UNCLASSIFIED

CIRC ACCESSION NO--AT0128799   PROCESSING DATE--27NOV70

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE FLOTATION OF GALENA, PYRITE,
AND ANTIMONITE WAS STUDIED AS A FUNCTION OF THE CONCN. OF MONO AND
DITHIOPHOSPHORIC AND PHOSPHOROUS ACIDS. THE EFFECT OF PH ON THE
FLOTATABILITY OF GALENA BY DIETHYL THIOPHOSPHINATE, DIETHYL
THIOPHOSPHATE, AND DIPHENYL DITHIOPHOSPHINATE OF DIFFERENT CONCNS. WAS
ALSO DETD.   FACILITY: INST. KHIM., DUSHANBE, USSR.

UNCLASSIFIED

USSR

SOL'SKAYA, L. L., and   ROZGON, M. L., Biochemical Department of the Central
Scientific Research Laboratory of the Tashkent Medical Institute

"An Investigation on the Cellular Level of the Formation of Antibodies to
Salm. Typhimurium in Mice of Various Ages"

Abstract: To elucidate the effect of age on immunological reactions, 270 mice
aged 1 day to 120 days were given intraperitoneally an immunizing dose (150
million bacteria per 16-20 g mouse) of Sal, typhimurium containing the O-
antigen. The animals were sacrificed on the 4th day after vaccination, and
their spleen, cecum, and mesenteric lymph nodes as well as serum antibodies
were investigated. In the spleen, the number of cells (per 10^6 karyocytes)
producing antibodies to O-antigen did not increase in 4-day old mice, just
began to increase in 6-day old mice, and was significantly increased in 41-day
old mice, resulting in a measurable increase in the serum titer of specific
antibodies. The specific immunological reaction was even less pronounced in
the cecum and mesenteric lymph nodes of young mice. However, these struc-
tures developed a larger number of cells producing antibodies to sheep
erythrocytes. The nature of this cross reaction remains unclear.

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UDC 621.383.292/52

USSR

SOLTANOV, U.B., ALEKSANDROV, I.R., DUNAYEVSKAYA, N.V., KLIMIN, A.I., LEPILIN, V.A., SMIRNOV, V.I.

"Use Of Silicon Multiplier Elements In Photoelectron Devices"

Elektron. tekhnika. Nauchno-tekhn. sb. Elektronnoluch. i fotoelektr. pribory (Electronics Technology. Scientific-Technical Collections. Electron Beam And Photo-electric Devices), 1970, Issue 1(15), pp 58-61 (from RZh--Elektronika i yeye primeneniye, No 2, February 1971, Abstract No 2A243)

Translation: The phenomenon is investigated of cathode amplification in silicon p-n structures developed for hybrid photomultipliers. The phenomenon consists of the fact that during bombardment of a crystal with a shallow lying p-n junction by an electron stream with a power U_a . I_a in the circuit of a backward-biased junc-tion, the current $I = aI_a$ $(a \gg 1)$ appears. The diffusion p-n structures with the depth of occurence < 1 micrometer is investigated, as well as junctions obtained by the method of ion implantation which are characterized by better reproducibility

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USSR

SOLTAMOV, U. B., et al, Elektron. tekhnika. Nauchno-tekhn. sb.
Elektronnoluch. i fotoelektr. pribory, 1970, Issue 1(15),
pp 58-61

of results. The dependences obtained for $a(U_a)$ are presented. At a number of dif-
fusion junctions the anomalous effect is detected of cathode amplification with the
coefficient "a" considerably exceeding the limit which is determined by the theory
of impact ionization. Using as an example models of a photomultiplier with silicon
photomultiplier elements, the use of this phenomenom in photoelectron devices is
shown. 6 ill. 8 ref. N.S.

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USSR

UDC 53.07/.08+53.001.5

SOLTAMOV, U. B., ALEKSANDROV, I. R., DUNAYEVSKAYA, N. V., KLIMIN, A. I.,
LEPILIN, V. A., SMIRNOV, V. I.

"The Use of Silicon Multiplying Elements in Photoelectron Devices. (Brief Note)"

Translation: The phenomenon of cathode amplification in silicon pn-structures is
investigated. The use of this phenomenon in photoelectron devices was shown in
mockups of photomultipliers with silicon multiplying elements. Authors abstract.

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UDC 519.1

USSR

ZAMBITSKIY, D. K., SOLTAN, P. S.

"Finding the Class of Z-Connectedness of a Graph"

V sb. Prikl. matem. i programmir. (Applied Mathematics and Programming --
Collection of Works), No 1, Kishinev, Academy of Sciences Moldavian SSR, 1969,
pp 61-67 (from RZh-Matematika, No 10, Oct 70, Abstract No 10V227)

Translation: The authors solve the problem of finding the minimum cut in a
plane, connected, weighted graph G: i.e., sets of arcs with minimum sum of the
weights, separation of which breaks down the connectedness of the graph. The
problem is essentially that of finding the cycle of minimum length in a double
graph G*; an algorithm is given for solving the latter. Generalizations of the
initial problem are also discussed. Ye. Dinits.

1/1

A. Soltanov

EFFICIENCY OF OXYGENOTHERAPY UNDER HYALOID TURBIDITY

Subconjunctive introducing of oxygen under various hyaloid turbidities effect good resolving. Having received the first course of treatment resolving of hyaloid turbidity and vision acuty improvement have been observed in 29 cases of 40. The repeated course of oxygenotherapy is of little efficiency. The improvement of vision acuty has been observed in 3 cases of 8.

REEL/FRAME
19791387

UNCLASSIFIED

--- 010

TITLE--SPECTROPHOTOMETRIC METHOD FOR THE QUANTITATIVE DETERMINATION OF
FURAN ALDEHYDES AND THEIR CONVERSION PRODUCTS IN REACTION MIXTURES -U-

PROCESSING DATE--30OCT70

AUTHOR-(03)-KULNEVICH, V.G., SOLTOVETS, G.N., ZELIKMAN, Z.I.

COUNTRY OF INFO--USSR

SOURCE--KHIM. GETEROTSIKL. SOEDIN. 1970, (2), 283-4

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--SPECTROPHOTOMETRIC ANALYSIS, FURAN, ALDEHYDE, ALCOHOL, ACETAL

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1997/0747

STEP NO--UR/0409/70/000/002/0283/0284

CIRC ACCESSION NO--AP0119654

UNCLASSIFIED

UNCLASSIFIED   PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AP0119654
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT.   THE UV SPECTRA OF FURAN ALDEHYDES
(I), ALCS. (II) AND ACETALS (III) WERE STUDIED.   A SPECTROPHOTOMETRIC
METHOD FOR THE QUANT. DETN. OF I, II, AND III SEPARATELY OR IN THE
REACTION MIXT. WAS DEVELOPED.   FACILITY: KRASNODAR. POLITEKH.
INST., KRASNODAR, USSR.

