotes the concentration of particles, n_e - the concentration of electrons, n_m^+ - the concentration of particles with the positive charge $+me_0$ (e_0 - the charge of the electron, M= 1,2, ...); n_m^- - the concentration of particles with the negative charge $-me_0$, n_0 - the concentration of the neutral particles. The ratio n_e/n can, after some elementary transformations, be expressed by the elliptic Θ-functions. The author then investigates several limiting cases. The formulae found here can easily be generalized for such cases in which the system contains dust particles of various kinds. There are 1 figure and 5 references, 4 of which are Soviet.

PRESENTED: June 4, 1958, by V.N.Kondrat'yev, Academician

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, Yu.S.

Characteristics of radiation from an ideally conducting sphere located in an inhomogeneous medium. Zhur.tekh.fiz. 29 no.12: 1486-1489 D '59. (MIRA 14:6)

1. Institut khimicheskoy fiziki, Moskva.
(Antennas (Electronics))

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, Yu. S. (USSR)

"Theory of Molecular Dissociation by Neutrons".

paper submitted for the Symposium on the Chemical Effects of Nuclear Transformation (IAEA) Prague, 24-27 Oct. 1960.

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C111/C333

24.6730

AUTHORS: Mel'nikov, V. K., Sayasov, Yu. S.

TITLE: The determination of the stability domain for an equation of second order with slow time

PERIODICAL: Referativnyy zhurnal, Matematika, no. 2, 1962, 46, abstract 2B209. ("Tr. Vses. soveshchaniya po differentsial'n. uravneniyam, 1958", Yerevan, AN Arm SSR, 1960, 131-132)

TEXT: Considered is the equation

$$\frac{d}{dt}(m(\varepsilon t)\dot{x}) + \varepsilon f(\varepsilon t, x, \dot{x})\dot{x} + k(\varepsilon t)p'(x) = 0$$

which occurs in the theory of the accelerators of charged particles; ε -- small parameter, $m(\varepsilon t) \neq 0$, $k(\varepsilon t) \neq 0$. The authors investigate the positions of equilibrium of saddle type (such, where $p''(x) < 0$) and of focus type (where $p''(x) > 0$), as well as stability domains of these positions in the $(x, \dot{x})$-plane. Under certain assumptions the solution approximating the position of equilibrium of saddle type for $t \to \infty$, is expanded into a series in powers of ε. Proofs are not given. [Abstracter's note: Complete translation.]

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, Yu.S., MEL'NIKOV, V.K.

Theory of the capture of particles into the synchronous accelerating regime allowing for the nonconservation of the equation of motion. Zhur. tekhn. fiz. 30 no.6:656-664 Je '60. (MIRA 13:8)

1. Institut khimicheskoy fiziki AN SSSR, Moskva.
(Particles (Nuclear)—Capture)

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, YU. S. and MELNIKOV, V. K.

"The theory of particle capture into synchrotron acceleration regime with account of non-conversation of motion equations."

Paper presented at the Intl. Symposium on Nonlinear Vibrations, Kiev, USSR, 9-19 Sep 61

Institute of Chemical Physics of the USSR Academy of Sciences, USSR

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A001/A101

11.7430

AUTHOR: Sayasov, Yu.S. (Moscow)

TITLE: On the structure of skew shock waves in a chemically reacting gas

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 6, 1961, 172 - 174

TEXT: The author writes down the equation of conservation, state and kinetic equations which describe the flow of a chemically reacting non-viscous gas beyond a shock wave. Assumptions are made that the shock wave front is plane and lines of the current beyond the discontinuity are rectilinear. If temperature T beyond the front is not very high and the case of shock waves in air is considered, the system of equations is reduced to one equation which looks in the main phase of dissociation process (neglecting the reversal reaction) as follows:

$$\frac{d\alpha}{dt} = - k_o n \alpha \exp\left(-\frac{T_o}{T}\right) \quad \left(n = \frac{p}{kT}\right) \qquad (16)$$

where α is concentration of O_2, t is time of the motion of a gas particle along

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On the structure of skew shock waves ...

the line of the flow, p is pressure, $k_0 \approx T^{-2}$; the approximate solution of this equation is given. The author thanks E.I. Andriankin, G.I. Barenblatt and Yu.P. Rayzer for the discussion of the results of the present study. There is one Soviet-bloc reference.

SUBMITTED: August 2, 1961

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9.9300

AUTHOR: Sayasov, Yu. S.

TITLE: Scattering of electromagnetic waves from an ideally conducting sphere in an inhomogeneous medium

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 3, 1961, 261-270

TEXT: The author studies the scattering mentioned in the title as well as the characteristic properties of radiation of this system for the case that the primary antenna is an electric or magnetic dipole on the surface of the sphere. In this case the inhomogeneous sphere is assumed to be in an inhomogeneous medium with a dielectric constant $\varepsilon = \varepsilon' + i\varepsilon''$ depending exclusively on the radius. Besides, the author also assumed that $\varepsilon \to 1$ with $r \to \infty$. μ is assumed to be constantly equal to 1, the time dependence of the field is assumed to be characterized by $e^{-i\omega t}$. The Maxwell equations then hold in the space around the sphere: $\mathrm{curl}\,\vec{H} = -ik\omega\vec{E}$, $\mathrm{curl}\,\vec{E} = ik\vec{H}$ (1)

$$\begin{cases} E_r = \dfrac{\partial}{\partial r}\dfrac{1}{\varepsilon}\dfrac{\partial U}{\partial r} + k^2 U, \\ E_\theta = \dfrac{1}{r\varepsilon}\dfrac{\partial^2 U}{\partial r \partial \theta} + \dfrac{ik}{r\sin\theta}\dfrac{\partial V}{\partial \varphi}, \end{cases}$$

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The general solution of these equations can be written in the form

$$\left.\begin{aligned} E_\varphi &= \frac{1}{\varepsilon r \sin\theta}\frac{\partial^2 U}{\partial r \partial \varphi} - \frac{ik}{r}\frac{\partial V}{\partial \theta}; \\ H_r &= \frac{\partial^2 V}{\partial r^2} + k^2 \varepsilon V, \\ H_\theta &= -\frac{ik}{r\sin\theta}\frac{\partial U}{\partial \varphi} + \frac{1}{r}\frac{\partial^2 V}{\partial r \partial \theta}, \\ H_\varphi &= \frac{ik}{r}\frac{\partial U}{\partial \theta} + \frac{1}{r\sin\theta}\frac{\partial^2 V}{\partial r \partial \varphi}, \end{aligned}\right\} \quad (2)$$

The scalar functions U, V are defined by

$$\varepsilon \frac{\partial}{\partial r}\frac{1}{\varepsilon}\frac{\partial U}{\partial r} + \frac{1}{r^2} LU + k^2 \varepsilon U = 0, \quad (3)$$

and

$$\frac{\partial^2 V}{\partial r^2} + \frac{1}{r^2} LV + k^2 \varepsilon V = 0, \quad L = \frac{1}{\sin\theta}\left(\frac{\partial}{\partial \theta}\sin\theta\frac{\partial}{\partial \theta}\right) + \frac{1}{\sin^2\theta}\frac{\partial^2}{\partial \varphi^2}. \quad (4)$$

