

ACCESSION NR: AP4041994

S/0057/64/034/007/1199/1205

AUTHOR: Kreyndel', Yu.Ye.; Ionov, A.S.

TITLE: Some peculiarities of low pressure Penning discharges

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.7, 1964, 1199-1205

TOPIC TAGS: discharge plasma, ion beam, electron beam, Penning tube

ABSTRACT: The beam issuing from a central opening in one cathode of a Penning tube was caught in a Faraday cage and the ion and electron currents in the beam were measured separately as functions of the longitudinal magnetic field in the discharge region. The compositions of beams issuing from non-central openings were also determined, and the discharge was photographed. The single annular anode of the Penning tube was midway between the two cathodes, which were separated by 28 mm. The tube was continuously pumped, and the discharges were examined at pressures from 2×10^{-6} to 10^{-4} mm Hg. The discharge tube and the experimental arrangement are described in more detail elsewhere (Yu.Ye.Kreyndel', ZhTF 33,883,1963). At low magnetic fields the beam issuing from the central opening of the cathode consisted mainly of positive ions but had a substantial electron component. When the magnetic field was

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increased to a certain critical value (800 Oe in one case) the electron component of the beam current increased sharply, and the total beam current became negative. The discharge was unstable in magnetic fields near the critical value, but in stronger fields it was stable with a negative beam current. By varying the distance of the Faraday cage from the Penning tube cathode it was found that the ion component of the beam was more divergent than the electron component. When the central beam current became negative, the current in beams issuing from openings near the periphery of the cathode remained positive and, indeed, increased. The beam current was nearly the same in tubes in which both cathodes had central openings as in those in which only one cathode was pierced. This shows that the electron component is not primarily due to secondary electrons emitted by the opposite cathode and traversing the tube rectilinearly. Photographs of the discharges showed that at low magnetic fields the luminosity was confined to the region of the anode and to a thin filament extending axially from one cathode to the other. This axial filament was present at all values of the magnetic field whether one, both, or neither of the cathodes was pierced. The luminous region about the anode extended toward the cathodes as the magnetic field was increased, and at the critical field it suddenly spread over the cathodes themselves. Orig.art.has: 6 figures.

Cont
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ACCESSION NR: AP4041994

ASSOCIATION: none

SUBMITTED: 14Sep63

SUB CODE: NP, EM

NR REF SOV: 004

ENCL: 00

OTHER: 004

Card

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KREYNDEL', Yu. Ye.; IONOV, A.S.

Characteristics of discharges in Penning tubes at low pressures.
Zhur. tekhn. fiz. 34 no.7:1199-1205 J1 '64 (MIRA 17:8)

S/029/60/000/07/22/024
B013/B058


AUTHORS: Belorusets, M., Engineer, Ionov, B., Engineer

TITLE: The Miracle Screen

PERIODICAL: Tekhnika molodezhi, 1960²⁸ No. 7, pp. 37-39

TEXT: The authors report on the manufacture of screen films for the graphic industry. The technology of the three classical printing methods, relief-, surface-, and intaglio printing, is explained in the introduction. The Moskovskiy poligraficheskiy institut (Moscow Polygraphic Institute) has set the problem to its Scientific Students' Society to develop screen films, the manufacture of which should be simpler and cheaper compared with the foreign material. These films should also produce perfect reproductions. Under the supervision of Nikolay Ivanovich Sinyakov, Docent, Candidate of Technical Sciences, the students developed several methods for the manufacture of screen films. The new material was tested under operational conditions and patented. Screen films for relief-, surface-, and intaglio printing were developed. The new screen-film²⁸ material differs from common films by the fact that the silver halide crystals are in strict order in the

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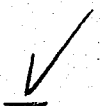


The Miracle Screen

S/029/60/000/07/22/024
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gelatinous emulsion layer. A picture composed of dots can thus be obtained from a half-tone pattern without having to use a screen. The negative represents a common half-tone picture behind an opaque screen in intaglio printing. The diapositive obtained from this negative looks like the original behind a transparent screen. Special screen films were developed for color printing. The manufacture of these films is extremely simple. A screen is recorded first on a common film. An emulsion layer, sensitive to any tint, is then applied to the back of the base. The new screen films were experimentally tested at the printing shops of the "Pravda" and the "1-ya Obraztsovaya". The results were satisfactory. The new material was recommended to the Moscow, Tatariya, and Latviya sovnarkhoz for test and use. There are 6 figures.

Card 2/2



Ионов, Б. Д.

1. BUVERT, V. V., Prof.; IONOV, B. D., Docent; KISHINSKIY, M. I., Docent; SYROMYATNIKOV, S. A., Docent
2. USSR (600)
4. Lumbering
7. New textbook on land transport of timber ("Land transport of timber." Prof. V. V. Buvert, Docent B. D. Ionov, Docent M. I. Kishinskiy, Docent S. A. Syromyatnikov. Reviewed by M. A. Zav'yalov, G. T. Urtaev.) Les. prom., 13, no. 4, 1953.
9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

IGONOV, B.D., dotsent.

For a modern technology of log skidding. Les.prom.14 no.4:4-7 Ap '54.
(MLRA 7:4)

1. Moskovskiy lesotekhnicheskij institut. (Lumbering)

BUVERT, Viktor Vladimirovich, prof.; IONOV, Boris Dmitriyevich, dotsent, kand.tekhn.nauk; KISHINSKIY, Mikheil Il'ich, dotsent, kand.tekhn.nauk; SYROMYATNIKOV, Sergey Arkad'yevich, dotsent, kand.tekhn.nauk; KORUNOV, M.M., prof., retsenzent; VERIGO, M.F., prof., doktor tekhn.nauk, red.; POLTEVA, B.Kh., red.izd-va; BACHURINA, A.M., tekhn.red.

[Land transportation of timber] Sukhoputnyi transport lesa.
Izd.2., perer. Pod obshchei red. M.F.Verigo. Moskva, Gosles-
bumizdat. Vol.1. 1960. 475 p. (MIRA 14:4)
(Lumber--Transportation)

BELOZERTSEV, Vasilii Yefimovich, kand.tekhn.nauk; KUVSHINSKIY, V.V.,
insh., retsenzent; IEPIFANOV, B.Ye., dotsent, kand.tekhn.nauk,
retsenzent; IONOV, B.D., red.; PITERMAN, Ye.L., red.izd-va;
PARAKHINA, N.L., tekhn.red.

[Road-building machinery] Dorozhnostroitel'nye mashiny. Moskva,
Goslesbumisdat, 1960. 263 p. (MIRA 14:3)
(Road machinery)

YEMIFANOV, Boris Yefimovich, dotsent; IONOV, Boris Dmitriyevich, dotsent;
KORUNOV, M.M., prof., retsenzent; SHCHELKUNOV, V.V., dotsent,
retsenzent; SHCHERNIKOV, P.N., dotsent, retsenzent; SMIRNOV,
A.I., dotsent, red.; PITERMAN, Ye.L., red.izd-va; VDOVINA, V.M.,
tekhn.red.

[Road-building machinery in the forest industries and principles
of road building] Dorozhno-stroitel'nye mashiny v lesnoi pro-
myshlennosti i osnovy dorozhnogo dela. Moskva, Goslesbumizdat,
1961.. 376 p. (MIRA 14:12)

1. Ural'skiy lesotekhnicheskiy institut (for Korunov). 2. Arkha-
gel'skiy lesotekhnicheskiy institut (for Shchelkunov).
(Road machinery) (Wood-using industries)

MEL'NIKOV, Valentin Ivanovich, dots., kand. tekhn. nauk; SERGEYEV, Petr Georgiyevich, dots., kand. tekhn. nauk; DMITRIYEV, Yuriy Yakovlevich, kand. tekhn. nauk; SELIN, M.F., retsenzent; DOIL'NITSINA, A.G., retsenzent; IONOV, B.D., retsenzent; KISHINSKIY, M.I., otv. red.; PLESKO, Ye.P., red. izdva; GRECHISHCHEVA, V.I., tekhn. red.

[Land transportation of timber and lumber floating] Sukhoputnyi lesotransport i lesosplav. Moskva, Goslesbumizdat, 1962. 314 p. (MIRA 15:12)

1. Petrozavodskiy lesotekhnicheskii tekhnikum (for Ionov). (Lumber—Transportation)

IONOV, B.I.; PETROV, N.I., redaktor; KONSTANTINOV, V.P., redaktor; KRAS-
NAYA, A.K., tekhnicheskij redaktor

[Practical guide for ship radio operators] Prakticheskoe rukovod-
stvo sudovomu radistu. Izd. 2-e, perer. i dop. Moskva, Izd-vo Mini-
sterstva rechnogo flota SSSR, 1952. 219 p. [Microfilm] (MIRA 8:7)
(Radio in navigation)

ICNCV, B. V.

Reinforced Concrete Construction

Large-scale reinforced concrete products for Moscow housing construction. *Biul.stroi. tekhn.* 9 no. 15, 1952.

9. Monthly List of Russian Accessions, Library of Congress, November 195~~8~~₂, Uncl.

IONOV, F.

IONOV, F.

Roads in the Tatar A.S.S.R. are not maintained. Avt.transp. 32
no.5:37 My '54. (MLRA 7:7)

1. Upravlyayushchiy Tatarskim avtotrestem "Soyuzzagottrans".
(Tatar A.S.S.R.--Roads) (Roads--Tatar A.S.S.R.)

VINNIKOV, V., podpolkovnik; IONOV, G., podpolkovnik

Breakthrough from the march. Voen.vest. 39 no.4,30-34 Ap '60.
(MIRA 14:2)

(Attack and defense (Military science))

SEROV, Aleksandr Ivanovich, polkovnik; IONOV, Gleb Aleksandrovich,
podpolkovnik; DUKACHEV, M.F., polkovnik, red.; BUKOVSKAYA,
N.A., tekhn.red.

[Teaching defense operations] Obuchenie deistviam v oboro-
nitel'nom boiu. Moskva, Voen.izd-vo M-va obor.SSSR, 1960.
76 p. (MIRA 14:4)
(Attack and defense (Military science))

IONOV, I.F., inzhener; ARSENT'YEV, A.N., redaktor.

[Communications and signalling, interlocking and block systems
on coal-pit railroads] Sviyaz' i STab na zheleznodorozhnom trans-
porte ugol'nykh kar'erov. Moskva, Ugletekhizdat, 1952. 77 p.
(MLRA 7:3)

(Mine railroads) (Railroads--Signalling)

LOZOVY, A. V.; MUSELEVICH, D. L.; RAVIKOVICH, T. M.; TITOVA, T. A.;
CHERKASOVA, V. F.; Primal uchastiye: IONOV, I. P.