UNCLASSIFIED

1/2   008

UNCLASSIFIED

TITLE--FURFURYL ALCOHOLS FROM THE CORRESPONDING ALDEHYDES --U--

PROCESSING DATE--23OCT70

AUTHOR-(04)-SMIRNOV, V.A., KULNEVICH, V.G., SOLTOVETS, G.N., SEMCHENKO, D.P.

COUNTRY OF INFO--USSR

SOURCE--GER. OFFEN. 1,803,373

DATE PUBLISHED--14MAY70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--CHEMICAL PATENT, FURFURYL ALCOHOL, ALDEHYDE, ORGANIC SYNTHESIS, PENTOSE, HEXOSE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1997/1422

STEP NO--GY/0000/70/000/000/0000/0000

CIRC ACCESSION NO--AA0120210

UNCLASSIFIED

CIRC ACCESSION NO--AA0120210   UNCLASSIFIED   PROCESSING DATE--23OCT70
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. FURFURYL ALCS. (I, R EQUALS H, CH
SUB2 OH, ME, PR, OR CL) WERE PREPD. IN 90-98PERCENT YIELD BY TREATING
THE CORRESPONDING ALDEHYDES (II) WITH NA AMALGAM AND PASSING CO SUB2.
AQ. SOLNS., AQ. ALC. SOLNS., OR SOLNS. OBTAINED FROM THE HYDROLYSIS OF
PENTOSANS OR DEHYDRATED HEXOSE WERE USED AS SOLNS. OF II. THUS, A
3.34PERCENT AQ. SOLN. OF 6.98 G I (R EQUALS CHO) WAS ADDED TO 0.3 L.
2.36N NA AMALGAM AT A RATE OF 16 ML-MIN AT 18DEGREES AND CO SUB2 WAS
BLOWN THROUGH AT 45 L.-HR TO GIVEN 6.3 G I (R EQUALS CH SUB2 OH).
FACILITY: ORDZHONIKIDZE, S., POLYTECHNIC INSTITUTE NOVOCHERKASSK AND
KRASNODAR POLYTECHNIC INSTITUTE.

UNCLASSIFIED

1/2   014

UNCLASSIFIED

TITLE--DIFFRACTION OF A TWO DIMENSIONAL ELECTROMAGNETIC WAVE ON DIELECTRIC
    CYLINDER WITH AN ARBITRARY SHAPE OF THE TRANSVERSE SECTION -U-

PROCESSING DATE--18SEP70

AUTHOR-(02)-SOLUDUKHOV, V.V., VASILYEV, YE.N.

COUNTRY OF INFO--USSR

SOURCE--ZHURNAL TEKHNICHESKOI FIZIKI, VOL. 40, JAN. 1970, P 47-53

DATE PUBLISHED-------70

SUBJECT AREAS--PHYSICS

TOPIC TAGS--ELECTROMAGNETIC WAVE DIFFRACTION, ELECTROMAGNETIC WAVE
    PHENOMENON

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1979/1618

STEP NO--UR/0057/70/040/000/0047/0053

CIRC ACCESSION NO--AP0047940

UNCLASSIFIED

CIRC ACCESSION NO--AP0047940   UNCLASSIFIED

ABSTRACT/EXTRACT--(U) GP-0-   ABSTRACT. SOLUTION OF THE PROBLEM OF
DIFFRACTION OF A TWO DIMENSIONAL ELECTROMAGNETIC WAVE ON A HOMOGENEOUS
DIELECTRIC CYLINDER WITH AN ARBITRARY SHAPE USING A SYSTEM OF INTEGRAL
EQUATIONS WITH RESPECT TO THE EQUIVALENT CURRENTS ON THE CYLINDRICAL
SURFACE. THIS EQUATION SYSTEM IS SOLVED USING A DIGITAL COMPUTER.
EXAMPLES ARE PRESENTED FOR ILLUSTRATING THE METHOD USED, AND A
COMPARISON WITH THE RESULTS OBTAINED BY OTHER METHODS IS PRESENTED.

PROCESSING DATE--18SEP70

UNCLASSIFIED

USSR

USSR   Bioacoustics

UDC 612.858.76

SOLUKHA, B. V., Institute of Zoology, Academy of Sciences Ukrainian SSR, Kiev

"Sound Location by Man Under Water"

Moscow, Doklady Akademii Nauk SSSR, Vol 213, No 1, 1973, pp 246-248

Translation: To assess the possibility of man's locating sound sources under water, it was necessary to perform a succession of experiments to study: (1) the mechanism of reception of sound oscillations; (2) location of a single sound source' (3) location of a signal source during interference.
With a piezoelectric emitter pressed against the skin, acoustic oscil-lations were excited in the tissues of the head, and the thresholds of percep-tion were determined. Harmonic signals at frequencies of 1 and 30 kHz were studied. The thresholds were lowest when the mastoid process, temporal and submaxillary regions, and lateral surface of the neck were stimulated.

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USSR

SOLUKHA, B. V., Doklady Akademii Nauk SSSR, Vol 213, No 1, 1973, pp 246-248
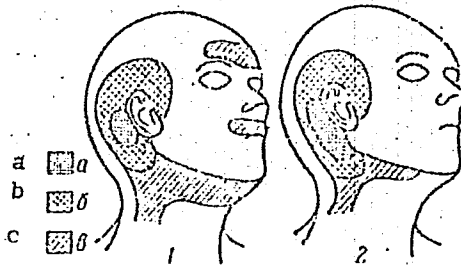

Fig. 1. Distribution of areas with the lowest threshold of excitation upon tactile stimulation, which correspond to the pattern of reception of sound oscillations under water. a, b, c: zones which differ in threshold by 5 db. 1) tactile stimulation at a frequency of 1 kHz; 2) at 30 kHz.

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The thresholds for remote stimulation in water and tactile stimulation in air coincided. Deatherage [4] showed that persons submerged in water and exposed to an ultrasonic field behaved as though they sensed stimulation by bone conduction. In our experiments, the thresholds corresponding to stimulation of bone structures and soft tissues differed only slightly.

Thus, it is fair to say that sound is conducted in water by tissue structures, which are a distributed receiver with a characteristics size of about 0.2 m.

Then using threshold methods we determined radiation patterns of the sound system for harmonic signals of 0.25, 1, 10, 15, and 30 kHz. The results were averaged for the number of subjects and number of experiments with each subject. The pattern showed an indistinct maximum only at frequencies of 15 and 30 kHz due to diffraction. The absence of directivity at the remaining frequencies is in agreement with the conclusions of Hollien and Rothman [5]. However, the differentiation of signals from sources located to the left or right of the subjects was quite pronounced for supraliminal signals at both audio and ultrasonic frequencies.