The solution of the Maxwell equations is described by the potentials

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$$U=\cos\varphi\frac{\partial P}{\partial\theta},\quad P=\frac{1}{ik^2}\sum_{n=1}^{\infty}a_n\left[u_n^{(2)}(r)-\frac{u_n^{(2)\prime}(R)}{u_n^{(1)\prime}(R)}u_n^{(1)}(r)\right]P_n(\cos\theta),\quad (5)$$

$$V=-\sin\varphi\frac{\partial Q}{\partial\theta},\quad Q=\frac{1}{ik^2}\sum_{n=1}^{\infty}a_n\left[v_n^{(2)}(r)-\frac{v_n^{(2)}(R)}{v_n^{(1)}(R)}v_n^{(1)}(r)\right]P_n(\cos\theta),\quad (6)$$

where $u_n^{(1)}$, $u_n^{(2)}(r)$, $v_n^{(1)}(r)$ and $v_n^{(2)}(r)$ are the solutions of the equations

$$\varepsilon\frac{d}{dr}\frac{1}{\varepsilon}\frac{du_n}{dr}+\left(k^2\varepsilon-\frac{n(n+1)}{r^2}\right)u_n=0,\quad (7)$$

$$\frac{d^2v_n}{dr^2}+\left(k^2\varepsilon-\frac{n(n+1)}{r^2}\right)v_n=0,\quad (8)$$

The scattered field $\vec{E}^s$, $\vec{H}^s$ is obtained if the terms containing $u_n^{(2)}(r)$ and $v_n^{(2)}$ are eliminated from the formulas (5), (6) and the functions $u_n^{(1)}(r)$, $v_n^{(1)}(r)$ are replaced by their asymptotic expression $e^{i(kr-\frac{n+1}{2}\pi)}$.

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Scattering of electromagnetic...

$$E_\theta^s = H_\varphi^s = \frac{e^{ikr}}{kr} V_1^s(\theta) \sin\varphi; \tag{9}$$

$$E_\varphi^s = -H_\theta^s = \frac{e^{ikr}}{kr} V_2^s(\theta) \cos\varphi, \tag{10}$$

with

$$V_1^s = \frac{\partial^2 P^s}{\partial\theta^2} - \frac{1}{\sin\theta}\frac{\partial Q^s}{\partial\theta}, \quad V_2^s = \frac{\partial^2 Q_s}{\partial\theta^2} - \frac{1}{\sin\theta}\frac{\partial P^s}{\partial\theta},$$

$$P^s = i\sum_{n=1}^{\infty} a_n \frac{u_n^{(2)\gamma}(R)}{u_n^{(1)\gamma}(R)} P_n(\cos\theta); \tag{11}$$

$$Q^s = i\sum_{n=1}^{\infty} a_n \frac{v_n^{(2)}(R)}{v_n^{(1)}(R)} P_n(\cos\theta). \tag{12}$$

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$$H_r(R)=E_\theta(R)=E_\varphi(R)=0,\ E_r(R)=V_r(\theta)\cos\varphi,$$

$$H_\theta(R)=V_\theta(\theta)\sin\varphi,\ H_\varphi(R)=V_\varphi(\theta)\cos\varphi,$$

$$V_r(\theta)=\frac{1}{a^2}\frac{\partial}{\partial\theta}\sum_{n=1}^{\infty}(2n+1)(-i)^n\frac{1}{u_n^{(1)\gamma}(R)}P_n(\cos\theta); \tag{13}$$

$$V_\theta(\theta)=\frac{1}{a}\left[\frac{i\varepsilon_1}{\sin\theta}\frac{\partial}{\partial\theta}\sum_{n=1}^{\infty}a_n\frac{1}{u_n^{(1)\gamma}(R)}P_n(\cos\theta)+\right.$$

$$\left.+\frac{\partial^2}{\partial\theta^2}\sum_{n=1}^{\infty}a_n\frac{1}{v_n^{(1)}(R)}P_n(\cos\theta)\right]; \tag{14}$$

$$V_\varphi(\theta)=\frac{1}{a}\left[i\varepsilon_1\frac{\partial^2}{\partial\theta^2}\sum_{n=1}^{\infty}a_n\frac{1}{u_n^{(1)\gamma}(R)}P_n(\cos\theta)+\right.$$

$$\left.+\frac{1}{\sin\theta}\frac{\partial}{\partial\theta}\sum_{n=1}^{\infty}a_n\frac{1}{v_n^{(1)}(R)}P_n(\cos\theta)\right]. \tag{15}$$

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are obtained for the field strength on the surface of the sphere. The primes in these three formulas denote the derivation with respect to the variables kr and $\alpha = kR$. In chapter 1 the author deals with the scattered field. He defines the differential scattering cross section $d\sigma_s$ as the ratio between the energy flux $r^2 d\Omega = r^2 \sin\theta d\theta d\varphi$, $\frac{c}{8\pi} \mathrm{Re}(E_\theta^s H_\varphi^{s*} - E_\varphi^s H_\theta^{s*}) r^2 d\Omega$ scattered through the solid angle and the energy flux per unit area in the incident wave $c/8\pi$. With (9), (10) the following expression is obtained: $d\sigma_s = \frac{1}{k^2}\left\{|V_1^s(\theta)|^2 \sin^2\varphi + |V_2^s(\theta)|^2 \cos^2\varphi\right\} d\Omega$. The author first studies the limiting case of sufficiently long waves λ, which satisfy the condition $\lambda \gg r\sqrt{|\varepsilon|}$ in the domain $R < r < R_1$, where R_1 is the effective radius of the inhomogeneous medium beginning with which ε approaches 1. If this condition is fulfilled the scattering of the incident wave has Rayleigh character. The quantities $\omega_n'(R)$ can be determined by an approximation method. The same also holds for the functions $v_n(r)$. Thus,

$$d\sigma = \alpha^4 R^2 \left(\left| \gamma \cos\theta + \frac{1}{2} \right|^2 \sin^2\varphi + \left| \gamma + \frac{1}{2} \cos\theta \right|^2 \cos^2\phi \right) d\Omega, \quad (19)$$

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is obtained where $\gamma = -y_1^{(2)'}(1)/y_2^{(1)'}(1)$. (19) and

$\gamma = \frac{\varepsilon_0 - 1 + (2\varepsilon_0 + 1)r_1^{-3}}{\varepsilon_0 + 2 + 2(\varepsilon_0 - 1)r_1^{-3}} r_1^3$ (20) are especially suited for studying the scattering of light from cosmic dust particles and from inhomogeneously distributed aerosols. With sufficiently short waves

$\frac{\lambda}{2\pi} \frac{\sqrt{(n')^2 + (\varkappa')^2}}{R(n^2 + \varkappa^2)} \ll 1$ (21) ($n = \mathrm{Re}\sqrt{\varepsilon}$, $\varkappa = \mathrm{Im}\sqrt{\varepsilon}$) holds (the prime denotes the derivation with respect to r) and the Eqs. (7), (8) can be solved by the Wentzel-Brillouin-Kramers approximation. The author studies the rules only for the angular region $0 \leqslant \theta < \theta_1$ which corresponds to rays reflected from the illuminated region. Thus, the following expression is obtained for the differential scattering cross section