Two-stage system for the hydrogenation method of production
of chemicals from Cherekhovo coal tars. Report No. 2. Trudy
IGI 17:174-181 '62. (MIRA 15:10)

(Coal-tar products) (Hydrogenation)

ACC NR: AR6018973

SOURCE CODE: UR/0271/66/000/002/B037/B037

AUTHOR: Ionov, I. P.

TITLE: A magnetic shift register using chokes

SOURCE: Ref. zh. Avtomat telemekh i vychisl tekhn, Abs. 2B263

REF SOURCE: Tr. Mosk. energ. in-ta. vyp. 60. no. 3, 1965, 67-82

TOPIC TAGS: shift register, magnetic core

TRANSLATION: The operation of a shift register based on serially connected chokes is analyzed and briefly described. The system realizes inverting codes for even and odd cores. The maximum operational frequency is 250 KHz, limited primarily by the ferrite core properties. The system has a minimum number of components and is easily adjusted. It is noted that for stable operation of this system, large turn ratios in the windings are necessary, which leads to an increase in the demands on power sources. A simple method for system design based on integration without graphic analysis is included. Good agreement between design and experimental data is noted. 2 references, 8 figures.
N. P.

SUB CODE: 09

UDC: 681.142.642.7

Card 1/1

IONOV, I.P.; IONKIN, P.A., red.

[Principles of the calculation and design of magnetic
semiconductor elements] Osnovy rascheta i proektirovania
magnitno-poluprovodnikovyykh elementov. Moskva, Mosk.
energeticheskii in-t, 1965. 276 p. (MIRA 18:12)

IONOV, I.P.

Magnetic shift register using choke elements. Trudy MEI
no. 60 no. 3:67-82 '65 (MIRA 19:1)

KATSNEL'SON, I.B., dotsent; BESSER, V.L.; IONOV, I.T.; GORYACHYI, M.P.;
IOFIN, I.I.; CHARTORIZHSKIY, N.A., kand.med.nauk

Poisoning from castor bean seeds; clinical and experimental observa-
tions. Sov. med. 24 no. 2:131-135 F '60. (MIRA 14:2)
(CASTOR BEAN--TOXICOLOGY)

KAPUSTIN, B.N., glav. inzh.; GVOZDEV, T.T., glav. inzh.; GRIGOROVICH, V.D., inzh.; KONDRASHENKO, A.A., inzh.; ABADEYEV, Yu.A., inzh.; RYADNOV, A.A., inzh.; YEGORYCHEV, V.P., inzh.; SHMEL'KIN, B.A., inzh.; MARSHUTIN, S.F., inzh.; KHODZHABARONOV, K.G., inzh.; FEDOSOVA, Ye.M., tekhnik; OSIN, V.I., tekhnik; SEMENOVA, Ye.P., tekhnik; AVSARAGOVA, G.A., tekhnik; PASHKEYEV, D.A., inzh.; KAPUSTIN, V.N., inzh.; NAGOROV, L.A., inzh.; IONOV, I.T., inzh.; KOPEYKINA, L.M., inzh.; TELEPNEVA, T.P., tekhnik; CHAKURIN, Zh.G., tekhnik

[Album of the mechanization of labor-consuming processes in stockbreeding] Al'bom mekhanizatsii trudoemkikh protsessov v zhivotnovodstve. Moskva, Izd-vo Giprosel'khoza. No.4. [Equipment and supplies for the mechanization of labor-consuming processes on livestock farms] Oborudovanie i inventar' dlia mekhanizatsii trudoemkikh protsessov na zhivotnovodcheskikh fermakh. 1959 [cover: 1961. 229] p. (MIRA 15:7)

1. Gosudarstvennyy institut po proyektirovaniyu sel'skokhozyaystvennykh sooruzheniy (for Kapustin, Grigorovich, Kondrashenko, Abadeyev, Ryadnov, Yegorychev, Shmel'kin, Marshutin, Khodzhabaronov, Fedosova, Osin, Semenova, Avsaragova).

(Continued on next card)

KAPUSTIN, B.N.—(continued). Card 2.

2. Respublikanskiy gosudarstvennyy institut po proyektirovaniyu sovkhoznogo stroitel'stva (for Gvozdev, Pashkeyev, Kapustin, V.N., Nagorov, Ionov, Kopeykina, Telepneva, Chakurin).

(Agricultural machinery)

IOHOV, L., inzh.

Machine for processing reed. Sel'.stroj. 15 no.8:22
Sel'.stroj. 15 no.8:22 Ag '60. (MIRA 13:8)
(Reed (Botany))

IONOV, L., inzhener, izobretatel'

Air-filed framework. Isobr. 1 rats. no.3:28-29 Mr '61. (MIRA 14:3)
(Buildings, Portable)

IONOV, L.; LYUTFALIBEKOV, F.

Structure made of mechanical and pneumatic elements. Sel'.
stroj. 16 no.6:14-15 Je '61. (MIRA 14:7)

1. Nachal'nik byuro sodeystviya racionalizatsii i izobretatel'-
'stvu Nauchno-issledovatel'skogo instituta sel'skogo stroitel'stva
(for Ionov). 2. Nachal'nik otdela nauchnoy metodiki i informatsii
(for Lyutfalibekov).

(Buildings, Plastic)

LIPKIN, M.Ye.; KISHKO, Ya.G.; URIN, A.I.; KOLOTILOVA, L.V.; IONOV, L.I.

Use of the fluorescent method for the detection of poliomyelitis
and rabies viruses. Vop. virus. 10 no.1:26-29 Ja-F '65.

(MIRA 18:5)

1. Institut epidemiologii, mikrobiologii i gigiyeny, L'vov.

ACC NR: AP7008877.

SOURCE CODE: UR/0020/66/169/003/0550/0553

AUTHOR: Ignov, L. N.; Akimov, I. A.; Terenin, A. N. (Academician)

ORG: none

TITLE: Photoconductivity of organic dyes at a frequency of 10 sup 10 c

SOURCE: AN SSSR. Doklady, v. 169, no. 3, 1966, 550-553

TOPIC TAGS: dye chemical, photoconductivity, EPR, klystron

SUB CODE: 20

ABSTRACT: The photoconductivity of 11 organic dyes has been studied at ultra-high frequencies by means of an electron paramagnetic resonan radiospectrograph with a transient resonator, described earlier (E. V. Baranov, I. A. Akimov, DAN, 1954, 184, 1964). No use was made of magnetic fields; the dye sample in the form of a 10^{-4} - 10^{-3} cm layer was held by a mica disc 5.3 cm in diameter and placed in the region of the maximum electric field within the H_{012} -type cylindrical resonator (Q factor with the sample = 10^4). The UHF power generated by a klystron ($\nu = 9600$ Mc, $P = 5$ mW) passed through the resonator and was registered by a bolometer. The article presents data about the various samples used, the spectral distribution of photoconductivity at UHF of copper polyphe-nylacetylenide, and curves of temperature dependence of photoconductivity at UHF of a crystalline and amorphous layer of dyes for all 11 dyes used. Ye. K. Putseyko and I. A. Popova supplied the pigment samples, while A. M. Sladkov supplied the polymer. The authors thank V. Ye. Kholmogorov for discussions during the work. Orig. art. has: 2 figures and 1 table. [JPRS: 38,417]

Card 1/1

UDC: 535.215

0929 1678

IONOV, Lev Pavlovich; GORLYSHKOV, Vladimir Pavlovich; LYUTFALIBEKOV,
Farkhad Ashrafovich; ZHURAVLEV, B.A., red. izd-va;
RODIONOVA, V.M., tekhn. red.

[Rural buildings that can be assembled in a few hours]
Sel'skie postroiiki, sobiraemye za neskol'ko chasov. Mo-
skva, Góstroizdat, 1962. 78 p. (MIRA 16:3)
(Farm buildings) (Buildings, Prefabricated)

IONOV, Lev Pavlovich; GORLYSHKOV, Vladimir Pavlovich

[Rural structures assembled in a few hours; aid for
the rural builder] Sel'skie postroiiki, sobiraemye za
neskol'ko chasov: pomoshch' sel'skomu stroitel'iu.
Izd.2., perer. i dop. Moskva, Stroiizdat, 1964. 142 p.
(MIRA 18:1)

IONOV, M.N.

~~Observations on the dormouse in Bet-Pak-Dala. Isv. AN Kazakh SSR.~~
Ser. zool. no. 7:124-126 '48. (MIRA 9:5)
(Bet-Pak-Dala--Dormouse)

1. IONOV, M. N.
2. USSR (600)
4. Furniture Industry
7. Put out furniture of exceptional quality. Der.i lesokhim prom 1 no2 - 1952

Monthly Lists of Russian Accessions, Library of Congress, March, 1953, Unclassified.

ROZANTSEV, S.; IONOV, N.

Production bases of repair and construction bureaus. Zhil.-kom.khos. 3 no.10:
12-16 0 '53. (MLRA 6:11)

(Building--Repair and reconstruction)

IONOV, N., inzhener.

~~Fuel syphon. Avt. transp. 35 no.1:34 Ja '57. (MIRA 10:3)~~
(Automobiles--Apparatus and supplies)

9(2)

SOV/9 1-59-9-16/33

AUTHOR: Ionov, N.A., Technician

TITLE: Copper-Graphite Contacts for Contactors

PERIODICAL: Energetik, 1959, Nr 9, p 24 (USSR)

ABSTRACT: For simplifying the operation of KT a.c. contactors, their stationary metal contacts were replaced by copper-graphite brushes having a high copper content. This replacement resulted in less frequent cleaning of the contacts, as compared to the all-metal contacts previously used. Regardless of the high frequency of switching operations, the stationary contacts proved to be stable in mechanical respect. The author states that the quality of such contacts may be improved, if they were manufactured at electrical equipment plants. There is 1 diagram.