The ability to locate sound sources under water suggests the presence in man of psychoacoustic phenomena described in [1] with algorithms similar

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SOLUKHA, B. V., Doklady Akademii Nauk SSSR, Vol 213, No 1, 1973, pp 246-248

to those mentioned in [3]. To check this assumption, we performed an experi-
ment in water to detect a signal against a background of interference with
some differences in the spatial location of the signal sources and interference,
but with an equal signal-to-interference level ratio. A mixture of signal and
noise was supplied to two spherical emitters. The signal was harmonic or
pulsed with harmonic filling. The interference was a thermal noise ranging from
50 to 20,000 Hz, or almost an order higher than the width of the critical
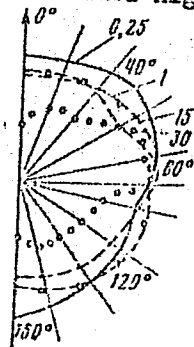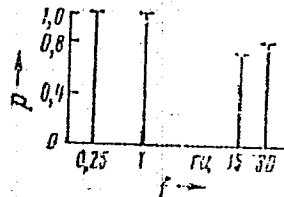frequency band [2].

Рис. 2

Рис. 3

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USSR

Fig. 2. Directivity patterns for human threshold signals in the water. Zero degrees corresponds to the position when the subject is looking directly at the radiator; the number represent frequency in kHz.

Fig. 3. Relationship between frequency (f) and the probability (P) of differentiating sources of audible and ultrasonic oscillations from sources located at the left and right of a subject (90° and 270°).

We determined the probability of detecting the signal against a noise background during the emission of the total signal and noise components by each of the two emitters. With an harmonic signal at a frequency of 10 kHz, the probability of detection was 0.84 but with a radio pulse signal at a frequency of 10 kHz lasting 1 msec and a repetition frequency of 10 Hz, the probability was 0.75. Then the signal alone was supplied to one of the emitters and the noise alone to the other emitter (the probability of detection for the harmonic and radio pulse signals was 0.95 and 0.94, respectively).

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SOLUKHA, B. V., Doklady Akademii Nauk SSSR, Vol 213, No 1, 1973, pp 246-248

The noise level and signal-to-noise ratio in the zone of reception was set the same way as in the preceding case. If the acoustic system does not have the capacity for space and time analysis (i.e., if it is incapable of taking into account the relative coordinates of the signal source and interference source and only the energy characteristics of the signal and interference are informational), the probability of detecting the signal against the noise background must remain as before because the signal-to-noise ratio did not change. However, the probability of detection increased; the difference was much greater than the possible accidental deviations. It is interesting to note that when the signal and noise were supplied to the receivers at the same time, the subjects detected the signal from the increase in noise level, but with spatial separation of the signal and noise, they readily distinguished the signal and could even differentiate somewhat the filling frequency.

Thus, man's acoustic system under water possesses the capacity for spatial and temporal analysis of acoustic information, i.e., regardless of the location of the signal source, information is used about the relative coordinates of the signal and interference sources.

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USSR

SOLUKHA, B. V., _Doklady Akademii Nauk SSSR, Vol 213, No 1, 1973, pp 246-248

The experimentally determined relationship between the possibility of man's detecting a signal in water against a noise background and the relative coordinates of the signal and noise sources is analagous to the "cocktail party" effect known in psychlacoustics /1/ but for air. Our experiment merely demonstrated the existence of this effect during hearing in water. Further careful research is needed to determine the capacity of the acoustic system for solving the problem of locating a signal source against a background of interference sources.

This effect can be mathematically modeled on the basis of a slight elaboration of Licklider's hypothesis /6/. If there are efferent impulses from the neurons that detect coincidences, impulses responsible for inhibition in the group of neurons that reflect the position of the interference source in space, the curves showing the relationship between the probability of detecting a signal against a noise background and the coordinates of the signal and noise sources will reflect the effects of spatial and temporal analysis. These curves were obtained, but there is as yet too little experimental data to be able to compare them with the experimental results.

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USSR

SOLUKHA, B. V., Doklady Akademii Nauk SSSR, Vol 213, No 1, 1973, pp 246-248

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2. Dubrovskiy, N. A., L. H. Tumarkina, and A. A. Freydin, DAN (Reports of the Academy of Sciences), 170, No 1, 1966.

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4. Deatherage, B. H., L. A., Jeffres, and H. C. Blodgett, J. Acoust. Soc. Am., No. 26, 1954.

5. Hollien, H. and H. Rothman, Government Reports Announcement, 71, No 12, 1971.

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- 4 -

SOLUKHA, B. V.

PART III. HYDROACOUSTICS

HYDROLOCATION CAPACITY OF DOLPHINS

Much attention is now being devoted to the echolocation of dolphins because the acoustic system of a dolphin is exceedingly well-developed and many of its components can be used in engineering.

The ranging system of a dolphin consists of two parts: transmitting -- a system of air bladders, larynx, fatty lens, reflector (skull bones), and receiving system -- organs of hearing, mechanoreceptors in the head, upper and lower jaws.

Transmitting part of dolphin ranging system. Along the nasal passage there are three pairs of sacs or bladders (pre-maxillary, tubular and vestibular). We will assume that sound generation occurs during passage of air from a sac into the nasal passage. The air bladders are surrounded by a system of fine, well-differentiated muscles regulating the air flow. In accordance with the nature of the sounds uttered by the dol-phin and the complexity of the sound-forming system, one can postulate presence of a complex semantic-information process in the articulation of the sounds used in intercourse and navi-gation. The tubular and premaxillary sacs evidently partici-pate in formation of the directional diagram, since the ves-tibular sacs protrude from the frontal part of the skull, playing the principal role in focusing of sounds [5,97]. The system of air sacs, without taking into account the influence of the skull and lens, should have a directional characteris-tic different from circular.

Shifting of the directional characteristic is neces-sary for a total scanning of space. It is evidently possible to bring about some displacement of the ray by changing the

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USSR

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

UDC 535.343.1

"Total Radiation from Hydrogen at Temperatures Below 10,000 Degrees"

Abstract: Calculating the radiational characteristics of gases at relatively low temperatures requires primarily consideration of molecular radiation. Detailed calculations for this were made by Olfe in 1961. For a thin layer of plasma in which self-absorption can be ignored, radiation from rotational transitions predominates up to 1000°; that from oscillation-rotational transitions between 1000 and 5000°. At higher temperatures negative hydrogen ions and positive molecular ions appear, the former more significant by an order of magnitude from 3000 to 10,000°K. At higher temperatures linear radiation becomes significant. When the plasma is of significant density and thickness, the results must be adjusted to account for the varying degrees of absorption at different frequencies and by different mechanisms.

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USSR

UDC 535.343.1

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"Discussion of Some Results of the Calculations"

Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka" (Siberian Branch), 1973, pp 40 - 48

Abstract: The special characteristics obtained are based on modern theoretical concepts and do not require extensive commentary. A few interesting results may be noted. At a temperature of 0.6 electron volts the Doppler mechanism begins to predominate for the Iα and Lβ resonance lines at 1 atmosphere and for the Iα lines at 10 atmospheres because of the low electron density at this temperature and the deep locations of the levels corresponding to these lines. At 10 and 20 atmospheres the lines are clearly visible against the background; at high temperatures they become narrower again because of the reduced electron density.

Although much energy is in the Lyman lines and continuum, self-absorption reduces radiation in these regions quite strongly, particularly at low temperatures.