$d\sigma_s = \frac{4}{k^2 \sin\theta} \left| \nu_0 \frac{d\nu_0}{d\theta} \right| e^{-2\mathrm{Im}S(\nu_0)} d\Omega$ (22) with

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$S(\nu_0) = \nu_0\theta + 2\alpha\int_1^\infty \left(\sqrt{\varepsilon - \frac{\nu_0^2}{\alpha^2 r^2}} - 1\right)dr$ and for the total scattering cross section $\sigma_s^0 \cong 2\pi R^2 \int_1^\infty \frac{e^{-4q}}{|\beta|^2} e^{-\theta^2/2\theta_0^2}\theta d\theta = 2\pi R^2 \frac{e^{-4q}}{p}$ (24). (22) is similar to the known expression of classical mechanics for the scattering cross section of particles in a central-symmetric field. Chapter two deals with the field on the surface of a sphere. With sufficiently long waves the non-zero components of the field strength on the surface of the sphere read as follows

$$E_r(R) = V_r(\theta)\cos\varphi, \quad V_r(\theta) = \frac{3}{y_1^{(1)\prime}(1)}\sin\theta \qquad (25)$$

(in the case of a homogeneous layer $y_i^{(1)\prime}(1) = \frac{1}{3}\left[\varepsilon_0 + 2 + 2(\varepsilon_0 - 1)r_1^{-3}\right]$)

$$H_\theta(R) = V_\theta(\theta)\sin\varphi, \quad V_\theta(\theta) = \frac{3}{2}i\cos\theta; \qquad (26)$$

$$H_\varphi(R) = V_\varphi\cos\varphi, \quad V_\varphi = \frac{3}{2}i. \qquad (27)$$

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with sufficiently short waves the following equations hold:

$$V_r(\theta)=\frac{2}{a^2}\varepsilon_1^{-\frac{1}{2}}\left(c_1-\frac{\nu_0^2}{a^2}\right)^{-\frac{1}{4}}\frac{e^{i\frac{\pi}{4}}}{\sqrt{\sin\theta}}\sqrt{\nu_0^3\frac{d\nu_0}{d\theta}}\,e^{iS(\nu_0)}; \tag{28}$$

$$V_\theta(\theta)=\frac{2}{a}\varepsilon_1^{1/2}\left(\varepsilon_1-\frac{\nu_0^2}{a^2}\right)^{-\frac{1}{4}}\frac{e^{-i\frac{\pi}{4}}}{\sqrt{\sin\theta}}\sqrt{\nu_0\frac{d\nu_0}{d\theta}}\,e^{iS(\nu_0)}; \tag{29}$$

$$V_\varphi(\theta)=\frac{2}{a}\left(\varepsilon_1-\frac{\nu_0^2}{a^2}\right)^{1/4}\frac{e^{i\frac{\pi}{4}}}{\sqrt{\sin\theta}}\sqrt{\nu_0\frac{d\nu_0}{d\theta}}\,e^{iS(\nu_0)}, \tag{30}$$

где

$$S(\nu_0)=\nu_0\theta+a\int_1^\infty\left(\sqrt{\varepsilon-\frac{\nu_0^2}{a^2r^2}}-1\right)dr.$$

The energy flux produced by the dipole 1 per unit of the solid angle with $r\longrightarrow\infty$ is $\frac{c}{4\pi}\cos^2\psi|E_r(R)|^2r^2d\Omega$. With sufficiently long waves

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$$dS^{e} = \frac{27\cos^2\psi}{8\pi\,|\,\nu_1^{(1)}(1)\,|^2}\sin^2\theta\, d\Omega, \qquad (33)$$

$$dS^{m} = \frac{27\sin^2\psi}{32\pi}(1-\sin^2\theta\cos^2\varphi)\, d\Omega; \qquad (34)$$

and with sufficiently short waves and small angles

$$dS^{e} = \frac{3}{2\pi}\cos^2\psi\,|\,\varepsilon_1\,|^{-3/2}\frac{e^{-2\eta}}{|\beta|^4}\theta^2 e^{-\theta^2/\theta_0^2}\, d\Omega, \qquad (35)$$

$$dS^{m} = \frac{3}{\pi}\sin^2\psi\,|\,\varepsilon_1\,|^{1/2}\frac{e^{-2\eta}}{|\beta|^2}e^{-\theta^2/\theta_0^2}\, d\Omega. \qquad (36)$$

are obtained for the characteristic radiation properties. There are 1 figure and 9 references: 8 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut khimicheskoy fiziki Moskva (Institute of Chemical Physics, Moscow)

SUBMITTED: November 13, 1959

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B108/B209

26.2321

AUTHORS: Andriankin, E. I. and Sayasov, Yu. S.

TITLE: Effect of an external magnetic field upon the boundary layer of a plasma

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 7, 1961, 775-780

TEXT: The authors studied the effect of an external magnetic field upon the laminar boundary layer in a plasma, forming when a supersonic gas flow passes by a body. The presence of a magnetic field perpendicular to the gas flow changes the velocity profile in the narrow zone of the boundary layer and thus reduces friction between the flow and a body in it, provided the temperature difference between body and gas is sufficient--ly high. When the temperature difference is small, so that the gas may be assumed to be incompressible, and when a pressure gradient exists along the flow, the hydrodynamic equations of the laminar boundary layer may be written in the form

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$$\left.\begin{aligned} v_x\frac{\partial v_x}{\partial x}+v_y\frac{\partial v_x}{\partial y}&=-\frac{\partial h}{\partial x}+\nu\frac{\partial^2 v_x}{\partial y^2}-\frac{H^2\sigma v_x}{\rho c^2},\\ \frac{\partial h}{\partial y}=0,\quad \frac{\partial v_x}{\partial x}+\frac{\partial v_y}{\partial y}&=0,\\ c_p\left(v_x\frac{\partial T}{\partial x}+v_y\frac{\partial T}{\partial y}\right)&=\frac{\partial}{\partial y}\varkappa\frac{\partial T}{\partial y}+\nu\left(\frac{\partial v_x}{\partial y}\right)^2-v_x\frac{\partial h}{\partial x}+\frac{H^2\sigma v_x}{\rho c^2}. \end{aligned}\right\} \quad (1)$$

where ν is the dynamic viscosity, $\varkappa$ - the thermal conductivity coefficient, c_p - specific heat at constant pressure. This system is transcribed into the form

$$\left.\begin{aligned} v_x\frac{\partial v_x}{\partial x}+v_y\frac{\partial v_x}{\partial y}&=-\frac{\partial h}{\partial x}+\nu\frac{\partial^2 v_x}{\partial y^2}-\frac{H^2\sigma v_x}{\rho c^2},\\ \frac{\partial v_x}{\partial x}+\frac{\partial v_y}{\partial y}&=0,\\ v_x\frac{\partial\theta}{\partial x}+v_y\frac{\partial\theta}{\partial y}&=\frac{1}{Pr}\nu\frac{\partial^2\theta}{\partial y^2}+\frac{\nu}{c_p\rho}\left(1-\frac{1}{Pr}\right)\frac{\partial}{\partial y}v_x\frac{\partial v_x}{\partial y}. \end{aligned}\right\} \quad (2)$$

where $\theta=\frac{1}{2}v_x^2+c_pT$ and $Pr=\frac{\nu\rho c_p}{\varkappa}$, considering that h is a function of x only. Since the examination of the system (2) in the general case is very