Card 1/1

SHESTAKOV, N.F., brigadir ekskavatorshchikov; IONOV, N.A., brigadir
ekskavatorshchikov

Using excavators in cleaning and deepening reservoirs.
Suggested by N.F.Shestakov, N.A.Ionov. Rats.i izobr.predl.v
stroj. no.11:87-89 '59. (MIRA 13:3)

1. Leningradskoye upravleniye tresta Gidropetsmetallurg-
stroy.

(Reservoirs)

PROCESSES AND PROPERTIES INDEX

(1) AND TWO CIPHERS

3

CA

Formation of negative halogen ions in the interaction of alkali halides with the surface of incandescent tungsten. V. M. Dubov'skii and N. I. Lomov. *J. Exptl. Theoret. Phys. (U. S. S. R.)* 20, 1948-50(1949).—When moles. of Na, K, Rb and Cs halides react with a W surface heated to 2000-2000°K., negative ions are produced. From measurements on the positive- and negative-ion currents (given in 5 tables), the electron affinities of the halogen atoms are: F, 4.11 e.v.; Cl, 3.71-3.78 e.v.; Br, 3.04 e.v.; I, 3.31 e.v. The app. is described and illustrated by means of 2 diagrams. F. H. Rathmann

METALLURGICAL LITERATURE CLASSIFICATION

SIGN BOW/IV

SIGN BOW/IV

PROCESSES AND PROPERTIES INDEX

3

CA

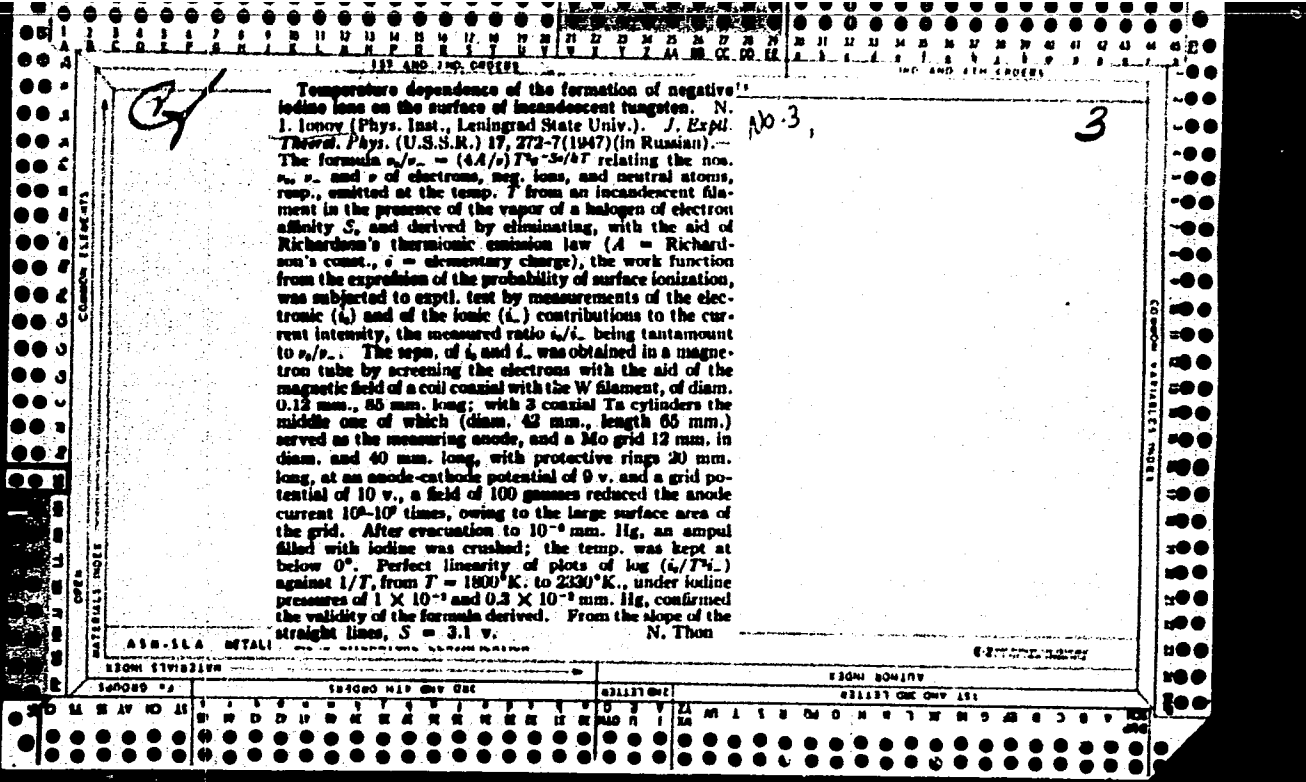
Formation of negative ions in the process of surface ionization of alkali halides on heated tungsten. N. I. Jonov. *Compt. rend. acad. sci. U. R. S. S.* 28, 612-13 (1949) (in English).—A thermodynamic treatment analogous to that followed in the deduction of Langmuir's equation was applied to calc. the probability for a halogen atom evapd. from the metal surface as a neg. ion. The equation found, giving the ratio of the no. of pos. alkali ions ν_+ to the no. of neg. halogen ions ν_- evapd. from the heated surface is $\nu_+/\nu_- = (1 + 4e\phi - S_0/RT)/(1 + 2e\phi - \phi_0/RT)$, where ϕ is the work function of the surface, I the ionization potential of the alkali atom and S the electron affinity of the halide atom. KCl, RbCl, KBr, RbBr and KI were investigated by directing mol. beams against a heated W filament, then drawing off the ions with an elec. field and counting with a Faraday counter 12 cm. away from the filament. Sepn. of electrons and ions was achieved by a magnetic field. The neg. current thus produced was found to increase markedly with increased temp. of the W filament. By using 4.52 e. v. for ϕ and the exptl. value for the ratio ν_+/ν_- , the following values for electron affinity of halide atoms were obtained: for Cl, $S = 3.71$ and 3.78 e. v. (from KCl and RbCl); for Br, $S = 3.64$ e. v. (from both KBr and RbBr) and for I, $S = 3.31$ e. v. (from KI).

Frank Green

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

ASME-SLA METALLURGICAL LITERATURE CLASSIFICATION

ASME-SLA METALLURGICAL LITERATURE CLASSIFICATION



PROCESSES AND PROPERTIES INDEX

3

C

Energy distribution of the positive ions of potassium formed in surface ionization on tungsten. N. I. Ionov (Leningrad Phys. Tech. Inst.); *J. Exptl. Theoret. Phys. (U.S.S.R.)* 18, 96-100(1948)(in Russian); cf. *C.A.* 42, 5757h.—The Maxwellian character of the initial energy distribution of K^+ ions formed from K, KCl, and KBr on W between 1300 and 2400°K. is demonstrated by the applicability of the exponential relation between the intensity of the ion current i and the stopping potential difference V between the wire and the collector in a cylindrical condenser, $i = i_0 e^{-eV/kT}$ (where i_0 = satn. current, e = elementary charge), valid for thermal electron emission. $\log i/i_0$ is a linear function of V , the slopes being the same for K, KCl, KBr, and for electrons at the same temp., and diminishing with rising temp. of the W wire. The temps. obtained from the slopes are higher than those detd. by the incandescence current. At 2050°K., i_0 for the pos. ions and for electrons are about equal; the $\log i/i_0 (V)$ lines are practically parallel.

N. Thon

METALLURGICAL LITERATURE CLASSIFICATION

REGIONAL DIVISION

GROUPS

GROUPS

Handwritten: 3

PROCESSES AND PROPERTIES INDEX

Main-spectrometric investigation of the formation of negative halogen ions in the interaction between halides and the surface of incandescent tungsten. N. J. Ionov. (Leningrad Phys. Tech. Inst.). *J. Exptl. Theoret. Phys.* (U.S.S.R.) 18, 174-86(1948)(in Russian); cf. *C.A.* 42, 815d. —(1) The intensity $I^- = v_-/v_+$ (ratio of the no. of neg. ions leaving the hot W surface and the no. of neutral atoms impinging thereon) was detd. in a mass spectrograph, indicating masses between 5 and 300, on mol. beams of NaCl, KCl, RbCl, CsCl, KBr, KI, and KF, as a function of the temp. T of the W wire, and compared with the formula $v_-/v_+ = (1 + 4e(\phi - S)/kT)^{-1}$ (where ϕ = work function of the surface, e = elementary charge, $-S$ = electron affinity of the neg. ion), analogous to the Saha-Langmuir expression for pos. ionization, $v_+/v_- = (1 + 2e(\phi - S)/kT)^{-1}$ (I = ionization potential of the pos. ion). The quotient v_-/v_+ permits exptl. detn. of the electron affinity of the halogens. Results are plotted in the form $\log I^-$ against $10^4/T$. The relation is linear at temps. above 2300°K.; below that temp., I^- decreases with decreasing temp. faster than linearly (except in the case of F^-); this indicates that ϕ is raised owing to adsorption of neg. ions on W; this is also shown by the hysteresis effects observed below 2300° on rapid changes of the temp. The $(\phi - S)$ values derived from the exptl. slopes of the rectilinear portions of the $\log I^- (10^4/T)$ graphs coincide satisfactorily with those obtained from v_-/v_+ ; if ϕ is taken = 4.54 e.v., one finds for the values of S : Cl 3.7, Br 3.34, I 3.12, with a possible error of ± 0.10 e.v. These values are considered more reliable than those found previously

(Dukelskii and I., *C.A.* 35, 5387). Absence of a direct detn. of ϕ for W in KF vapor under the same conditions prevents evaluation of an accurate S value for F; if ϕ is taken = 4.93, from the thermoelectronic emission of W in KF vapor (*l.c.*), one finds for F, $S = 4.0$ e.v. (2) The $\log I^- (10^4/T)$ curve for WCl₃ has the same shape as for the alkali metal halides; this indicates the same process of formation of neg. ions. (3) In ThCl₃ one observes, beside Cl^- ions, also a max. corresponding to the neg. mol. ion Cl_2^- . The intensity of Cl_2^- reaches a max. at about 2000°K. and decreases somewhat with further rising temp.; the intensity of Cl^- , after passing through the max., falls very rapidly with rising temp. The lower limit of S for Cl_2^- , unobtainable by the flux cycle owing to the unknown energy of disson. $Cl_2^- \rightarrow Cl + Cl^-$, can be estd. from the ratio $I^-(Cl)/I^-(Cl_2^-)$ (≈ 6) at 2000°K., on the assumption that, at that temp., the W surface is covered with a layer of Th thicker than mono-atomic, that is, that the ϕ involved is that of pure Th = 3.38 e.v.; further, that at 2000°K., where both $I^-(Cl^-)$ and $I^-(Cl_2^-)$ are max., the probabilities of formation of Cl^- and of Cl_2^- are equal. On these assumptions, $S(Cl_2^-) = 2.7$ e.v. This is consistent with the postulate that S for Cl_2 should be lower than for Cl (3.7) because of the pos. sign of the energy of disson. $Cl_2^- \rightarrow Cl + Cl^-$. The assumption of thick coverage of the W surface with Th, at 2000°, is substantiated by an estn. of the no. of Th atoms arriving at the surface, 10^{11} - 10^{12} /sq. cm./sec., as against the 1.5×10^{12} atoms/sq. cm./sec. evapng. from the surface.

N. Thon

ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION

EXTENDED ABSTRACT

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3

USSR/Physics
Ionization
Electrons

21 Jan 1948

"Ionization of Molecules KI, NaI and CaCl by Elec-
trons," E. I. Joffe, Leningrad Physicotech Inst,
Acad Sci USSR, 27 pp Leningrad

"Dokl Akad Nauk SSSR, Nova Ser" Vol LII, No 3 p. 467-9

Describes results of experiments on ionization of
bundles of molecules of alkali-haloid salts by elec-
trons. Dependence of the intensity of mass lines
upon change in density of the molecular bundles over
large interval of change in density showed that all
positive ions observed in ionization of molecules of

48792

USSR/Physics (Contd)

21 Jan 1948

the salts were formed by elementary acts, and the in-
fluence of secondary processes were not observed in
the experiments. Submitted by Academician A. F.
Joffe, 20 Nov 1947.