The lines of the Balmer and Lyman series tend to fuse even at relatively low quantum numbers. There is some question about the boundary between discrete,

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USSR

SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 40-48

continuous spectra and the relative displacement of this boundary due to Coulomb interactions and the smearing of lines as a result of transitions from high energy levels. The authors' calculations show that the spectral lines begin to fuse significantly earlier than the Coulomb "trimming" of the discrete spectrum.

In addition to the spectral curves, the authors calculated integral energy losses for hydrogen plasma over the range of parameters used. Special calculations were made to relate their work to that of D. B. Olfe, reported in J. Quant. Spec. Rad. Trans. 1,104, 1961, and satisfactory agreement was found.

The use of lasers to probe plasma requires quantitative information about the relationship between transparency and plasma temperature and density. These calculations were performed in two ways, assuming constant pressure and at a given initial particle density. The first procedure is necessary because the plasma has significant absorption only at relatively high pressures, yielding a condition without significant pressure gradients, but with high temperature and density gradients as the plasma is forced against the walls. Although there is an overall tendency toward absorption at longer wave lengths, there are anomalies due to the existence of strong absorption lines which are more or less active, depending on pressure and temperature. The second form of calculation

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 40-48

is more appropriate when the laser beam is directed along the long axis of the plasma chamber, as well as in evaluating the transparency of a plasma under laser heating.

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USSR

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and
Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

UDC 535.343.1

"The Continuum"

Abstract: Continuous spectra are generated by transitions to, from, or within the
unbound ("free") state. At temperatures below 5000 degrees these represent
free atoms (the total continuous radiation is small) while at higher temperatures
free electrons are a primary radiation mechanism. At electron temperatures much
less than 500 ev a semiclassical treatment is appropriate, yielding the so-called
Kramer's formulas with the Gaunt factor as a quantum mechanical corrective. A
formula for recombination radiation can be obtained by applying Kirchhoff's law
for local thermal equilibrium to the formulas for photo-ionization absorption.
This radiation is characterized by significant intensity close to the line series
and an exponential decay in the direction of short waves. Bremsstrahlung extends
indefinitely in the direction of long waves. The ratio of these two effects can be
calculated for a given temperature and frequency. Another factor is so-called
multi-quantum recombination occurring as a result of triple recombination. In a
nonequilibrium plasma this can substantially influence the distribution of electrons
in levels and the number of free electrons, but in an equilibrium plasma a
1/2

USSR

SOLUKhIN, R. I. et al, Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka" (Siberian Branch), 1973, pp 23 - 29

Boltzmann distribution in the levels is established, uniquely determined by temperature equilibrium. At fairly high pressures and temperatures below $10,000^\circ K$ a significant role is played by the formation of negative hydrogen ions, accompanied by radiation. At still lower temperatures continuous molecular spectra appear. There is also the so-called quasi-molecular continuum, which is due to the transition of a hydrogen molecule from an initial unstable state (occurring as the result of a collision between atoms with parallel spins) to a stable state.

In addition to the true continuum, there are quasi-continua, resulting from the overlapping of large numbers of broadened lines. These occur as various bands. At temperatures below $1000^\circ K$ induced rotational transitions are significant; although the radiation of gases at low temperatures is very low, the coefficient of absorption is quite significant.

2/2

USSR

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and
Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

UDC 535.343.1

"Spectral Lines"

Abstract: Three factors determine the nature of spectral lines: population,
transition probability, and form of the line. Although many processes contribute
to population distribution, collision with electrons and spontaneous radiation are
usually dominant. At low plasma densities secondary collisions can be ignored and
radiative transitions are dominant, while in dense plasmas nonradiative de-excitation
predominates. When the electron density becomes sufficiently high, radiation
intensity becomes independent of it; the plasma becomes a Boltzmann radiator.

Spectral lines from a plasma are all broadened as a result of interaction with
fluctuating internal microfields. The extension can be considered in terms of two
components; one described as the result of a linear Stark effect. due to the inter-
action of ions with other, relatively slow ions, and the other due to collision
broadening (also with a Stark effect component) from interactions with faster-moving
electrons. The electron effect is most significant at the center of the broadened
line; the statistical effect, at its edges. The center is also somewhat displaced
1/2

USSR

SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novisibirsk, "Nauka" (Siberian Branch), 1973, pp 16 - 23

from what would be obtained from an isolated atom. Although theoretical calculations for the edges of the broadened line show good agreement with experiments, computations for the central portion are considerably less satisfactory. In this area the authors base their work on a theory developed by Sobel'man, extended to cover also broadening due to collisions with other particles.

When the concentration of charged particles is low, Doppler broadening becomes significant. The integral expression for combined Doppler and dispersion broadening is not in finite form, so that calculation by approximation method is required.

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USSR

UDC 535.343.1

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and
Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"Method of Performing the Calculations"

Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka" (Siberian
Branch), 1973, pp 33 - 39

Abstract: Five mechanisms were considered in the computer programs used:
1) bound-bound electron transitions (linear radiation from atoms); 2) free-free
and free-bound electron transitions in the field of protons (the H continuum);
3) free-free and free-bound electron transitions in the field of atoms (H^- continuum);
4) free-free and free-bound proton transitions in the field of atoms (the H_2^+
continuum); 5) continuous radiation of quasi-molecular hydrogen
(H_2^{quasi} continuum). Previous studies have lumped line spectra in two or three
groups. The present work considers all transitions between discrete levels in the
hydrogen atom that realistically exist in the plasma. Within the limits of the
parameters chosen, this number varies from less than 10 to several tens of levels;
the number of spectral lines is proportional to the square of this number. Each
line is considered in its broadened form. The results are presented on a wave scale.
Variable step sizes are used to keep the calculation error approximately constant
over the entire spectrum. Step sizes were based on relative values of the derivative
1/2

USSR

SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka" (Siberian Branch), 1973, pp 33 - 39

of spectral intensity, except where the contribution of the maximum line was less than 1/10 the background radiation, where the step size was based on the continuum. In each step the calculation of step size was based on the line making the strongest contribution, rather than the line with the nearest center.

The program was written in ALPHA, a modification of ALGOL. Calculations were performed at the computer center of the Siberian Branch, Academy of Sciences of the USSR.

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USSR   UDC 535.343.1

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"Energy Structure of the Hydrogen Molecule"

Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka" (Siberian Branch), 1973, pp 12 - 14

Abstract: Quantum mechanical analysis shows that the diatomic hydrogen molecule is not stable unless the ends of the two electrons are in an antiparallel orientation. Although the two electrons of the molecule can be in various energy states, they are within an axially symmetric field whose axis of symmetry is the line connecting the two nuclei. In this case what is significant is not the absolute value of the orbital moment but its projection on the axis $\lambda \hbar$, where $\hbar$ is Planck's constant and λ is a quantum number similar to the magnetic quantum number m in atoms.