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difficult, the authors discuss two model cases. In the first case, H is assumed to obey the law $H=H_0\sqrt{\frac{l}{x}}$, where l is a characteristic length. The velocity v_x in the stream be constant: $v_x=v_0=\text{const}$. With the new variables

$$v_x=\frac{\partial\psi}{\partial y},\quad v_y=-\frac{\partial\psi}{\partial x},\quad \psi=\sqrt{2\nu v_0 x}\varphi,\quad \xi=y\sqrt{\frac{v_0}{2\nu x}},$$

the system (2) assumes the form

$$\left.\begin{aligned}&\varphi'''+\varphi\varphi''=\beta_1[\varphi' f(T)-1],\\&\vartheta''+\varphi\vartheta'=\gamma(\varphi')^2,\\&\vartheta=\frac{\theta}{c_pT_0}=\frac{T}{T_0}+\frac{v_0^2}{2c_pT_0}(\varphi')^2,\\&\gamma=1-\frac{1}{Pr},\ \beta_1=\frac{2H_0^2 l\sigma_0}{\rho c^2}.\end{aligned}\right\}\qquad(3).$$

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The conductivity σ is given in the form $\sigma = \sigma_0 f(T)$ where $f(T_0) = 1$. The primes indicate the derivatives with respect to ξ. With the boundary conditions for φ and ϑ and assuming thermal insulation on the surface, the system (3) has the plain integral $\vartheta = \vartheta_0$. With the function $f(T(\varphi')) = F(\varphi')$ and the new variables $(\varphi')^2 = z$ and φ, the system (3) leads to one equation:

$$\sqrt{z}\frac{d^2z}{d\varphi^2} + \eta\varphi\frac{dz}{d\varphi} = \beta[\sqrt{z}F(z) - 1], \qquad (5)$$
$$z(0) = 0,\ z(\infty) = 1,\ \beta = 2\beta_1$$

The friction on the body, $\tau = \nu\rho\left.\frac{\partial v_x}{\partial y}\right|_{y=0}$, may be expressed by $z(\varphi)$:

$$\tau = \rho v_0\sqrt{\frac{\nu v_0}{x}}\,\eta(\beta),\quad \eta(\beta) = \left.\frac{dz}{d\varphi}\right|_{\varphi=0}. \qquad (5a)$$

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Effect of an external magnetic field ...

The resulting function $\eta(\beta)$ may be represented as an asymptotic expansion:

$$\eta = \sqrt{2w(0)\beta}\left(1 + \sum_{k=1}^{\infty} \frac{1}{\beta^k}\psi_k(0)\right). \qquad (9)$$

The second example is a gas stream of constant conductivity passing through a diffuser which consists of two intersecting planes. The magnetic field is generated by a current along the line of intersection of the planes, i. e. it is purely circular and perpendicular to the stream, and obeys the law $H = H_0 \frac{1}{x}$. For this case, one obtains

$$\tau = \rho\sqrt{\frac{4\nu\alpha^3}{3x^4}\left(1 + \frac{3}{4}\frac{H_0^2 l^2 \sigma}{\rho c^2 \alpha}\right)}. \qquad (12)$$

$v_x = -\frac{\alpha}{x}$. The results show that at sufficiently high magnetic field strengths H, friction rises with H. There are 2 figures, and 4 references: 2 Soviet-bloc and 2 non-Soviet-bloc.

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B102/B201

26.2241
21.6000 (1043, 1565)

AUTHORS: Sayasov, Yu. S., Ivanov, G. K.

TITLE: Theory of the dissociation of molecules by neutrons. I. Diatomic molecules

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 2, 1961, 513-523

TEXT: In a collision between neutron and bound molecule, sufficient energy can be transferred to break the bond, i.e., to lead to a dissociation. This process, which has not been studied so far, is of great interest from the viewpoint of radiation chemistry, biology, and the slowing down of neutrons. A knowledge of the dissociation probability of molecules by neutrons is also important for the method of molecular neutronoscopy proposed by V. I. Gol'danskiy (Ref. 1: ZhETF, 31, 717, 1956). The authors developed a theory of the dissociation of diatomic molecules by neutrons based on the method of the Fermi pseudopotential. The neutron is presupposed to have an energy E of the

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Theory of the dissociation of ...

order of the dissociation energy of the molecule (viz., $E \sim 10$ ev); a wavelength of $\lambda_n \sim 10^{-9}$ cm corresponds to these energies; inequalities $\lambda_n \gg A$ and $a \gg A$ must hold between λ_n, the radius of nuclear forces $A \sim 10^{-13}$ cm and the vibration amplitude of the nuclei in the molecule $a \sim 10^{-9}$ cm, for the method of the Fermi pseudopotential to be applicable. The molecule is further assumed to remain in the ground state during decomposition. $V = 2\pi\hbar^2 \sum_i \frac{1}{\mu_i} A_i \vec{\delta}(\vec{r}_n - \vec{r}_i)$ is applied as interaction ansatz, where $\mu_i = m_i m/(m_i + m)$; here m denotes the neutron mass and m_i that of the i-th nucleus in the molecule, $A_i = a_i + b_i(\vec{i}\vec{s})$, the scattering amplitude of the neutron (spin $\vec{s}$) at the free nucleus (spin $\vec{i}$), $\vec{i}\vec{s}$ the eigenvalue of the operator $\hat{\vec{i}}\hat{\vec{s}}$;

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Theory of the dissociation of ...

the relation $d\sigma = \frac{k'}{k}\overline{|W|^2}\, d\vec{\varkappa}_1 \ldots d\vec{\varkappa}_n do$ is set for the dissociation cross section in first Born's approximation with respect to V- according to general perturbation-theoretical formulas for the transition probability from one state of the discrete spectrum to the continuous one. In this relation, do denotes an element of the solid angle, into which the neutron is scattered, k' and k are the wave numbers of the neutron prior to and after collision, $\vec{\varkappa}_1 \ldots \vec{\varkappa}_n$ are the wave vectors of the dissociation products. $W = \frac{\mu}{2\pi\hbar}\int e^{i(\vec{k}-\vec{k}')\vec{r}_n}\psi_0 V \psi_\varkappa^* d\vec{r}_n d\vec{r}$, where ψ_0 denotes the wave function of the initial state of the molecule, $\psi_\varkappa$ is the wave function of the end state of the molecule; $d\vec{r}$ denotes integration over all molecular coordinates. Since it is assumed (in adiabatic approximation) for the electron state of the molecule to remain unchanged, the electron wave functions are excluded, and ψ_0 and $\psi_\varkappa$ are regarded as wave functions of the relative motion of the nuclei. If