IONOV, N. I.

Sep 48

USSR/Chemistry - Ions, Electrolytic,
Mass of
Chemistry - Alkali Metal Salts

"Negative Ions of Alkali Metals in Gas Discharges Occurring in Vapors of Alkali-Haloid Salts," V. M. Dukel'skiy, E. Ya. Zandberg, N. I. Ionov, Leningrad Physicotech Inst imeni P. N. Lebedev, Acad Sci USSR, 2 pp

"Dok Ak Nauk SSSR" Vol LXII, No 3

Introduces results of preliminary experiments investigating composition of ions which form in a gaseous discharge in vapors of the alkali-haloid salts LiCl, NaI, and KI. Established the existence of negative ions of Li, Cl, and I and that their concentration in the discharge was large enough to enable easy discovery and measurement (mass). Submitted by Acad A. F. Ioffe, 14 Jul 48

PA 36/49T15

IONOV, N. I.

USSR/Physics - Ions
Mass-Spectrography

Sep 49

"Negative Ions of Rubidium and Cesium," V. M. Dukel'skiy, E. Ya. Zandberg,
N. I. Ionov, Leningrad Physicotech Inst, Acad Sci USSR, 2pp.

"Dok Ak Nauk SSSR" Vol LXVIII, No 1.

Used a low-pressure discharge in vapors of RbCl and CsI as an ion source. Ions were drawn from discharge in a vacuum, accelerated to an energy of 1,350 ev, and analyzed with a magnetic mass-spectrograph with a calculated resolving power of about 100. Ionic currents were measured with a vacuum-tube electrometer having sensitivity of approx $6 \cdot 10^{-14}$ amp per scale division. Discovery of negative Rb and Cs ions shows that atoms of all alkali metals have electron affinity. Submitted by Acad. A. F. Ioffe 6 Jul 49.

PA 2/50T103

IONOV N. I.

Oct 50

USSR/ Physics Discharge Ions, Negative

"Negative Ions in a Gaseous Discharge in Vapors of Halide Salts of Alkali and Alkali-Earth Metals," V. M. Dukel'skiy, E. Ya. Zandberg, N. I. Ionov, Leningrad Physicotech Inst, Acad Sci USSR.

"Zhur Eksper i Teoret Fiz" Vol XX, No 10, pp 877-885.

Mass-spectroscopic analysis of composition of negative ions occurring in gaseous discharges in vapors of subject salts: Establishes existence of Li^- , Na^- , K^- , Rb^- , Cs^- , Ions Mg and Ca, in discharges in vapors of $MgCl_2$ and $CaCl_2$ are not observed. Molecular negative ions of type MeX^- and MeX_2^- are observed in the case of alkali halide salts, and ions of type MeX^- , MeX_2^- , and MeX_3^- for $CaCl_2$ and $MgCl_2$ also are observed. Negative atomic ions of Ag are observed in discharges in vapors of AgI. Submitted

7 Mar 50

PA 169T93

IONOV, N. I.

USSR/Physics - Ions of Metals,
Negative

11 Dec 51

"Negative Ions of Selenium, Tellurium, Antimony,
and Bismuth," V. M. Dukel'skiy and N. I. Ionov,
Leningrad Phys-Tech Inst, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXXI, No 5, pp 767-769

Establishes that neg ions of subject metals, which
had not been known up to this time, actually do
exist. Investigates the arc discharge in the va-
por of the metal. Demonstrates the possibility of
the formation of neg ions by heavy metal atoms.
Submitted by Acad A. F. Ioffe 16 Oct 51.

210794

PA 227T77

IONOV, N. I.

USSR/Physics - Plasma of Gaseous
Discharge

1 Aug 52

"Measuring the Electrons and Positive Ions in the
Plasma of Gaseous Discharge," N. I. Ionov, Lenin-
grad Phys-Tech Inst, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol 85, No 4, pp 753-755

Describes attempts to utilize, for the detn of
plasma parameters, probes which consist of 2 elec-
trodes (grids and collector plates), thus ensuring
sep measurement of the electron current and current
of pos ions arriving at the collector. Finds the
energy distribution of the pos ions in the plasma.
Submitted by Acad P.I. Lukirskiy 3 Jun 52.

227T77

IONOV, N. I.

USSR .

A resonance magnetic mass spectrometer with a high resolving power. N. I. Ionov, B. A. Mamyrin, and V. B. Fiks. Zhur. Tekh. Fiz. 23, 2104-6 (1953).—A resonance magnetic mass spectrometer is described which has an increased current intensity and whose resolving power can be changed without discontinuity. J. Rovlar Leach

62

Ionov, N.I.

USSR/ Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 36/63

Authors : Hakulina, I.N., and Ionov, N.I.

Title : The energy of electron affinity of Cy determined by the method of surface ionization of KCN and KCNS molecules

Periodical : Dok. AN SSSR 99/6, 1023-1024, Dec 21, 1954

Abstract : The surface ionization of potassium thiocyanate (KCNS) and potassium cyanide (KCN) molecules on incandescent W was investigated. During the analysis of spectra of the positive and negative ions formed during surface ionization of KCN and KCNS molecules, the authors discovered positive ions of K39 and K41 isotopes, as well as negative ions with a mass 26. It was established that the magnitude of the energy of the electron cyan affinity is not lower than 3 ev and that its values, at high filament temperatures, were very close to actual. The negative ions with mass 32, discovered during ionization of KCNS, were found to be the ions of the most widely known S32 isotope. Two references; 1-USA and 1-USSR (1948- and 1952). Table.

Institution: Academy of Sciences USSR, The Physico-Technical Institute, Leningrad

Presented by: Academician A.N. Terenin, July 12, 1954

IONOV - N. I.

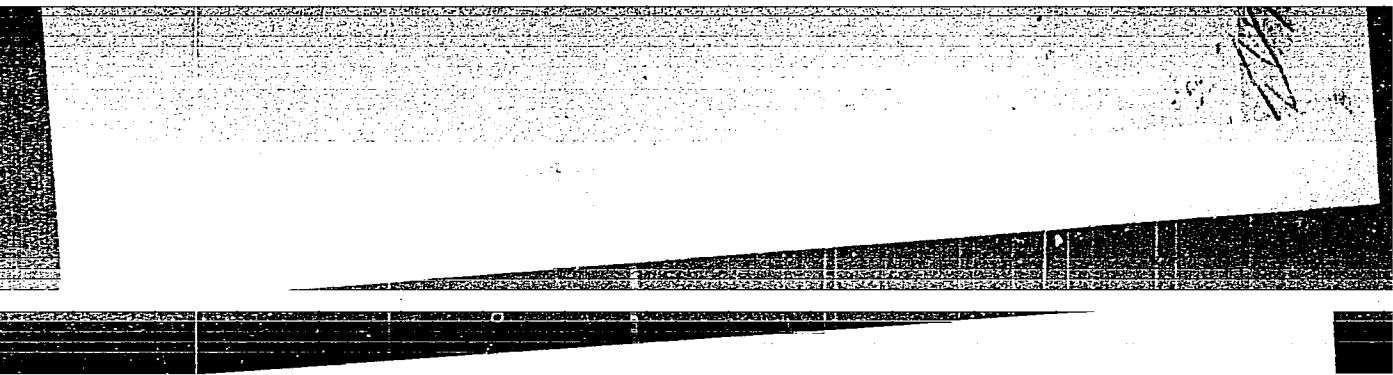
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~~Energy of the electron affinity of the halogen atoms.
 I. N. Bakulina and N. I. Ionov (Phys.-Tech. Inst., Lenin-
 grad). *Doklady Akad. Nauk S.S.R.* 105, 680-2 (1955).
 The electron affinity of F, Cl, Br, and I atoms was detd. by
 the Saha-Langmuir formula for the surface ionization of
 alk. halide salts. The difficulty with that formula is its
 inclusion of ϕ (Richardson) work function, which can be
 detd. only indirectly. A modification of that formula that
 does not contain ϕ , is used to calc. the 6 possible combinations
 of the difference, $S_1 - S_2$, in electron affinity of 2 halogens.
 These 6 differences (expressed in e.v.) are: $S_{Cl} - S_I =$
 0.48 ± 0.03 , $S_{Cl} - S_{Br} = 0.21 \pm 0.06$, $S_{Cl} - S_F = 0.21 \pm$
 0.03 , $S_{Br} - S_I = 0.27 \pm 0.02$, $S_{Br} - S_F = 0.03 \pm 0.02$,
 $S_F - S_I = 0.24 \pm 0.04$. In the absence of a sufficiently
 accurately known value for any one halogen atom, a pro-
 visional value of 3.6 is assumed for Br, i.e., $S_{Br} = 3.6$ e.v.,
 and this, combined with the above difference values, yields:
 $S_{Cl} = 3.8$, $S_I = 3.3$, and $S_F = 3.5$ e.v. V. H. G.~~

RM

"APPROVED FOR RELEASE: Thursday, July 27, 2000

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APPROVED FOR RELEASE: Thursday, July 27, 2000

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I ONOV, N.I.

CARD 1 / 2

PA - 1580

SUBJECT
AUTHOR
TITLE
PERIODICAL

USSR / PHYSICS
IONOV, N.I.

The Surface Ionization of the Molecules of Potassium Chloride and Cesium Chloride in an Electric Field.
Zurn.techn.fis, 26, fasc.10, 2200-2203 (1956)
Issued: 11 / 1956

Some years ago the author carried out comparative measurements of the temperature dependence of the current of potassium ions produced on the occasion of the surface ionization of potassium atoms and of molecules of all halide in tungsten in order to discover the influence exercised by the chemical potassium ion compounds on surface ionization. The effective pressure in the bundle was from 10^{-6} to 10^{-7} torr. The dependences found are shown in a diagram. It is interesting to note the absence of a noticeable influence exercised by the chemical compound of the potassium atoms on the course of the temperature dependence of the flux of positive ions. The slight increase of amperage on the occasion of the ionization of molecules as compared with the amperages of potassium atoms in the temperature interval of from 1200 to 1800° K can be explained by an increase of the output work of tungsten as a result of absorption of the halide in the surface. At temperatures of the wire below 1200° all curves have the same shape. According to S.V.STARODUBCEV a thermal dissociation of a certain part of the impinging salt molecules in alkali and halide atoms takes place. The surface of the heated tungsten acts catalytically on the dissociation of the salt molecules. Furthermore, the decrease of

PA - 1580

Žurn.techn.fis, 26, fasc.10, 2200-2203 (1956) CARD 2 / 2

amperage on the occasion of an increase of temperature beyond 1200° K tends to show that the salt molecules which are in temperature equilibrium with the surface are rather highly ionized. The modification of evaporation heat "adatoms" (evaporation on the surface) in the case of a constant number of molecules impinging upon the surface per second shifts the low temperature range of the ionization curve. In the case of surface ionization the evaporation heat of the "adatoms" contains the work performed against the polarization forces. This work is diminished in an exterior electric field and consequently the temperature threshold of surface ionization must depend on the field strength on the surface. In order to confirm this assumption tests of surface ionization mentioned in the above title were carried out. The shape of the electrodes is described. Test results are shown in a diagram. It was found that the temperature threshold of surface ionization shifts considerably towards lower anode temperatures in the case of an increasing potential difference between anode and grid. In the particularly thin tungsten band marked ionization emission was noticed already at 50° C. This shifting of the temperature threshold can be explained on the basis of the ideas developed by DOBRECŌV.