In addition to the electron degrees of freedom, the molecule has oscillatory and rotational degrees of freedom. For each characteristic electron state, there is a set of discrete oscillatory states, which can be obtained as the solution of Schroedinger's equation for a harmonic oscillator. Consideration of non-harmonic oscillations leads to a more complex expression. Rotation is also

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka (Siberian Branch), 1973, pp 12 - 14

characterized by a discrete selection of energy states, describable in terms of the rotational quantum number, the molecular constant, and a coefficient which characterizes the relationship of rotation to oscillation (nonrigidity of the rotator). Since the hydrogen molecule does not have a constant dipole moment, it cannot in isolation have oscillatory and rotational transitions, but in a real gas this prohibition is removed because of induced electric dipole moments occurring in collisions. Although any transition can occur, transitions of ± 1 are most common. For electron-oscillatory spectra, the relative probability of various transitions is determined by the Franck-Condon principle.

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and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"Energy Structure of the Hydrogen Atom"

Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka",
(Siberian Branch), 1973, pp 9-12

Abstract: Schroedinger's equation yields solutions only for negative values of
E for which

$$E_n = -\frac{2\pi^2 me^4}{h^2 n^2} = \frac{Rh}{n^2},$$

where n is a whole number and R is the Rydberg constant. m must be replaced
by $\frac{mM}{m+M}$,

where m is the mass of the electron and M is the mass of the nucleus, to account
for movement of the nuclear mass. Relativistic generalization of Schroedin-
ger's equation requires that azimuthal quantum numbers be considered in addi-
tion to the primary number n. In the presence of an external field, the

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 9-12

magnetic quantum number must also be considered (Zerman effect). However, not all transitions described by this scheme are found in spectroscopic obser- vation. According to quantum mechanics, the following types of optical dipole transitions are possible: change in azimuthal quantum number = $\pm$ 1; change in magnetic quantum number = 0 $\pm$ 1; change in m = 0; change in internal quantum number ($\left|\text{azimuthal} \pm m_s\right|$) = 0 $\pm$ 1.

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SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical
and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"The Composition of Hydrogen Plasma"

Abstract: A plasma of pure hydrogen can contain ten different kinds of
particles -- H_2 and H_3 molecules, positive and negative ions of these molecules,
atoms, positive and negative ions of the atoms, and free electrons. Diagrams
are given to show the relative contribution of each of these particles as a
function of temperature and pressure. The law of mass action gives the rela-
tive amounts of large particles and their breakdown products as functions of
the degrees of freedom of each such component. There are four types of freedom:
electron, oscillatory, rotational, and translational. The product of the first
three is the statistical sum of internal degrees of freedom, called the statis-
tical weight of the particle. There are formulas for finding each of these as
the sum of a series in terms of energy of excitation, electron level, natural
oscillation frequency, oscillatory quantum number, and other factors. Trans-
lational freedom can also be expressed in terms of mass and relative volume.
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SOLUKhIN, R. I., et al., Opticheskiya Kharakteristiki Vodorodnoy Plasmy, 1973, pp 5-9

Since dissociation and ionization ordinarily begin at temperatures significantly below the corresponding binding energy, because of the high statistical sum of the free state, in the majority of cases only the basic electron term need be considered and the unharmonic nature of hydrogen molecule oscillations can be ignored. Several studies have determined ionization energy in a plasma and its reduction due to the total electric field of charged particles around the atom, particularly Ecker and Kroell (1963). The thermo-dynamic calculations of plasmic composition made in the present work yielded results close to those obtained by Patch in 1969.

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SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical
and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

UDC 535.343.1

"Gas Dynamic Properties and Elements of Radiation Gas Dynamics"

Abstract: In many cases, gas dynamic properties of plasmas must be considered
along with radiative properties. The authors arbitrarily distinguish two
thermodynamic regions: a) temperature less than 10 electron volts and pressure
less than 1 atmosphere -- radiation is not blocked and the pressure of the
photon gas may be ignored; b) a "black" plasma at high temperatures and den-
sities -- radiation energy and pressure must be considered. There are also
such cases as the propagation of shock waves with high radiation flow, in which
it is necessary to consider changes in the thermodynamic properties of the gas
ahead of the front due to absorption of the flow of advance radiation from the
hot gas behind the front. Knowledge of some thermodynamic and gas dynamic
properties of low-temperature hydrogen plasma is therefore also necessary.
    Where there is overall flow of matter in an optically thin plasma, the
usual hydrodynamic equations must be supplemented by a radiant energy factor
which represents a volume energy source. For an optically thick body in which
the radiant heat transfer approximation holds, the state of the matter is
determined solely by its optical properties. In other cases, as in the problem

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 61-69

without material flow, a complete system of equations must be solved.
      The equilibrium concepts used by the authors are applicable to quasi-equilibrium processes, since the time to establish equilibrium between radiation and matter is of the same order as the lifetime of the photon, which is usually very much less than the characteristic times of hydrodynamics, which are equal to or less than the thermal velocities of the molecules. Of course, the usual conditions of quasi-equilibrium must be supplemented by a condition that the radiation absorbed by matter in the time interval of interest does not change the state of the matter.

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SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

UDC 535.343.1

"Laser Heating of a Plasma"

Abstract: Laser heating is one of the proposed methods of attaining a controlled thermonuclear reaction. The necessary conditions are the opposite of those necessary for optical analysis without perturbation. There are varying difficulties in this process. At low temperatures, there are many energy-absorbing transitions to be passed through, and radiation losses begin to be significant as the plasma is heated. At higher temperatures, effective heating is also reduced by the increase in transparency of the plasma. The heating must be rapid to prevent loss of heat to the walls and the development of instabilities. Use of a solid or liquid target, although it requires additional energy for melting and evaporation, makes attainment of the Lawson criterion easier because of the high initial plasma density; if evaporation takes place from all sides simultaneously, a significant compression factor can be added.
    At thermonuclear temperatures, only inverse bremsstrahlung is effective for heating. For plasmas of moderate density (less than or equal to $10^{19} cm^{-3}$),

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy,
1973, pp 69-72

infra-red lasers are significantly more effective, but short-wave lasers are
most effective for heating solid targets. The decrease in the coefficient of
absorption at very high temperatures may be compensated by the inverse cyclotron
effect. Heat absorption may also be increased by several new types of non-
linearities that have recently been reported.

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SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

UDC 535.343.1

"Radiation of a Nonisothermic Plasma. Transfer Coefficients"

Abstract: In the presence of a substantially nonisothermic plasma, radiation transfer is described with the aid of special coefficients, calculated, in turn, from the spectral characteristics of isothermal plasmas. In an optically thin layer, the divergence of radiation flow can be described by using modified Planck coefficients, while an optically dense plasma is described by Rosseland's equation. In the general case of arbitrary optical density, the radiation transfer is computed by using the so-called modified emission capacity. Although the calculations are simpler for extremely thin plasmas in which lines predominate or extremely thick plasmas in which the continuum is dominant, real situations usually require dealing with the more complex calculations of intermediate cases.

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SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical
and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"Radiation of a Quasi-Equilibrium Hydrogen Plasma, Considering Conductive
Thermal Conductivity"

Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, "Nauka" (Siberian
Branch), 1973, pp 59-61

Abstract: Only conductive and radiant heat transfer are considered in this
book, although convective transfer is important in a number of cases, because
convective heat transfer has not been adequately studied, either theoretically
or experimentally. There are, however, many cases in which convective transfer
does not occur.