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the electron state in the molecule is equal to Σ, the wave function of the relative motion of the nuclei will coincide in adiabatic approximation with that of the relative motion of two particles interacting in a central-symmetrical manner. Formula

$$\psi_{\varkappa}^{-} = \frac{1}{4\pi\varkappa r} \sum_{l=0}^{\infty} i^{l} (2l+1) e^{-i\delta_l} \chi_{\varkappa l}(r) P_l\left(\frac{\varkappa r}{\varkappa r}\right), \qquad (3)$$

holds, where $\chi_{\varkappa l}$ denotes the wave function of equation

$$\frac{d^2\chi_{\varkappa l}}{dr^2} + \left(\varkappa^2 - \frac{2\mu_m U}{\hbar^2} - \frac{l(l+1)}{r^2}\right)\chi_{\varkappa l} = 0, \qquad (4),$$

U is the molecule potential, μ_m is the reduced mass of the molecule. The initial state of the molecule (vibration number n, rotation number K) is given by $\psi_o = \frac{1}{r}\left(\frac{2}{\pi}\right)^{1/4} a^{-1/2} e^{-\xi^2} H_n(\xi) Y_{KM_K}(\vartheta, \varphi)$, where

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$\xi = (r-r_0)/a$, r_0 is the minimum point of U, $a = \sqrt{2\hbar/\mu_m\omega}$ the vibration amplitude of the nuclei in the molecule, $H_n(\xi)$ the Hermitian function, M_K the projection of the torque of the molecule onto the molecule axis, θ, φ denote the orientation of the molecule in the c.m.s. of neutron and molecule. Thus, from

$$d\sigma = \frac{k'}{k}\frac{1}{2K+1}\sum_{M_K=-K}^{K}\overline{|W_{M_K}|^2}\,d\varkappa\,do, \tag{6}$$

$$W_{M_K} = \frac{\mu}{2\pi\hbar^2}\int e^{i(\mathbf{k}-\mathbf{k}')\mathbf{r}_n}\psi_0 V\psi_\varkappa^{-*}\,d\mathbf{r}_n\,d\mathbf{r},$$
$$V = 2\pi\hbar^2\left(\frac{A_1}{\mu_1}\delta(\mathbf{r}_n-\mathbf{r}_1)+\frac{A_2}{\mu_2}\delta(\mathbf{r}_n-\mathbf{r}_2)\right). \tag{7}$$

one obtains for the dissociation cross section

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$$d\sigma_{nK} = \sqrt{\frac{\pi}{2}}\frac{k'}{k}\frac{1}{a}\left[\sum_{l=0}^{\infty}(2l+1)\sum_{L=|l-K|}^{l+K}(C^{Lo}_{loKo})^2 F_{lL}\right]d\varkappa\, do, \quad (9)$$

$$F_{lL} = \overline{A_1^2}\frac{1}{g_1^2}\left(\frac{\mu}{\mu_1}\right)^2 J_{g_1}^2 + \overline{A_2^2}\frac{1}{g_2^2}\left(\frac{\mu}{\mu_2}\right)^2 J_{g_2}^2 + (-1)^L\overline{2A_1A_2}\frac{\mu^2}{\mu_1\mu_2}J_{g_1}J_{g_2}\frac{1}{g_1g_2},$$

$$J_g = \int_0^\infty \frac{1}{r}e^{-\xi^2}H_n(\xi)\chi_{\varkappa l}(r)\psi_{L+1/2}(gr)\,dr,$$

$$\psi_{L+1/2}(x) = \sqrt{x}J_{L+1/2}(x), \quad g = g_{1,2} = \frac{m_{2,1}}{m_1+m_2}|k-k'|, \quad (10),$$

where C^{Lo}_{loKo} denotes the Clebsch-Gordan coefficients. If the molecule consists of different atoms, $\overline{A^2_{1,2}} = a^2_{1,2} + \frac{1}{4}i_{1,2}(i_{1,2}+1)b^2_{1,2}$; $\overline{A_1A_2} = a_1a_2$, where $i_{1,2}$ denotes the nuclear spins. If it consists of

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equal atoms, $\overline{A_{1,2}^2} = a^2 + \frac{1}{4} i(i+1)b^2$, $\overline{A_1 A_2} = a^2 + \frac{3}{8} b^2 [2i(i+1) - I(I+1)]$, where I denotes the total spin of the system of the two nuclei. In the case of quasiclassical conditions (the wavelengths ($\lambda_n \sim 10^{-9}$ cm) corresponding to the neutron energies are small compared with molecular sizes) one obtains

$d\sigma = \frac{1}{2\sqrt{2\pi}} \frac{k'}{k} a \frac{1}{\varkappa'} \frac{\mu^2}{\mu_1^2} Ei(-\rho^2)\varkappa d\varkappa do$ (18), and therefrom, if $\rho^2 > 1$: (19), and if $\rho^2 < 1$: (20),

$$d\sigma = \frac{1}{2\sqrt{2\pi}} \frac{k'}{k} a \left(\frac{\mu}{\mu_1}\right)^2 \overline{A_1^2} \frac{1}{\varkappa'} \frac{e^{-\rho^2}}{\rho^2} \varkappa d\varkappa do, \quad (19)$$

$$d\sigma = \frac{1}{2\sqrt{2\pi}} \frac{k'}{k} a \left(\frac{\mu}{\mu_1}\right)^2 \overline{A_1^2} \frac{1}{\varkappa'} \ln(\gamma/\rho^2) \varkappa d\varkappa do \quad (20)$$

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where γ denotes Euler's constant. By integrating (18) with respect to θ and $\varkappa$, one obtains the total cross section $\sigma = \pi \overline{A_1^2} \frac{\mu\mu_m}{\mu_1^2} \frac{E-D}{E}$, and in case of an n-p collision in a heavy molecule ($\mu = \mu_m = m$, $\mu_1 = m/2$, $\mu\mu_m/\mu_1^2 = 4$), $\sigma = \sigma_0(E-D)/E$. If $ak' \gg 1$, θ can be determined from

$$\varkappa' \approx \sqrt{\frac{\mu_m}{\mu}(k^2 - k'^2)} = g_1 = \frac{m_2}{m_1 + m_2}\sqrt{k^2 + k'^2 - 2kk' \cos\theta},$$

$$\cos\theta_0 = [(\nu + 1)p'^2 - (\nu - 1)p^2]/2pp', \qquad (24)$$

$$p = k\hbar, \quad p' = k'\hbar, \quad \nu = m_1(m_1 + m_2 + m)/mm_2.$$

If θ is almost equal to θ_0 and $\vartheta_0 \ll 1$, $\vartheta \ll \theta_0$, one obtains from (18):

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$d\sigma = \frac{\sigma_0}{\sqrt{2\pi}} \left(\frac{p'}{p}\right)^2 Ei\left(\frac{-\vartheta^2}{\vartheta_0^2}\right) \frac{1}{p_0} dp' d\vartheta$. The threshold-near dissociation cross section is calculated next. If the neutron energy is near the dissociation energy D, and the discrete level ε of the molecule is deep enough for $E - D \ll \varepsilon$, one obtains

$$d\sigma = \frac{1}{\sqrt{2\pi}} \sigma_0 \frac{a}{r_0^2 \alpha} \frac{\cos^2\tau}{\cos^2 q} \frac{k'\varkappa^2}{k^4} d\varkappa do,$$

$$\tau = \int_{r_1}^{r_0} \tilde{\varkappa}_0 dr - g r_0. \qquad (28)$$

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Thus, $\sigma = \frac{1}{2}\left(\frac{\pi}{2}\right)^{3/2}\sigma_0 \frac{a}{\alpha r_0^2}\left(\frac{E-D}{D}\right)^2 \frac{\cos^2\tau}{\cos^2 q}$, $q = \frac{1}{\hbar}\int_{r_1}^{\infty}\sqrt{-2\mu_m U}\,dr = \pi\left(n+\frac{1}{2}\right)$.