INSTITUTION: Leningrad Physical-Technical Institute of the Academy of Science in the USSR.

IONOV, N.I.

IONOV, N.I.; KARATAEV, V.I.

Mass analyzer for the rapid determination of isotopic components
of alkaline and alkali earth metals. Zav. lab. 23 no. 5:621-624
'57. (MIRA 10:8)

1. Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR.
(Mass spectrometry) (Isotopes)

IONOV, N. I.

20-1-11/44

AUTHORS: Bakulina, I.N., Ionov, N.I.

TITLE: Determination of the Energy of Electronic Affinity of Sulphur Atoms by Means of the Method of Surface Ionization (Opredele-niye energii elektronogo srodstva atomov sery metodom pover-khnostnoy ionizatsii)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 1, pp. 41 - 44 (USSR)

ABSTRACT: The experiments described by the present paper permit a very reliable determination of the energy of the electronic affinity of sulphur atoms. The authors determined the difference of the energies between electronic affinity of bromine atoms and sulphur atoms by studying the surface ionization of the molecules of sodium bromides (NaBr) and sodium sulphites (Na₂S). For this purpose bundles of NaBr-molecules and Na₂S molecules taken from two independent platinum furnaces were directed on to a tungsten wire heated up to a temperature T. The positive and negative ions formed on the wire were analyzed by means of a magnetic sector mass spectrometer. During ionization of NaBr and Na₂S ions only Na⁺ ions are observed in the spectrum of the positive ions, and Br⁻ ions and S⁻ ions in the

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20-1-11/44

Determination of the Energy of Electronic Affinity of Sulphur Atoms by Means of the Method of Surface Ionization

spectrum of the negative ions. The method used for measurements is discussed in short. This method does not give absolute values for the energy of electronic affinity. As a result of their experiments the authors give the value $s_2 = 2,37$ eV for the energy of the electronic affinity of the sulphur atoms. This value agrees with the value $s_2 > 2,2$ eV found by ionization of SO_2 molecules by means of an electron collision. A recently undertaken determination of the energy (by means of the method of photo ionization of the electrons from negative S^- ions) resulted in the value $s_2 = 2,07 \pm 0,07$ eV. The deviation of this value from the value found here may indicate that the energy of the electronic affinity of the bromine atoms is less than 3,6 eV. There are 1 figure and 5 references, 3 of which are Slavic.

ASSOCIATION: Physico-Technical Institute AS USSR (Fiziko-tekhicheskiy institut Akademii nauk SSSR)
PRESENTED: April 27, 1957, by A.A. Lebedev, Academician
SUBMITTED: April 23, 1957
AVAILABLE: Library of Congress

Card 2/2

ОНОУ, N.I.

16

SOV/103-4-1-24/24

AUTHORS: Vasil'yev, G.F., Politova, N.M., Shabel'nikova, A.E., Pervova, L.Ya. and Yasnopol'skaya, A.A.

TITLE: Interdepartmental Seminar on Cathode Electronics (The 11th Meeting) (Mezhduvedomstvennyy seminar po katodnoy elektronike) (11-e zasedaniye)

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 4, pp 731 - 732 (USSR)

ABSTRACT: A meeting of the seminar took place on December 1, 1958 at the Institut radiotekhniki i elektroniki AN SSSR (Institute of Radio-engineering and Electronics of the Ac.Sc.USSR). During the meeting 8 papers were read. Yu.G. Puzhinskii read a paper entitled: "Kinetics of the Adsorption of Oxygen on the Surface of Tungsten". The second paper, by I.M. Dyman and S.M. Pekar, dealt with "The Admixture Photo-effect of Semiconductors in the Region of the Exciton Light Absorption". The paper by T.L. Matkayich was devoted to "The Problem of the Secondary Electron Emission of Fine Films of a Number of Organic Substances". The problem of "Surface Ionization in a Strong Electric Field on a Surface with a Non-homogeneous Work Function" was considered by S.Ya. Zandberg and N.I. Ioney. I.M. Bakulina and N.I. Ioney read a paper entitled "Determination of the Surface Attachment Energy and of the Potentials of Atoms by the Method of Surface Ionization". N.I. Yasnopol'skiy and A.P. Aleksyevskiy dealt with the problem of "Passage of Steady-state Currents Through a Dielectric When the Current Carriers Are Introduced Through One of the Contacts by Means of Electron Bombardment". The lecture by B.A. Samichov and K.G. Vakin discussed the following - "The Possibility of the Analysis of the Total-energy Distribution of Electrons in a Quasi-spherical Condenser". The work by N.L. Kapitsa, S.A. Fridrikhev and A.R. Shul'man dealt with an investigation of the secondary electron emission and the characteristic energy losses of a number of dielectrics (glass, mica, fluorite and alkali-haloid monocrystals).

Card 1/2

Card 2/2

USSR 24-40997

AUTHORS: Agishev, Ye. I., ~~Ionov, N. I.~~ SOV/57-58-8-27/37
TITLE: Mass Spectrometer With a Pulsed Ion Source (Mass-spektroskop
s impul'snym istochnikom ionov)
PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958,²⁸ Nr 8, pp. 1775 - 1788
(USSR)

ABSTRACT: Since the present work is a continuation of that reported in reference 1 problems bearing upon the resolution and the intensity of the mass spectrograph are approached in this paper. Further experiments carried out with test mass spectrographs in the laboratory are described. These experiments furnished the design data for industrial equipment similar to the series of test apparatus. The evidence advanced provides the following information of the particular features of the pulsed mass spectrograph: 1) The resolution of the spectrograph can be raised to values as high as several hundreds. The resolution is basically limited by difficulties arising in the design of an amplifier with a sufficient amplification factor and a bandwidth of the order of 100 mc. 2) The intensity of this apparatus operating with an ion-focusing source is higher than that

Card 1/3

SOV/57-58-8-27/37

Mass Spectrometer With a Pulsed Ion Source

of magnetic mass spectrographs with the same resolution. This is due to the fact that practically no limitations are imposed on the diameter of the aperture of the ion source in mass spectroscopes. 3) On account of the direction and velocity focusing it is possible to analyze the ions being formed in the ionization chamber. Thus the intensity of light is increased and it is possible to investigate ionization processes with a small probability (for example the photoionization of gases). 4) When the accelerating potentials U_1 are small the resolution is determined from the initial energy distribution of the ions. Hence, the mass spectroscopy can be used in the measurement of the width of the mass-peaks of the source energies of split-off ions. A knowledge of the initial energies is highly important in the investigation of the binding energies of atoms in molecules. 5) The oscillograph permits to localize simultaneously the whole mass spectrum of the gas under investigation corresponding to one definite moment of ionization. 6) The modifications of the gas composition in the ionization chamber in principle can be located by the pulse sequence of the ionizing pulses of the electron current which in the de-

Card 2/3

SOV/57-58-8-27/37

Mass Spectrometer With a Pulsed Ion Source

scribed equipment is 10^{-4} sec. This particular feature of the device is of importance in the study of the time course of various processes. The Scientific Superior Collaborators E. Ya. Zandberg and B. A. Mamyrin assisted in the construction of the test mass spectroscopes. There are 8 figures and 5 references, 4 of which are Soviet.

ASSOCIATION:

Leningradskiy fiziko-tekhnicheskii institut AN SSSR (Leningrad Physical and Technical Institute, AS USSR)

SUBMITTED:

July 10, 1957

Card 3/3

ZANDEBERG, E.Ya.; IONOV, N.I.

Surface ionization of lithium ions on the polycrystalline tungsten
in electric fields up to 1.3×10^6 volts/cm. Zhur. tekhn. fiz. 28
no.11:2444-2454 N 1958. (MIRA 12:1)

(Lithium chloride) (Ionization)

SOV/76-33-9-28/37

5(4)

AUTHORS:

Bakulina, I. N., ~~Ionov, N. I.~~

TITLE:

Determination of the Electron Affinity of Halogen- and Sulphur Atoms as Well as of the CN-Radical by the Method of Surface Ionization

PERIODICAL:

Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 9, pp 2063 - 2072 (USSR)

ABSTRACT:

Due to the lack of reliable methods of determination, an accurate theoretical calculation of the electron affinity (s) has hitherto been made only for hydrogen, while for all other elements various methods of extrapolation were employed. Direct experimental methods of determining (s) probably are the most reliable ones. One of the first of its kind is the method of surface ionization (SI) which may be used for the determination of (s) of most atoms in which (s) is a positive value. However, this method has also some disadvantages which are to be taken into account. Some values are given which were obtained for the $s(X)$ (Refs 2,3) by various direct experimental methods (Table 1). In the present case, the (SI)-method was used for a determination of the difference $s_1 - s_2$ of two

Card 1/3

Determination of the Electron Affinity of Halogen- and Sulphur Atoms as Well as of the CN-Radical by the Method of Surface Ionization

SOV/76-33-9-28/37

negative ions with the application of equations which avoided the above disadvantages and yielded more accurate results. The ionic current was measured on a mass spectrograph (Fig 1) and an EMU-3 electrometer. The values of $s_1 - s_2$ for all halogens (Table 2) are independent on temperature of the tungsten filament of the ionic source within the temperature range under investigation (1750-2230°K). The value of (s) for fluorine is smaller than that for chlorine, i.e. contrary to expectation, there is no uniform increase in the (s) of the halogens with a decrease of the atomic number. Determination of (s) for the sulphur atom, which was equally made by measuring the negative ionic current, yielded a value of 1.23 ± 0.05 eV with the observation of independence on the temperature of the tungsten filament (Table 4). Further, the authors determined the (s) of the CN and examined the applicability of the method of (s) -determination for radicals. Finally, preliminary qualitative experiments were made to investigate the (SI) of Se and Te on tungsten, as well as of Sb and As on thorium-oxide cathodes (TOC) (with a molybdenum core). In this connection, the authors

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Determination of the Electron Affinity of Halogen- and Sulphur Atoms as Well as of the CN-Radical by the Method of Surface Ionization SOV/76-33-9-28/37

investigated the self-emission of the negative ions of (TOC) and found that the (SI) on (TOC) may be employed for the preparation of effective sources of negative ions of electro-negative elements. There are 2 figures, 4 tables, and 22 references, 8 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR Fiziko-tekhnicheskii institut, Leningrad
(Academy of Sciences of the USSR, Leningrad, Physical-technical Institute)

SUBMITTED: March 10, 1958

Card 3/3

SOV/56-36-4-5/70

21(1)

AUTHORS:

Bakulina, I. N., Ionov, N. I.