    The relative contributions of radiant and convective heat transfer for a
plasma without interior directed velocities can be determined from the differ-
ential equation of radiation transport and the law of energy conservation. If
the absorbed energy is much less than the radiated energy, the system of des-
criptive equations can be reduced to two equations; an expression for heat trans-
fer which determines the state of matter throughout the entire volume, and an
expression of radiation transfer which can be used to find the spectral density
of radiation. This occurs in an optically thin system without external
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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 59-61

radiation flows. A similar separation can be obtained if the absorbed energy is greater than the radiated energy, but the total absorption of the radiation flow throughout the entire volume is less than the flow of energy related to heat transfer and is thus incapable of changing the temperature distribution. Truly radiative transfer states also exist, described by the so-called diffusion or radiant heat transfer approximations. Although the assumption that radiant heat transfer exceeds conductive transfer is correct in the overwhelming major- ity of cases, there is a region in which this is not true.

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UDC 535.343.1

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V.; Institute of Theoretical
and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"The Role of Hydrogen Plasma Radiation in the Problem of Thermonuclear Fusion"

Abstract: In the majority of thermonuclear installations radiation is the
primary source of heat loss, since the times involved are too short for con-
vection losses (particularly when viscosity is increased by a magnetic field),
and conductive heat loss can be ignored when the plasma is separated or dis-
tant from the walls. For a deuterium-tritium plasma the necessary conditions
can be achieved at temperatures over 5 kev, while for pure deuterium they
cannot be achieved at all unless the magnetic field is used only for thermal
insulation, not retention of the plasma, or measures are taken to reduce
radiation loss (use of an optically thick plasma or radiation-reflecting
walls).

      Quantitative information about radiation capacity of the plasma makes
it possible to determine the minimum power of a steady-state reactor and the
minimum temperature of its center in the general case of combined heat transfer
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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 73-76

and radiation losses. Assuming the plasma is not separated from the wall and its lifetime is not limited by instabilities, the zone of maximum brightness will be a hollow cylinder at a temperature of several electron volts. Calculations indicate a minimal temperature of about 7 kev at the center of a reactor without magnetic field, using a 50% deuterium-tritium mixture. The dimensions of such a reactor must be on the order of several kilometers and the heat loads on its walls must greatly exceed the capacity of modern materials.

Calculations show that an equilibrium reactor with a magnetic field would not produce energy at the center sufficient to compensate losses at the exterior due to the poor heat transfer properties of the magnetized plasma and that reflecting shells would be difficult to obtain, since most of the radiation is in the form of x-rays.

Since continuous operation is apparently impossible, attention is currently focused on various short-term processes. One main line of research involves the use of relatively long laser pulses for supplementary heating of plasma in various magnetic containment devices, while a second line is directed toward the use of very short-powerful laser pulses to bring targets

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 73-76

to the threshold of useful fusion without auxiliary containment. Unfortunately laser efficiencies at the wave length needed for this second process are very low. There is also work being done on combined fusion-fission mechanisms, using the fusion to produce additional neutrons for improved fission output.

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UDC 535.343.1

SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

"Optical Diagnostics of Plasma"

Abstract: Plasma characteristics (primarily the concentration and temperature of various components) are determined from active and passive optical analysis. Passive methods, in which the plasma is illuminated by external sources, have the advantage of causing less perturbation to the plasma than other sampling techniques, although nonlinearities must be considered when such strong light sources as lasers are used.

The most developed methods are based on measurement of radiative and absorptive properties, although measurements of the index of refraction are also used. Due to the complexity of optical processes in a plasma, the most widely used method is to begin with rough measurements based on one of the basic radiation mechanisms and proceed to more detailed analysis. Although in some particularly clear situations this method is expedient, there are many cases in which the preliminary determination of the primary mechanism is quite

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, 1973, pp 48-55

difficult or even meaningless. In addition, the overwhelming majority of these methods assume an optically rare plasma; when self-absorption must be considered, this analytical approach leads to very complex expressions. A more general approach, ignoring only those components whose contribution is obviously unimportant, is clearly necessary. The use of computer calculations over a broad range of parameters provides this more general approach, serving as a "mathematical experiment" to relate the results of different studies and serve as a guide for future research.

The index of refraction is the foundation of another group of methods, primarily interferometry and Schlieren methods. These methods can determine the density and density gradient of a single type of particle when this type has primary influence on the effects of refraction. The relative sensitivity of these two methods depends on the effective radius of the plasma formation, the diameter of the focal point, the focal length of the lenses used in the Schlieren method, and the wave length of light employed.

Primary attention is currently on the use of infra-red and x-ray-probe wave lengths. Infra-red is particularly sensitive to the charged particle components, including the electron continuum. Passive x-ray diagnosis can be used in determining parameters of a high-temperature plasma along the discharge

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, Novosibirsk, 1973, pp 48-55

axis.

As a rule, the diagnostic methods produce information about the plasma in a given element of the volume at a specific moment in time. Local discrimination is achieved usually by using the Abel transform and assuming axial symmetry of the plasma formation. Time discrimination is achieved by using various types of time scanning. Optical analysis of hydrogen plasma is characterized by four specific factors: 1) absence of a constant dipole moment; 2) relatively high availability of electrons, so that the continuum in the initial stages of ionization is determined primarily by radiation related to negative ions; 3) the Stark effect as a primary determinant of the spectral line broadening; 4) complete ionization at high plasma temperatures.

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SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical
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UDC 535.343.1

Opticheskiye Kharakteristiki Vodorodnoy Plazmy (Optical Characteristics of
Hydrogen Plasma), Novosibirsk, "Nauka" (Siberian Branch), 1973, 82 pp

Abstract: Results are given from detailed calculations of the special char-
acteristics of hydrogen plasma over a wide range of parameters, considering
all significant radiation mechanisms. The material on the computation is pre-
ceded by a brief systematic summary of information about the hydrogen atom
and molecule and the composition and thermodynamic and gas dynamic properties
of the hydrogen plasma. Radiation processes are covered in detail, including
radiation from nonisothermic plasma, which requires simultaneous consideration
of radiation and thermal conduction. In this connection, the results of the
calculations are discussed, recommendations for their practical use are made,
and some questions of the diagnostics of hydrogen plasma are examined.
    This material will be useful to a broad group of engineer-physicists
and graduate students and students in senior courses specializing in spectro-
scopy, plasma physics, astrophysics, and physical gas dynamics.