The total cross section may be also obtained from

$$d\sigma = \frac{1}{\sqrt{2\pi}}\sigma_0 \frac{a}{r_0^2\alpha}\frac{\cos^2\tau}{\cos^2 q + \pi^2\varkappa^2/\alpha^2}\frac{k'\varkappa^2}{k^4}d\varkappa do. \qquad (32).$$

In this case, $\sigma = \frac{1}{\sqrt{2\pi}}\sigma_0 \frac{a\alpha}{r_0^2 k_m^2}\frac{E-D}{D}\cos^2\tau$, $k_m^2 = \frac{2\mu_m D}{\hbar^2}$.

V. I. Gol'danskiy is thanked for having suggested the subject, A. I. Baz', A. S. Kompaneyets, and F. L. Shapiro for their discussions.
Some mathematical problems are discussed in an appendix. There are 5 references: 3 Soviet-bloc and 2 non-Soviet-bloc.

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ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences, USSR)

SUBMITTED: June 26, 1960

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34308

S/207/62/000/001/009/018
B145/B138

AUTHOR: Sayasov, Yu. S. (Moscow)

TITLE: The kinetics of nitrogen oxidation in a direct shock wave

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 1, 1962, 61 - 67

TEXT: The kinetics of N_2 oxidation in a direct shock wave is investigated on the assumption of a quasi-stationary concentration change in the N atoms. The following assumptions are made: 1. The excitation of vibrational freedom exceeds the equilibrium value. 2. The totality of the elementary transformations is described by the scheme of Ya. B. Zel'dovich (Ref. 2: Seldovich J. B. Kinetics of Nitrogen Oxidation, Acts Physicoch. URSS, 1946, vol. 21, no. 2, p. 577) (notations and rate constants from Ref. 1) (Ref. 1: Duff R. Davidson N. Calculation of reaction profiles behind steady state shock waves, J. Chem. Phys., 1959, vol. 31, no. 4, p. 1018).

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$$(1)\quad O_2 + M \rightleftarrows O + O + M$$

$$(4)\quad N_2 + O \rightleftarrows NO + N$$

$$(5)\quad O_2 + N \rightleftarrows NO + O$$

$k_1 = 10^{-8} \exp(-59/\vartheta)$ см³/сек, $k_1' = 10^{-33}$ см⁶/сек

$k_4 = 10^{-10} \exp(-38/\vartheta)$ см³/сек, $k_2' = 2\cdot 10^{-11}$ см³/сек

$k_5 = 2\cdot 10^{-11} \exp(-3/\vartheta)$ см³/сек, $k_5' = 2\cdot 10^{-12} \exp(-19/\vartheta)$ см³/сек

On the assumption of constant mean molecular weight $\mu = \rho/n$ (n total number of particles per cm³), the following system of equations is obtained:

$$\frac{d\alpha_O}{dt} = 2\{1\} + \{5\} - \{4\}, \quad \frac{d\alpha_{NO}}{dt} = \{4\} + \{5\} \qquad \left(t = \int_0^s \frac{ds}{v}\right)$$

$$\frac{d\alpha_N}{dt} = \{4\} - \{5\}, \quad \frac{d\alpha_{O_2}}{dt} = -\{1\} - \{5\}, \quad \frac{d\alpha_{N_2}}{dt} = -\{4\} \qquad (1.\ 1)$$

$$\{1\} = k_1 n \alpha_{O_2} - k_1' n^2 \alpha_O^2, \quad \{4\} = k_4 n \alpha_{N_2} \alpha_O - k_4' n \alpha_{NO} \alpha_N$$

$$\{5\} = k_5 n \alpha_{O_2} \alpha_N - k_5' n \alpha_{NO} \alpha_O$$

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(α_O, α_N, etc. denote relative concentrations, t time, s coordinate along the direction of flow, v gas velocity along the direction of flow. 3. $d\alpha_N/dt = 0$ (the condition of application $\alpha_N/\alpha_O \ll 1$ is satisfied for T_2 (temperature behind the wave front) $\lesssim 10000^{\circ}K$). By means of the equation for maintaining enthalpy and kinetic energy, one obtains: $n = n_2/(1-\sigma)$, $v = v_2(1-\sigma)$, $p = nkT = n_2kT_2 = const$, $\sigma = (6500\alpha_O + 12600\alpha_N)/T_2$ (1. 9) (the indices 1 and 2 denote the quantities in front of and directly behind the wave front respectively). In the simplest case (constant temperature and density, condition: $59\sigma/\xi_2 < 1$, fulfilled at $T_2 < 3000^{\circ}$, $p_2 > 1$ atmosphere) the following equations are obtained:

$$\alpha_O = \alpha_O^{\check{}} \frac{\exp(2t/\tau_O) - 1}{\exp(2t/\tau_O) + 1} \qquad (2.\ 1)$$

$$\alpha_{NO} = \alpha_{NO}^{\check{}} \frac{[\mathrm{ch}(t/\tau_O)]^{2\nu} - 1}{[\mathrm{ch}(t/\tau_O)]^{2\nu} + 1} \qquad (2.\ 2)$$

(α_{NO}^{x} equilibrium concentration for the nonequilibrium temperature ξ),

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where τ_0 (time of equilibrium adjustment in respect of the O atoms) = $1/2(k_1 k_1' n^3 \alpha_{O_2})^{1/2}$ and $\nu = 2 \cdot 10^{22}(1/n)(\alpha_{N_2}/\alpha_{O_2})^{1/2} \exp(-27/\vartheta)$. For higher temperatures, the variability of T must be considered according to Eq. (1.9). For the initial state of the process $(k_1 n \alpha_{O_2} \gg k_1' n^2 \alpha_0^2)$ one obtains the equation: $t = \frac{1}{k_{10} n_2} \exp(2b(\alpha_{O_2})_0)[\mathrm{Ei}(-2b\alpha_{O_2}) - \mathrm{Ei}(-2b(\alpha_{O_2})_0)]$

$$\mathrm{Ei}(-x) = \int_x^\infty \frac{e^{-x}}{x} dx, \qquad \alpha_{O_2} = (\alpha_{O_2})_0 - \alpha_0/2 \tag{3.2}$$

For τ_0 in this case $\tau_0 = 1/(k_1^x k_1' n_2^3 \alpha_{O_2}^x)^{1/2} \left[1 + \alpha_0^x(1 - 2b\alpha_{O_2}^x)\right]$ and for $\alpha_{O_2} \approx (\alpha_{O_2})_0 \gg \alpha_{NO}$: $\alpha_N = 4 \exp(-35/\vartheta_2) \exp(-d\alpha_0)\alpha_0/(\alpha_{O_2})_0$. In the case of $\vartheta_2 > 7$, the dissociation of N_2, which had been neglected in both the previous cases, must be considered. With the argument $\ell = \vartheta_2 - 2.7 + 13\alpha_{O_2} - 12.6\alpha_{N}$