TITLE:

Determination of the Ionization Potential of Uranium Atoms by the Method of Surface Ionization (Opredeleniye potentsiala ionizatsii atomov urana metodom poverkhnostnoy ionizatsii)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1001-1005 (USSR)

ABSTRACT:

In the present paper the authors describe a method of determining the ionization potential differences of two arbitrary elements which were ionized simultaneously on a heated metallic surface (tungsten or tantalum). The authors had already employed this method (Ref 1). In the introduction, the theoretical bases of the method are discussed, and for the ion current the formula

$$I = \epsilon n A^* \exp \left[\left(\phi^* + \sqrt{\epsilon E} - V \right) \frac{\epsilon}{kT} \right] \text{ is given.}$$

(ϵ = electron charge, n = number of atoms impinging per second on the surface, T = surface temperature, A^* = a function weakly dependent on T , into which there also enters the statistical sum of ion and atom). In the following chapter the measuring method is discussed; Figure 1 is a systematic representation

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SOV/56-36-4-5/70

Determination of the Ionization Potential of Uranium Atoms by the Method of Surface Ionization

of the experimental arrangement. The substances, on which surface ionization was investigated, were mounted on tungsten- or tantalum filaments and served as ion sources of the mass spectrometer. No pure metals, but the salts NaCl, LiCl, LiF, UCl₄, and UF₄ were investigated. Measurements were carried out

according to two methods: either the ion current of F⁻ in LiF-UF₄ and Cl⁻ respectively in NaCl-LiCl or LiCl-UCl₄ were measured, or only the dependence of the positive ion current on T, and the diagram $\lg(I_1/I_2) = f(1/T)$ was made. Filament

temperature in all cases was 2250°K for tantalum and 2650°K for tungsten base. The apparatus and the method had been checked by means of ΔV -measurement of sodium- and lithium atoms, the ionization potential of which is well known. Measuring results are given in form of diagrams. Figure 2 shows $\lg(I_T/I_{2250}) = f(1/T)$ for the ionization of Li and Na on tantalum (straight line in the interval 1700 - 2375°K). An arithmetic mean of 85 measurements resulted in $V_{Li} - V_{Na} =$

Card 2/4

SOV/56-36-4-5/70

Determination of the Ionization Potential of Uranium Atoms by the Method of Surface Ionization

0.25 ± 0.02 v according to the first method; according to the second (Fig 3) averaging within the same temperature range (diagram $\lg(I_1/I_2) = f(1/T)$) with respect to 10 series of measurements resulted in: $V_{Li} - V_{Na} = 0.26 \pm 0.05$ v. Figure 4 shows $\lg(I_{T}/I_{2650}) = f(1/T)$ for ionization of LiF and UF₄ in tungsten in the temperature interval of 2100 - 2800°K, and figure 5 shows $\lg(I_{Li}/I_U) = f(1/T)$; from the slope of the curve (straight line) the difference $V_U - V_{Li}$ may be determined as 0.68 ± 0.08 v. Thus, $V_U = 5.40 + 0.68 = 6.08 \pm 0.08$ v results for the ionization potential of uranium atoms. The accuracy of temperature measurement by means of an optical pyrometer amounted to 2 + 3%. There are 5 figures and 4 Soviet references.

ASSOCIATION: Leningradskiy fiziko-tehnicheskiy institut Akademii nauk SSSR
Card 3/4 (Leningrad Physico-Technical Institute of the Academy of Sciences)

SOV/53-67-4-2/7

28(8)

AUTHORS:

Zandberg, E. Ya., Ionov, N. I.

TITLE:

Surface Ionization (Poverkhnostnaya ionizatsiya)

PERIODICAL:

Uspekhi fizicheskikh nauk, 1959, Vol 67, Nr 4, pp 581-623 (USSR)

ABSTRACT:

The authors give a survey of the phenomena of surface ionization taking special account of the theory. The following subjects are dealt with by the individual parts: I. Surface ionization with formation of positive ions in general representation; 1) emission formulas for a homogeneous surface without electric field, 2) emission formulas for a homogeneous surface with electric field, 3) surface ionization of atoms on semiconductors, 4) emission formulas for an inhomogeneous surface, 5) thresholds in the temperature-dependence of the surface ionization current. In part II the results obtained by a number of experimental works on positive surface ionization are compiled. Individual chapters deal with the following subjects: 6) The methods of investigating positive surface ionization. 7) The positive surface ionization of Cs-, Rb-, and K-atoms on tungsten in weak electric fields. 8) The positive surface ionization of Na- and Li-atoms on tungsten in weak fields. 9) The positive surface ionization of alkali-halide

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Surface Ionization

SOV/53-67-4-2/7

salts on tungsten weak fields. 10) The positive surface ionization of alkali metal atoms and molecules of alkali-halide salts on platinum in weak fields. 11) The surface ionization of other elements and other compounds in weak fields (on tungsten). 12) The investigation of the energy distribution of positive ions (Fig 14). 13) The positive surface ionization in electric fields (10^4 v/cm). 14) The determination of the isothermal evaporation heats of ions and atoms on the surface. 15) Measurement of the ionization coefficient of K- and W-atoms. In part III of the paper the surface ionization with formation of negative ions is discussed in short. Individual chapters deal with the following: 16) The negative surface ionization on homogeneous surfaces. 17) Negative surface ionization on spotted surfaces. 18) Discussion of investigation methods. 19) Measurement of the temperature dependence of the negative ion current (Figs 21-23). 20) Determination of the energy of affinity to the electron by the method of negative surface ionization (Tables 1 and 2). - The paper gives a detailed description of the problems, methods, and results connected with the phenomena of surface ionization. The material was obtained solely from published works. The paper is of great value for scientists dealing with these problems on account of its clearness, its wealth of material, and its comprehensive

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Surface Ionization

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account of publications. There are 23 figures, 2 tables, and 113 references, 66 of which are Soviet.

Card 3/3

GAPANOV, Viktor Ivanovich; IONOV, N.I., prof., retsenzent; NILENDER, B.A.,
prof., retsenzent; TSAREV, B.M., prof., retsenzent; BRAGINSKIY,
V.B., red.; MURASHOVA, N.Ya., tekhn.red.

[Electronics] Elektronika. Moskva, Gos.izd-vo fiziko-matem.
lit-ry. Pt.1. [Physical principles] Fizicheskie osnovy. 1960.
516 p. (MIRA 14:3)

(Electronics)

24:6700,24.7000

77315
SOV/57-30-2-12/18

AUTHORS: Belyakov, Yu. I., Ionov, N. I.
TITLE: Investigations of Hydrogen and Deuterium Desorption
From Palladium by Means of a Pulse Mass Spectroscope
PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol 30, Nr 2,
pp 216-222 (USSR)

ABSTRACT: It is of general interest to compare the composition of
desorbed gases with the composition of the initial
material. In the case of the system hydrogen-palladium
the authors tried to answer the question about the
possibility of creating H radicals and positive and
negative ions, together with initial H₂ molecules.

There exist conflicting reports on this subject in the
scientific literature and the authors used, therefore,
a time-of-flight (pulse) mass spectrometer to investi-
gate the desorbed particles after permeation of hydrogen
through palladium. They also analyzed the equimolecular
mixture of hydrogen and deuterium crossing the heated

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Investigations of Hydrogen and Deuterium
Desorption From Palladium by Means of a
Pulse Mass Spectroscope

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SOV/57-30-2-12/18

palladium membrane. The mass spectroscope was described earlier by Agishev and Ionov (ZhTF, XXVI, 203, 1956, ZhTF, XXVIII, 1775, 1958). The source shown on Fig. 1 contained a rectangular window on the electrode 1, covered by a $24 \times 21 \text{ mm}^2$ palladium membrane 0.12 mm thick. Electrodes 2 and 3 were 22 mm in diameter and consisted of transparent grids. Tube C was connected through a covar junction O to the glass tube. The membrane could be heated up to 750°C by means of the heater H, and a platinum-platinorhodium thermocouple, T, supplied the temperature. Tube M was a bypass for the hydrogen gas. An electron beam was formed from the cathode K by means of electrodes Z and A, and ended on the collector C. An oil diffusion pump TsVL-100 with a vapor trap reduced the pressure to $1 \cdot 10^{-7} \text{ mm Hg}$. The authors first worked without an electron beam and observed significant ion currents of K^+ and Na^+ , and also considerable peaks of Rb^+ and Cs^+ . These elements are always present in small quantities in palladium.

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Investigations of Hydrogen and Deuterium
Desorption From Palladium by Means of a
Pulse Mass Spectroscop

77315
SOV/57-30-2-12/18

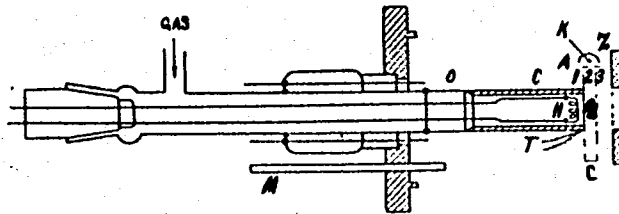


Fig. 1.

No new ions were found when hydrogen was passing through the membrane at temperatures between 80 and 750° C. The sensitivity of the spectrometer would allow the detection of currents of the order of 10^{-12} a/cm² of the Pa membrane. The authors did not observe any negative peaks whatsoever. After switching on the electron beam the ratio of the H^+/H_2^+ was 0.01 which can be due to the background of H radicals in the spectrometer chamber

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Investigations of Hydrogen and Deuterium
Desorption From Palladium by Means of a
Pulse Mass Spectroscope

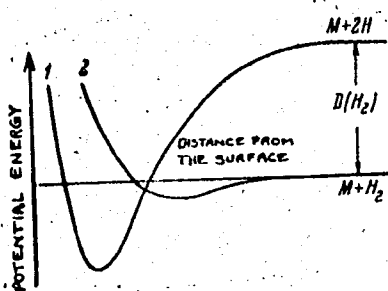
77315
SOV/57-30-2-12/18

rather than to an effect of desorption. The authors finally investigated an equimolecular hydrogen-deuterium mixture. They first sent the mixture via the tube M and observed in addition to the H_2 and D_2 peaks not more than 10% of HD molecules. However, when the mixture was sent through the membrane, the ratio of the H_2^+ , HD^+ , and D_2^+ at $80^\circ C$ would start with 4.0:3.5:1 values. With the increase of temperature the ratio between H_2^+ and D_2^+ becomes nearly unity, showing that the isotopic difference of permeation decreases with the increase in temperature. The high HD^+ content can be explained in the following manner: The system of metal plus 2H and metal plus H_2 potential curves have different shapes, as shown on Fig. 3 by curves 1 and 2, respectively. If the minimum of curve 1 is below the minimum of curve 2; the hydrogen is adsorbed in the form of atoms and desorbed in molecular form. In that case the heat of

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Investigations of Hydrogen and Deuterium
Disorption From Palladium by Means of a
Pulse Mass Spectroscope

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SOV/57-30-2-12/18



Card 5/6

Fig. 3.