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, 82 pp

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy,
1973, 82 pp

15. The Role of Hydrogen Plasma Radiation in the Problem of
    Thermonuclear Fusion

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SOLUKhIN, R. I., YaKOBI, Yu. A., and KOMIN, A. V., Institute of Theoretical
and Applied Mechanics, Siberian Branch of the Academy of Sciences of the USSR

UDC 535.343.1

"On the Thermodynamics of Radiation"

Abstract: The primary obstacle to establishing equilibrium in a system includ-
ing radiation is the loss of energy by radiation outside the system. An
excited particle can lose energy either through a damping collision or by
spontaneous radiation. If there is any significant ionization, the majority
of collisions are with electrons. Thus, given the damping collision cross-
section of the particle and its radiational lifetime (considering also stimu-
lated emission), the relative probabilities of damping and radiation can be
calculated. If damping is more probable, local thermodynamic equilibrium may
be established. Overall equilibrium will depend on the volume absorption
coefficient and the relative probability of damping. The calculations for
absorption must consider re-radiation, so that "absorption" implies a sufficient
number of collisions to make the probability of damping high. If this total
path length is much greater than the dimensions of the volume, the result is

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973, pp 14-16

volume radiation; if it is much less, surface radiation. Equilibrium radiation of a surface plasma radiator is equivalent to that of an absolute black body and is referred to as Planck radiation. Volume equilibrium in the sense of local thermodynamic equilibrium yields so-called Boltzmann radiation, since the nature of the radiation is determined by the Boltzmann distribution of electrons in levels. While a special form of Kirchhoff's law applies to the latter case and the black body radiation is determined from Planck's formula, nonequilibrium radiation can be analyzed only by solving an enormous system of kinetic equations, since nature depends on the probabilities of a large number of elementary processes.

In a moderately dense plasma local thermodynamic equilibrium is the most probable state; it is sufficient for the probability of collision processes to exceed the probability of radiation processes by an order of magnitude. In fact, the rigidity of this condition for a resonance transition with maximum probability of spontaneous radiation can be significantly reduced in the majority of real cases by the trapping of radiation in the optically dense plasma. Since most experimental installations produce a plasma for a short time, it is necessary to verify that the time to establish equilibrium is brief in comparison with the time to establish a quasi-stable state. This can be

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SOLUKhIN, R. I., et al., Opticheskiye Kharakteristiki Vodorodnoy Plazmy, 1973,
pp 14-16

done by considering the slowest process, the relaxation of the resonance level.
Under experimental conditions, radiation scattering (primarily Thomson
scattering) is ignored, since the mean free path is very long; under actual
physical conditions, this factor may be important.

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UDC 617-001.34-07:616-009.939.6

MOLCHANOV, V. V. and SOLUN, V. S., Saratov Medical Institute

"Changes in Blood Protein Metabolism in Vibration Disease"

Moscow, Gigiyena Truda i Professional'nyye Zabolevaniya, No 10, 1971, pp 43-45

Abstract: Total proteins and changes in the blood protein fractions were studied in 94 persons who had been exposed to local vibration for varying lengths of time: 34 still using vibrating tools at the time of the examination and 60 no longer doing so because symptoms of vibration sickness had been detected. Both groups showed changes in protein metabolism -- decrease in albumins, hyperglobulinemia (increase in the α_2, α_2, and γ fractions), and decrease in the albumin-globulin ratio. These changes were more pronounced in the first group, especially among the female workers. Dysproteinemia intensified with length of time on the job, being particularly severe in those with 16 to 20 years of experience. Protein metabolism exhibited a tendency to return to normal in those no longer exposed to vibration.

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USSR   UDC 530.12:531.18+538.3

ZAYTSEV, G. A., SOLUNIN, A. M.

"On the Problem of the External Invariance of Maxwell Equations in a Space
With a Medium"

V sb. Nekotor. differents. uravneniya mat. fiz. i teorii kolebaniy (Certain
Differential Equations of Mathematical Physics and the Theory of Oscillations --
Collection of Works), Ivanovo, 1970, pp 91-97 (from RZh-Fizika, No 1, Jan 71,
Abstract No 1B137)

Translation: The general Maxwell equations in the presence of electric and
fictitious magnetic charges are described in the algebraic form:

$$\nabla \Phi = j. \qquad\qquad (1)$$

In the above expression $\nabla = e^{\alpha}\partial_{\alpha}$, where e^{α} are generating algebras of the 16th
order A, related by the relationships:

$$1/2\,(e^{\alpha}e^{\beta} + e^{\beta}e^{\alpha}) = g^{\alpha\beta}e; \quad (\alpha, \beta = 1, 2, 3, 4).$$

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ZAYTSEV, G. A., SOLUNIN, A. M., Nekotor. differents. uravneniya mat. fiz. i
teorii kolebaniy, Ivanovo, 1970, pp 91-97

The elements ϕ and j from the algebra A are expressed in terms of the electromag-
netic field tensor $F = 1/2F^{\alpha\beta}e_\alpha e_\beta$ and in terms of the 4-vector and 4-pseudovector
electric and magnetic currents $j_{el} = j^\alpha_{el}e_\alpha$ and $j_{mag} = j^\alpha_{mag}e_\alpha$ by the formulas:

$$\Phi = p + F, \quad p = p_1 e + p_i i, \quad i = e^1 e^2 e^3 e^4;$$

$$-4\pi/c(j_{el} - ij_{mag}) = -\nabla p + j_1 - ij_2.$$

The Maxwell equations in form (1) are invariant relative to external transforma-
tions under which the coordinates of x^α do not change and ϕ and j are multiplied
on the right by the inverse elements from algebra A which are linear combinations
of the products of an even number of generatrices e_α. For a space with a medium,
it is proposed that the bound electric charges and currents be replaced by fic-
titious bound magnetic charges and currents leading to the same macroscopic
characteristics of the medium. As a result, it becomes possible by an external
transformation to give a new physical sense: namely, they convert free and
bound electric charges and currents among themselves. G. A. Zaytsev.

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TITLE--DETERMINATION OF THE MONETHYL ADIPIC ACID CHLORIDE -U-

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AUTHOR-(04)-SOLUNINA, I.A., PARFENOVA, V.V., DEVYATNIN, V.A., KUZNETSOVA, T.N.

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2/2   009   UNCLASSIFIED   PROCESSING DATE--09OCT70
CIRC ACCESSION NO--AP0113429
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A PROCEDURE WAS DEVELOPED FOR
DETG. THE TITLE COMPD. (I) IN THE PRESENCE OF MONO ET ADIPATE (II) AND
HCL.   THE PROCEDURE WAS BASED ON ETHANOLYSIS OF I WITH ABS. ETOH TO FORM
DI ET ADIPATE AND HCL, AND ON HYDROLYSIS OF I TO FORM II AND HCL.   A
TITRIMETRIC DETN. OF THE ACIDS FORMED BOTH REACTIONS PERMITS THE I
CONTENT TO BE ASSESSED FROM THE DIFFERENCE.   THE HCL CONTENT WAS DETD.
BY THE VOLHARD METHOD.   THE PROCEDURE IS AS FOLLOWS: DISSOLVE A SAMPEL
(SIMILAR TO 0.15 G) IN 5 ML ABS. ETOH, ADD SEVERAL DROPS OF BROMOTHYMOL
BLUE AND TITRATE WITH 0.1 N NAOH.   THEN ADD 10 ML 16PERCENT HNO SUB3, 20
ML 0.1 N AGNO SUB3, AND BACK TITRATE THE AGNO SUB3 WITH 0.1 N NH SUB4
SCN IN THE PRESENCE OF NH SUB4 FE(SO SUB4) SUB2.   DISSOLVE ANOTHER
SAMPLE IN 5 ML DIOXANE, ADD 20 ML H SUB2 O, AND TITRATE WITH 0.1 N NAOH
USING THE SAME INDICATOR AS IN THE 1ST TITRN.   CALC. THE CONTENT OF
I,II, AND HCL FROM THE GIVEN FORMULAS.   THE RELATIVE ERRORS OF THE DETN.
OF I, II, AND HCL BY THIS PROCEDURE WERE 5.5, 1.1, AND 15.0PERCENT,
RESP.   FACILITY: VSES. NAUCH. ISSLED. VITAMIN. INST., MOSCOW,
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TITLE--CERTAIN UNSTEADY PROBLEMS OF THE THEORY OF FINITE AMPLITUDE WAVES IN
DISSIPATIVE MEDIA -U-