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one obtains the equation:

$$t = \frac{1}{k_{10} n_2} e^{c\alpha_N(\alpha_{0,})} [\mathrm{Ei}(-b\alpha_{0,}) - \mathrm{Ei}(-b(\alpha_{0,})_0)] \qquad (3.6),$$

where $c = 740/(\gamma_2 - 2.7)^2$ and $b = 780/(\gamma_2 - 2.7)^2$. Examples with concrete values were calculated for all three cases and the results are in good agreement with those from Ref. 1. There are 4 figures and 9 references: 7 Soviet and 2 non-Soviet. The two most recent references to English-language publications read as follows: Duff R., Davidson N., J. Chem. Phys., 1959, no. 31, 1018, Calculation of reaction profiles behind steady state shock waves, J. Chem. Phys., 1959, vol. 31, no. 4, p. 1018; Lin S., Fife W. Strong shock waves structure in the air, Phys. Fluids, 1961, vol. IV, no. 2, p. 238.

SUBMITTED: July 25, 1961

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35659

S/020/62/143/001/012/030
B104/B108

24.6730

AUTHORS: Zel'manov, I. L., Kompaneyets, A. S., and Sayasov, Yu. S.

TITLE: Phase motion of particles in accelerators with variable parameters

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 1, 1962, 72-73

TEXT: The phase oscillation equation of particles in an accelerator whose parameters have negligible random disturbances is in linear appoximation

$$\frac{d^2q}{dt^2} + \omega^2(t)\, q = a(t)\, \psi(t), \qquad (1).$$

q is the distance between the particle ooserved and an "ideal" synchronous particle, ψ is a random quantity characterizing the phase deviation of the synchronous particle from the "ideal" particle, $\omega^2(t)$ and a(t) are known functions slowly changing with time. The phase oscillations in an "ideal" accelerator are described by

$$\frac{d^2q_0}{dt} + \omega^2(t)\, q_0 = 0, \qquad (2),$$

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where $Q = q - q_0$ and $\dot{Q} = \dot{q} - \dot{q}_0$ characterize the deviations of the position and velocity of the particle observed from the "ideal" one. Assuming that $\overline{\psi(t)} = 0$, $\overline{\psi(t)\,\psi(t')} = \psi_0^2\,\delta(t - t')$ and that the solutions of (1) and (2) may be found in Wentzel-Kramers-Brillouin's approximation,

$$\frac{\partial\Phi}{\partial t} + \dot{Q}\frac{\partial\Phi}{\partial Q} - \omega^2 Q\frac{\partial\Phi}{\partial\dot{Q}} = \nu(t)\left(\frac{\partial^2\Phi}{\partial Q^2} + \omega^2(t)\frac{\partial^2\Phi}{\partial\dot{Q}^2}\right), \tag{3}$$

$$\nu(t) = \frac{\psi_0^2}{2\omega(t)}\left(\frac{a^2(t)}{\omega(t)} + \omega^2(t)\int_{t_0}^{t}\frac{a^2(\tau)}{\omega(\tau)}\,d\tau\right).$$

is obtained for the probability density $\Phi(t,Q,\dot{Q})$. As a solution of (3),

$$\Phi = \frac{1}{4\pi\int_{t_0}^{t}\nu\omega\,dt}\exp\left(-\frac{Q^2}{\frac{4}{\omega}\int_{t_0}^{t}\nu\omega\,dt} - \frac{\dot{Q}^2}{4\omega\int_{t_0}^{t}\nu\omega\,dt}\right), \tag{9}$$

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is obtained. This solution holds for any dynamic system which has a potential $\frac{1}{2}\omega^2(t)q^2$ slowly changing with time, and which is affected by random forces $a(t)\psi(t)$. The reference to the English-language publication reads as follows: S. Livingstone, Accelerators, 1956.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: October 16, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: October 10, 1961

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

SAYASOV, Yu.S.

Ionization kinetics behind a straight shock wave in the air.
Dokl. AN SSSR 146 no.2:409-412 S '62. (MIRA 15:9)

1. Institut khimicheskoy fiziki AN SSSR. Predstavleno akademikom V.N. Kondrat'yevym.
(Shock waves) (Ionization)

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

S/109/63/008/003/017/027
D271/D308

AUTHORS: Sayasov, Yu. S., and Zhizhimov, L. A.

TITLE: Resonance scattering of radio waves by trials of artificial earth satellites

PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 3, 1963, 499-502

TEXT: Scattering phenomena are discussed based on the assumption that a plane wave hits in a normal direction a cylindrical inhomogeneity of infinite length, with an electron concentration dependent solely on the distance from the axis, and that the electric vector of the incident wave is parallel to the cylinder axis. The permittivity of the trail is lower than that of the surrounding ionosphere because of the lower electron concentration. It is shown that the trail region, with respect to its scattering properties, is an analog of the attracting potential in quantum mechanics. If one of the possible stationary condi-

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tions is near zero, the scattering of the particles has a resonance character. Self-resonance is always possible if the region is cylindrical. In view of the great length of the trail, self-resonance is possible even though the cross-dimensions of the trail are small by comparison with the wavelength critical. An equation is given for E_z, and its solution takes the form:

$$H_z = \sum_{l=-\infty}^{+\infty} R_l(r) e^{il\theta} . \qquad (2)$$

The scattering amplitude is obtained by subtracting a plane wave from Eq. (2) and assuming the difference to be a propagating cylindrical wave. The expression thus obtained is discussed, given the conditions required for self-resonance. In real conditions, the trail is not truly cylindrical but flattened in the

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x-direction. The analogy with a unidimensional potential cavity is applied to the evaluation of the reflection coefficient of a plane wave travelling in the x-direction. In this case, the full scattering cross-section does not extend beyond the effective trail surface, whereas in the case of full cylindrical symmetry it is many times greater. Resonance scattering does not occur when the trail length and the relative change in electron concentration are relatively small. Gratutude is expressed to M. Ye. Gertsenshteyn, A. V. Gurevich, A. S. Kompaneyts, and L. I. Pitayevskiy for their help in checking results.

SUBMITTED: July 7, 1962

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

KOZHUSHNER, M.A.; SAYASOV, Yu.S.

Interrelation of elastic and inelastic scattering cross sections in nonadiabatic atomic collisions. Opt. i spektr. 15 no.5:577-581 N '63. (MIRA 16:12)

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

ACCESSION NR: AP4009455 S/0051/63/015/006/0734/0742

AUTHRO: Kozhushner, M.A.; Sayasov, Yu.S.