Investigations of Hydrogen and Deuterium
Desorption From Palladium by Means of a
Pulse Mass Spectroscope

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desorption of hydrogen in the form of H_2 molecules is smaller than the heat of desorption of two atoms of hydrogen by the quantity $D(H_2) = 4.5$ ev. The experimental results show then, that all the hydrogen and deuterium, after crossing the diaphragm, first create on the outgoing surface a chemisorbed layer of adatoms H and D. From this layer, H and D desorb in the form of molecules of H_2 , HD and D_2 through a combination of H and D adatoms, according to the laws of probability; E. I. Agishev helped during the work. There are 3 figures; and 12 references, 5 Soviet, 2 French, 1 Japanese, 2 German, 1 U.K., 1 U.S. The U.K. and U.S. references are: C. H. Bachman, P. A. Silberg, J. Appl. Phys., 29, Nr 8 (1958); R. G. Stensfield, Proc. Cambr. Phil. Soc., 34, 120 (1938).

ASSOCIATION: Physico-Technical Institute AS USSR, Leningrad (Fiziko-
tehnicheskij institut AN SSSR, Leningrad)

SUBMITTED: August 14, 1959

Card 6/6

S/057/60/030/05/13/014
B012/B056

AUTHOR: Ionov, N. I.

TITLE: The Mechanism of the Conductivity²¹ of Electrode Spacings in
the Vacuum Before Breakdown²¹

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol. 30, No. 5,
pp. 561 - 567

TEXT: It is first pointed out that although numerous papers (Refs. 1-5) deal with the insulating properties of vacuum spacings, the theory of the detachment of particles is nevertheless not able to explain all experimental facts, whereas the assumptions which serve as a basis are not in keeping with the conceptions of cathode electronics. The difficulties arising in this connection are pointed out, and the conclusion is finally arrived at that hitherto no uniform theory on the conductivity of vacuum spacings exists, that might at least qualitatively explain all well-known facts found to occur in experiments. In the present paper several additional considerations concerning the mechanism of vacuum-spacing conductivity are given. These considerations are based on the special part

✓B

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The Mechanism of the Conductivity of Electrode
Spacings in the Vacuum Before Breakdown

S/057/60/030/05/13/014
B012/B056

played by ion-emission²¹ in the generation of conductivity in real spacings (Ref. 6). Here, only the conductivity between real electrodes under real vacuum conditions is investigated. The hypothesis is set up that the conductivity of the spacing can be produced only by an emission of negative ions from the cathode and of positive ions from the anode in an electric field. This initial emission is then intensified by the secondary ion-induced ion emission and ion-induced electron emission on the electrodes. The conditions for a stability of the conduction current and for the development of the ion-avalanche are given. On the basis of the hypothesis given, all main facts established in the experiments with respect to the conductivity of electrode spacings in the vacuum before breakdown are explained. V. N. Glazanov and I. N. Slivkov as well as the Schottky effect are mentioned in this paper. There are 14 references: 11 Soviet and 3 English.

ASSOCIATION: Fiziko-tekhnicheskij institut AN SSSR Leningrad (Institute
of Physics and Technology of the AS USSR, Leningrad)

SUBMITTED: August 10, 1959

Card 2/2

✓B

84730

S/057/60/030/010/010/019
B013/B063

9, 4174
26. 1630

AUTHOR: Ionov, N. I.

TITLE: Theory of Vacuum Thermocouples

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol. 30, No. 10,
pp. 1210 - 1214

TEXT: The theory of vacuum thermocouples with plane electrodes¹ was established by A. I. Ansel'm (Ref.1) and L. N. Dobretsov (Ref.2) who assumed that the space charge is fully compensated. The author gives a more general and simpler solution to this problem. Fig. 1 shows the Scheme of a plane diode whose electrodes are connected to the outer resistor r. The author assumes that the work function φ_1 is larger than the work function φ_2 , and that the electrode temperature T_1 is higher than the electrode temperature T_2 . The current i , which is equal to the difference between the thermal electron currents $i_1 - i_2$, flows through

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Theory of Vacuum Thermocouples

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B013/B063

the diode chain and a potential difference $V = ir$ occurs simultaneously at the external resistor. The potential distribution in the diode chain is schematically represented in Fig.2. The volt-ampere characteristics of the currents i_1 and i_2 are plotted in Fig.3. Fig.4 shows the dependence of δ (in volts) on T_1 for different values of T_2 and V_m . It is concluded from the formulas derived that the quantities W_m (output) and γ_m (optimum efficiency) are practically independent of the quantity φ_2 within the limits of their possible values. These limits may, however, be shifted by changing the quantity T_2 . The formulas derived by the author hold for electrodes having uniform work functions. The work functions on the surfaces of real electrodes are not uniform. Roughly speaking, it may be assumed that the surface of the electrode consists of various spots, the work function having different values of φ_i , which are, however, constant within each of the spots. Next, the question as to whether the formulas derived may also be applied to "heat converters"

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Theory of Vacuum Thermocouples

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B013/B063

with spotty electrodes is considered for two limiting cases. As converters of heat into electric energy, such diodes will be of practical value, whose current density will amount to amperes and dozens of amperes per cm^2 . This is, however, only possible if the electron space charge is fully compensated by positive ions (e.g., cesium). Full compensation of the electron space charge by surface ionization alone is possible only in an electric field with zero strength. The author thanks Professor L. N. Dobretsov for valuable discussions. There are 4 figures and 2 Soviet references:

ASSOCIATION: Fiziko-tehnicheskiy institut AN SSSR, Leningrad
(Institute of Physics and Technology AS USSR, Leningrad)

SUBMITTED: May 13, 1960

Card 3/3

83752

S/056/60/038/004/045/048
B006/B056

24.6/00
AUTHORS:

Ionov, N. I., Mittsev, M. A.

TITLE:

Determination of the First Ionization Potentials of Neodymium and Praseodymium Atoms by the Method of Surface Ionization

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 4, pp. 1350 - 1351

TEXT: In the present "Letter to the Editor", the authors give a report on the determination of ionization potentials by the method of surface ionization, which is described in detail in Ref. 2. Indium was used as a reference element, for which the potential $V = 5.79$ ev had been spectroscopically determined. The potentials were determined by way of a determination of the temperature dependence of the ion current ratio J_1/J_2 from the formula $\log(J_1/J_2) = \log(n_1 A_1/n_2 A_2) + 5040(V_1 - V_2)/T$, where $A = Q_+/Q_0$ is the ratio of the statistical sums of state of the positive ion Q_+ and of the atom Q_0 . From the diagrams $\log(J_1/J_2) = f(1/T)$,

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83752

Determination of the First Ionization Potentials of Neodymium and Praseodymium Atoms by the Method of Surface Ionization S/056/60/038/004/045/048 B006/B056

it is thus possible to determine the difference $V_1 - V_2$ for the pairs Pr - In and Nd - In. From seven independent coefficient determinations from the diagrams (cf. Fig. 2), (0.22 ± 0.01) and (0.19 ± 0.02) ev were obtained for the two pairs. The final values for the first ionization potentials are $V_{Pr} = (5.48 \pm 0.01)$ ev and $V_{Nd} = (5.51 \pm 0.02)$ ev. There are 2 figures and 3 references: 2 Soviet and 1 British. X

ASSOCIATION: Leningradskiy Fiziko-tehnicheskii institut Akademii nauk SSSR (Leningrad Institute of Physics and Technology of the Academy of Sciences USSR)

SUBMITTED: February 2, 1960

Card 2/2

21. 3220 (1395, 1482, 1138)

S/057/61/031/002/008/015
B124/B202

AUTHORS: Belyakov, Yu. I. and Ionov, N. I.

TITLE: Penetration of hydrogen and deuterium through a nickel membrane in the temperature range from 250-600°C

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 2, 1961, 204-210

TEXT: The authors describe experiments of studying the penetration of H₂ and D₂ through a flat nickel membrane at a temperature range of 250-600°C by using a pulsed mass spectroscope (Ref. 7). On the basis of these experiments, the authors determined empirical rules governing diffusion, permeability, and solubility of H₂ and D₂ in nickel below and above the point of magnetic conversion. In the given temperature range nickel has, in the case of high permeability, very stable diffusion properties, and no structural defects are formed on protracted penetration of H₂ through the membrane (Refs. 8, 9). These properties of nickel are important when determining possible small isotopic effects. The scheme of the experimental

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S/057/61/031/002/008/015
B124/B202

X

Penetration of hydrogen ...

device is shown in Fig. 1; it consists of three main parts: 1) pulsed mass spectroscope IMS, 2) diffusion cell B, and 3) supply system of the gas into cell B and IMS for calibrating the latter with respect to the gas flow. L is the Pd supply pipe, K a stopcock, IMS and the supply system were evacuated by means of two independent vapor - oil pressure pumps 4Bn-100 (TsVL-100), i.e., in the former to a residual pressure of about

$5 \cdot 10^{-7}$ mm Hg and in the latter to some 10^{-6} mm Hg. With a resolution of 60 the sensitivity of IMS to H_2 and D_2 with respect to the vertical displacement of the oscilloscope beam of 1 mm is equal to $1.84 \cdot 10^{-7}$ and $2.92 \cdot 10^{-7}$ mm.l/sec, respectively. The diffusion cell B is schematically shown in Fig. 2. The cup-shaped nickel membrane M with flat bottom (area $A = 2.55 \text{ cm}^2$, thickness $d = 0.395$ mm) was welded to the thick-walled steel cylinder C (wall thickness 10 mm) by means of copper. The cylinder C was hermetically connected with the flange F. The membrane was heated to 650-700°C by an external furnace P, the temperature was measured by a Pt-PtRh thermocouple with an accuracy of $\pm 5^\circ$. The time dependence of the height of the peaks of H_2^+ or D_2^+ ions was measured for three different temperatures T (Fig. 3).

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Penetration of hydrogen ...

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The area $F = \int_0^t l(t)dt$ bounded by curve $l(t)$ and the axis of time is

proportional to the total amount of gas which has passed through the membrane during the time t . Fig. 4 shows the diagram $F(t)$ for three different membrane temperatures. Fig. 5 shows the dependence of the quantities $D(2)$ and $P(1)$ (D -- diffusion coefficient, P -- specific permeability) on $1/T$. The calculated values of E_D (activation energy of diffusion), E_p (activation energy of permeability), P_0 and D_0 (which are constants under the given conditions), S_0 (solubility of the isotopes in nickel), and E_s (dissolution temperature) are given in the table. These data indicate that 1) $S_{oH} = S_{oD}$, 2) $E_{DH} = E_{DD}$, 3) E_p and E_s of deuterium in nickel are by 800-900 cal./g-at. higher than in the light isotope, and 4) $D_0:P_0$ in both hydrogen isotopes is equal to $\sqrt{2}$. The penetration of hydrogen into the nickel lattice can be divided into several stages as is illustrated by the energy

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B124/B202

Penetration of hydrogen ...

diagram shown in Fig. 6. An abrupt change of the diffusion properties of the system H_2 -Ni is observed at the Curie point. The isotope effects observed are explained by the different dissociation energies of the molecules H_2 and D_2 and the different characteristic oscillation frequencies. There are 6 figures, 1 table, and 13 references: 4 Soviet-bloc and 9 non-Soviet-bloc. X

ASSOCIATION: Fiziko-tehnicheskiy institut im. A. F. Ioffe AN SSSR
Leningrad (Institute of Physical Technology im. A. F. Ioffe
AS USSR, Leningrad)

SUBMITTED: June 30, 1960

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4

22125

S/056/61/040/003/005/031
B111/B202

26.2312

AUTHORS: Ionov, N.I., Mittsev, M.A.

TITLE: Determination of the first ionization potentials of atoms by the method of surface ionization

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 3, 1961, 741 - 742

TEXT: The authors present the results of surface ionization of Er, Tb, Ce atoms and ThCl_4 molecule on polycrystalline tungsten. It is demonstrated that the temperature dependence of the ion currents is in line with the formula for the surface ionization on complex surfaces. The ionization potentials of Er, Tb, Ce and Th atoms were obtained by comparing these functions with the time dependence of the current of positive In ions. At sufficiently high temperatures the functions shown in Fig. 1 are well approximated by straight lines. The standard element In has the ionization potential $V_{\text{In}} = 5.79$ ev. Also the functions represented in Fig. 2 can be

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22125

S/056/61/040/003/005/031
B111/B202

J

Determination of the first ...

approximated by straight lines. The differences of the ionization potentials of In and Er, Tb, Ce, Th can be determined from their inclination; the following values are obtained: $V_{Er} = 6.08 \pm 0.03$ ev,

$V_{Tb} = 5.98 \pm 0.02$ ev, $V_{Ce} = 5.60 \pm 0.05$ ev, $V_{Th} = 6.95 \pm 0.06$ ev. In all

calculations, the lowest excited states of the atoms and positive ions of In were taken into account. With Er, Tb, Ce and Th atoms and ions the excitation states were not considered since the position of the energy levels of these elements is unknown. There are 2 figures and 3 Soviet-bloc references.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskii institut Akademii nauk SSSR (Leningrad Institute of Physics and Technology of the Academy of Sciences SSSR)

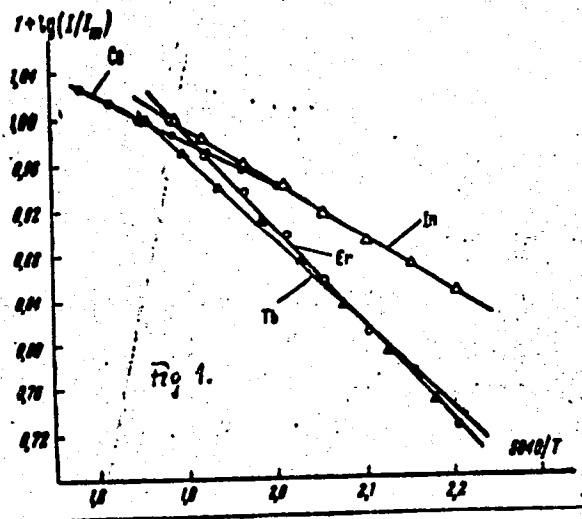
SUBMITTED: October 3, 1960

Card 2/4-3

S/056/617040/003/005/031
B111/B202

Determination of the first ...

Legend to Fig. 1:
1) $\log(I/I_m)$
logarithm of the re-
lative positive-ion
currents (ordinate);
T) temperature of
the tungsten fibers
(abscissa)



Card 3/4-3

ZANDBERG, E.Ya.; IONOV, N.I.

Emission of positive molecular ions from heated surfaces in vacuum. Dokl. AN SSSR 141 no.1:139-142 N '61.

(MIRA 14:11)

1. Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR.
Predstavleno akademikom B.P. Konstantinovym.
(Ionization)

39163
S/120/62/000/003/029/048
E032/E114

5.5310
AUTHORS:

Ionov, N.I., and Karatayev, V.I.

TITLE:

A double magnetic mass spectrometer for the analysis of small impurities

PERIODICAL: Pribory i tekhnika eksperimenta, no.3, 1962, 119-122

TEXT: One of the most important aims of analytical mass spectrometry is the development of methods for the quantitative analysis of very pure materials, capable of determining the presence of small impurities (10^{-4} - $10^{-8}\%$). This means that the appropriate mass spectrometer must be able to handle mass lines differing in intensity by a factor of 10^6 - 10^{10} . The present authors describe a two-stage mass spectrometer which is capable of achieving this. It uses a uniform magnetic field and the average ion trajectories take the form of semicircular arcs with radii r_1 (first stage) and r_2 (second stage), as shown in Fig.3. The spectrometer chamber is in the form of a brass cylinder 20 cm in diameter, 4 cm long. The chamber is divided into two parts by means of a partition with slits μ_1 , μ_2 , μ_3 and μ_6 . Ions leaving the source through μ_1 pass through μ_2 .
Card 1/2

A double magnetic mass spectrometer... S/120/62/000/003/029/048
E032/E114

reaching the collector K₁. Alternately they can pass through
M₃ and M₄ into the second stage of the device and then through
M₅ and M₆ on to the second collector K₂. The motion in the
second stage takes place in the stainless steel container D
which is insulated from the main chamber. A potential difference
is applied between the two chambers so as to reduce the ion
velocity between M₃ and M₄. Ion currents to K₁ and K₂ are
measured by independent electrometers ЭМУ-3 (EMU-3). The
residual gas pressure was of the order of 10⁻⁷ mm Hg. Fig.4
shows a spectrum obtained with the first stage only, and Fig.5
the same spectrum as recorded by K₂. It is noted that comparable
results were obtained by F.A. White and T.L. Collins (Appl.
Spectroscopy, 8, 1954, 169) with a very much more complicated
apparatus. There are 5 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR
(Physicotechnical Institute, AS USSR)

SUBMITTED: October 30, 1961)

Card 2/2

37071
S/057/62/032/004/017/017
B173/B102

26.1640 26.2312

AUTHORS: Zandberg, E. Ya., Ionov, N. I., Paleyev, V. I., and
Tontegode, A. Ya.

TITLE: Determination of thermionic emission constants from energy
distribution curves for thermoelectrons and positive ions

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 4, 1962, 503 - 516

TEXT: For plane and coaxially cylindrical electrodes with homogeneous
work function, expressions ("ideal" retardation curves) for the emission
current are derived on the assumption of Maxwellian energy distribution,
and extended to electrodes with inhomogeneous work function (experimental
retardation curves). As the areas of different work function (spots)
cannot be localized, only a qualitative consideration is possible. The con-
tact potential field of the spots is regarded first as being compensated
by the external field (independent emission of individual spots) and then
as not being compensated. The mean work function of the cathode was deter-
mined from the saturation current at given temperature. An apparent con-
tact potential difference, which can be determined from the experimental

Card (1/2)

S/057/62/032/004/017/017
B173/B102

Determination of thermionic...

curves and is related to the mean work functions of the electrodes in the same manner as the contact potential difference between homogeneous electrodes is to their work functions; is assumed for the arrangement of electrodes with inhomogeneous emission. The electron gas temperature for the experimental case of inhomogeneous electrodes is determined in the same way as for the ideal case of homogeneous electrodes. The retardation curves of the positive ion current caused by surface ionization at the cathode are considered analogously. The case of a compensated contact potential field was experimentally investigated in a vacuum tube with coaxially arranged triodes (polycrystalline tungsten cathode) and with a container for metallic Cs. Retardation curves for thermoelectrons ($T > 2000^{\circ}\text{K}$) and positive Cs ions ($T = 1200^{\circ}\text{K}$) were plotted, and the mean work functions, the apparent contact potential difference, and the mean temperatures determined. The compensation of the electron space charge by positive Cs ions was examined in the same tube, used as a diode system. There are 9 figures. X

ASSOCIATION: Fiziko-tehnicheskii institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute imeni A. F. Ioffe AS USSR, Leningrad)

SUBMITTED: May 11, 1961
Card 2/2

37269

S/057/62/032/005/017/022
B104/B102

26.2312

AUTHORS: Ionov, N. I., and Karatayev, V. I.

TITLE: The distribution of initial velocities of thermoelectrons and of K^+ and Cl^- ions produced by the surface ionization of KCl molecules on tungsten and tantalum

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 5, 1962, 626 - 631

TEXT: An experimental arrangement (Fig. 1) is described which enables determination of the distribution of the normal and tangential components of the initial velocities of thermoelectrons and positive and negative ions. The normal components of the initial velocities of K^+ ions and thermoelectrons produced by ionization on W and Ta have Maxwellian distribution up to relatively high V_z potentials (-2.5 v). The distribution was measured at the temperature of the emitter. Deviations from Maxwellian distribution at low V_z values are explained by the nonuniformity of the work functions of emitter and collector. The tangential components of the initial velocities of thermoelectrons and K^+ ions from a spot emitter

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The distribution of initial velocities...

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possess Maxwellian distribution only when the contact field is neutralized by an external accelerating field. This is the experimental proof of the existence of a temperature equilibrium on surface ionization of KCl molecule on W and Ta and of the fact that the accommodation coefficient of the molecule equals one. The tangential components of the initial velocities of Cl^- ions on the ionization of KCl on W have Maxwellian distribution. The volume ionization of KCl molecules by thermoelectrons is small. There are 5 figures.

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Fig. 1. Diagram of the experimental arrangement.
Legend: (N) emitter; (\mathcal{E}_1) and (\mathcal{E}_2) accelerating electrodes; (Π) KCl quartz vaporizer; (O) plate capacitor; (A) grid analyzer; (K) cathode; (V_3) potential between the middle grid of the analyzer and the emitter; (1) to the photomultiplier.
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