TITLE: Regarding the probabilities for inelastic atomic collisions in the case of several points of intersection (or pseudointersection) of the terms

SOURCE: Optika i spektroskopiya, v.15, no.6, 1963, 734-742

TOPIC TAGS: atomic collision, collision probability, inelastic collision, collision cross section, level intersection, term intersection, diatomic system, excitation function

ABSTRACT: The present quantum mechanical theory (L.Landau and E.Lifshits, Kvantovaya mekhanika, M.1948) of electronic transitions in diatomic systems may not correctly represent the situation that obtains in cases when the terms of the two electronic states between which the transition occurs have more than one point of intersection. This situation obtains, for example, if the terms actually intersect at one point and approach close to each other for large distances between the atoms, i.e., when there occurs "pseudointersection". There may also occur cases when the terms actually intersect at two or more points. Accordingly, in the present paper there are deduced formulas for the probabilities for inelastic processes in the

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presence of two points of intersection (or "pseudointersection") of the terms. The results are susceptible of generalization to the case of an arbitrarily large number of points of intersection. It is assumed that the interactions depend only on the separation between the atoms, that is, that the problem is centrosymmetric. Thus, investigation of the problem of scattering incident to collision of two atoms reduces to consideration of a system of two related radial equations corresponding to the given azimuthal quantum number in the system formed by the two colliding atoms. The calculations are carried out by a method analogous to that proposed by E. C.Stückelberg (Helv.Phys.Acta,5,370,1932). A specific solution is derived for the case of two points of intersection of the terms and equations are derived for the cross section for inelastic processes in the case of two pairs of transition points. It is shown that in the case of several points of intersection (or "pseudointersection") of the terms the energy dependence of the cross section for collisions of the second kind may exhibit a number of peaks. "We desire to express our gratitude to A.S.Kompaneyts for discussion of the work and useful suggestions." Orig.art.has: 60 formulas and 1 figure.

ASSOCIATION: none

SUBMITTED: 20Jul62 DATE ACQ: 03Jan64 ENCL: 00

SUB CODE: PH NR REF SOV: 002 OTHER: 004

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

IVANOV, G.K.; SAYASOV, Yu.S.

Scattering theory in the impulse approximation. Zhur. eksp. i teor. fiz. 45 no.5:1456-1466 N '63. (MIRA 17:1)

1. Institut khimicheskoy fiziki AN SSSR.

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

ACCESSION NR: AR4014684 S/0271/64/000/001/A058/A058

SOURCE: RZh. Avtomatika, telemekhanika i vy*chislitel'naya tekhnika, 1964, no. 1, Abs. 1A378

AUTHORS: Saydov, P. I. and Sliv, E. I.

TITLE: Gyroscopic bearing indicators

CITED SOURCE: Izv. Leningr. elektrotekhn. in-ta, vy*p. 48, 1963, 90-109

TOPIC TAGS: gyroscopic bearing indicator, vertical gyro, gyro error signal, gyroscopic position indicator, inertial gyroscope

TRANSLATION: The possibility of using a vertical gyro with radial correction as a gyroscopic bearing indicator is examined. Since the moments of the error correction applied to the vertical gyro are functions of longitude and latitude derivatives, it is possible to obtain continuously the coordinates of a moving object by integrating the respective signals. Cases of a four- gyro vertical system, an inertial gyro system with integral correction, and an inertial gyro system with an azimuthal gyro are discussed. Orig. art. has 7 figs. and 6 refs.

SUB CODE: GE ENCL: 00 DATE ACQ: 19Feb64 I. L.

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L 11086-65 EWT(m) DIAAP/AFWL/SSD/ESD(t)

ACCESSION NR: AP4046630 S/0181/64/006/010/3118/3123

AUTHORS: Arifov, P. U.; Gol'danskiy, V. I.; Sayasov, Yu. S. (B)

TITLE: Determination of the momentum distribution of annihilating electron-positron pairs from the gamma-quantum angular distribution 19

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3118-3123

TOPIC TAGS: annihilation reaction, electron, positron, angular momentum distribution, gamma quantum distribution

ABSTRACT: It is shown that the formula customarily used to reconstitute the momentum distribution from the γ-quantum angular correlation is based on assumptions that are too approximate. The author consequently derives a relation between the density $\rho(p)$ of the momentum distributions of e^+e^- pairs and the coincidence counting rate I (as a function of angle), in which correct account is taken of the geometry of the experiment and of the variability of the

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probability that the angles of the emitted annihilation γ quanta can be correctly registered by the detectors. The conditions under which the new formulas give results that differ appreciably from the old formula are indicated. It is also shown that the new formulas can also be used directly to determine the momentum distribution of slow neutral pions from the angular correlation of the γ quanta produced by their decay. Orig. art. has: 2 figures and 11 formulas.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR, Moscow (Institute of Chemical Physics, AN SSSR)

SUBMITTED: 15May64 ENCL: 00

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001447510003-6

ACCESSION NR: AP4019221 S/0056/64/046/002/0560/0567

AUTHOR: Sayasov, Yu. S.

TITLE: Concerning the probabilities of nonadiabatic transitions near the turning points

SOURCE: Zhurnal eksper. i teor. fiz., v. 46, no. 2, 1964, 560-567

TOPIC TAGS: nonadiabatic transition, nonadiabatic transition probability, Landau formula, two atom system, central symmetry interaction

ABSTRACT: A generalization of the Landau formula for the probabilities of nonadiabatic transition in a system of two atoms is obtained for the case where the energy of the system in the initial state can be close to the total value of the potential energy at the crossing point of the terms of the initial and final states, and the interaction energy between the terms is sufficiently large. The probability of the transition, determined by introducing a classical trajectory,

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is shown to coincide with the exact quantum-mechanical probability, provided the force used is not the arithmetic mean but the geometric mean of the individual forces. The formula derived for the probability is valid for any excess energy above the potential energy. The derivation is based on the placing of the crossing terms by "regular" noncrossing terms constructed with allowance for the interactions that cause the transitions. "I am grateful to A. S. Kompaneyets and M. Ya. Ovchinnikova for a discussion of this work and for many valuable hints." Orig. art. has: 2 figures and 21 formulas.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, AN SSSR)

SUBMITTED: 15Jun63 DATE ACQ: 27Mar64 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 002

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L 13488-65 EWT(1)/EWT(m)/T/EWA(h) IJP(c)/AEDC(a)/AEDC(b)/ASD(a)-5
ACCESSION NR: AP4047908 S/0056/64/047/004/1405/1414

AUTHORS: Ivanov, G. K.; Sayasov, Yu. S.

TITLE: Theory of molecular transformations induced by neutrons 19 B

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 4, 1964, 1405-1414

TOPIC TAGS: Molecular transformation, neutron interaction, momentum transfer, electronic state, particle collision

ABSTRACT: A general method is developed for investigating the probabilities of molecular transformations induced by neutron impact. The method is based on the assumption that the transformations of the molecule are such that the molecule remains in the electronic ground state, that the neutron imparts momentum only to peripheral atoms, and the interactions between the atoms receiving the momentum and the other atoms of the molecule have a paired character. The method

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ACCESSION NR: AP4047908

involves the application of the impulse approximation to secondary collisions between the atoms ejected by the neutrons and the other atoms of the molecule. The method is used to calculate the probability of dissociation of a triatomic molecule by neutrons, accompanied by excitation of the diatomic residue. Orig. art. has: 25 formulas.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR)

SUBMITTED: 04Apr64 ENCL: 00

SUB CODE: NP, GP NR REF SOV: 008 OTHER: 000

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