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AUTHOR-(02)-RUDENKO, O.V., SOLUYAN, S.I.

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CIRC ACCESSION NO--AT0055063

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272   019

CIRC ACCESSION NO--AT0055063   UNCLASSIFIED

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. STUDY OF CERTAIN UNSTEADY PROBLEMS
REGARDING WAVE PROPAGATION IN DISSIPATIVE, SPATIALLY SYMMETRICAL MEDIA.
IT IS SHOWN THAT, IN CERTAIN IMPORTANT PARTICULAR CASES, THE NONLINEAR
PARTIAL DIFFERENTIAL EQUATIONS DESCRIBING PLANE AND CYLINDRICALLY
SYMMETRICAL WAVES CAN BE REDUCED TO ORDINARY DIFFERENTIAL EQUATIONS.
EXACT SOLUTIONS ARE OBTAINED WHICH, IN THE CASE OF PLANE WAVES, MAKES IT
POSSIBLE TO ANALYZE THE PROPAGATION OF SINGLE PULSES OF VARIOUS
PROFILES. IN THE CASE OF CYLINDRICAL WAVES, THE SOLUTION IS OBTAINED IN
PARAMETRIC FORM AND IS AN ANALOG OF THE QUASI STEADY STATE SOLUTION.
THE EXACT SOLUTIONS OBTAINED ARE FREE FROM CONSTRAINTS ON THE VALUE OF
THE REYNOLDS NUMBER. FACILITY: MOSKOVSKII INSTITUT NARODNOGO
KHOZIAISTVA, MOSCOW, USSR.

PROCESSING DATE--16OCT70

UNCLASSIFIED

1/2   024

TITLE--STUDY OF THE ACOUSTIC AND GASDYNAMIC CHARACTERISTICS OF A JET NOISE MUFFLER -U-

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PROCESSING DATE--23OCT70

AUTHOR-(04)-KRASHENINNIKOV, S.YU., SORKIN, L.I., TOLSTOSHEYEV, M.N., YAKOVLEVSKIY, O.V.

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DATE PUBLISHED-------70

SUBJECT AREAS--PHYSICS, PROPULSION AND FUELS

TOPIC TAGS--ENGINE MUFFLER, TURBOJET ENGINE, NOISE REDUCTION, EXHAUSE GAS DYNAMICS

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1988/1459

CIRC ACCESSION NO--AP0106215

STEP NO--UR/0046/70/016/000/0088/0095

UNCLASSIFIED

CIRC ACCESSION NO--AP0106215   UNCLASSIFIED

PROCESSING DATE--23OCT70

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. STUDY OF A JET NOISE MUFFLER CONSTURCTED IN THE FORM OF A SET OF ADAPTERS LOCATED AT THE OUTLET SECTION OF A JET NOZZLE. IN THIS CASE AIR OR SOME OTHER GAS IS BLOWN THROUGH THE ADAPTERS PERPENDICULAR TO THE ENGINE EXHAUST JET. THE EXPERIMENTALLY OBTAINED REDUCTION IN THE MAXIMUM INTENSITY OF THE NOISE LEVEL AMOUNTS TO 4 TO 5DB. IN STUDIES ON MODELS SIGNIFICANT CHANGES IN THE STURCTURE OF THE EXHAUST JET, UNDER THE ACTION OF THE INJECTED GAS ARE NOTED NAMELY, A REDUCTION IN THE LENGTH OF THE INITIAL SECTION OF THE JET, AN INCREASE IN THE TRANSVERSE DIMENSIONS OF THE JET, AND OTHER CHANGES.

UNCLASSIFIED

USSR

SOLYAKOV, S. P., BELKIN, G. I., TATAKIN, A. N., NACHAYEV, V. M., ZOBNIN, S, I.,
ZYEV, N. M., IVANOV, A. B., VUKOLOV, V. V., SVALOV, G. N., DEVYATKIN, V. N.,
ALEKSANDROV, V. A., GRIBOV, V. I.

"Method of Processing Slimes from Electrolytic Production of Magnesium"

Translation: In order to use the slime for production of Mg, it is fed from the
electrolyzers to chlorinators together with the depleted $MgCl_2$ electrolyte
in the form of a pulp containing 1-10% MgO and 5-25% $MgCl_2$. The chlorinators
also receive the Cl-Mg raw material and Cl_2, after which the electrolyte,
enriched with $MgCl_2$, is fed to the electrolyzers.

1/1

USSR

Water Treatment

BAKHANOVA, R. A., SVETLAKOV, A. M., and SOLYANEK, YE. G.: Scientific-
Research Institute of Hydrometeorology, Kiev

UDC 536.423.1:661.184

"Determination of the Coefficient of Water Evaporation From a Flat Surface
Covered with a Surfactant Film"

Abstract: The effect of surfactants deposited on an evaporating surface on
the evaporation rate of vapors was studied. The coefficient of water evapora-
tion was determined from the temperature dependence of the evaporation rate of
pure water and water covered with surfactants. The temperature range
studied was 0-40°. When cetyl alcohol was used as the surfactant the coeffi-
cient of water evaporation was 6.8·10^{-5}, with a mixture of higher aliphatic
alcohols (C_{18}-C_{23}) it dropped to 3.8·10^{-5}. A sharp change in the decrease of
the evaporation rate due to surfactant films is observed with increasing water
temperature. This is accounted for by the beginning of phase transition on the
surface layer.

1/1

USSR

SOLYANIK, B.L. and YASTREBENETSKIY, M.A.

"The Occurrence of Failures in Automatic Systems When There is Random Switching Off of Equipment"

Abstract: While investigating the reliability of automatic systems to monitor and control large power engineering complexes consisting of boilers and turbines, the authors developed failure models which are applicable to these systems and to other industrial complexes where large portions of the equipment being controlled are switched off at random moments of time. The following assumptions were made: 1) all the automatic systems of the complex are switched on and off simultaneously: that is, the failure rates of all component systems are subject to abrupt changes at the same moment of time; 2) the lengths of T', the operating time, and T", the downtime of the complex, are independent random variables having continuous distribution functions with finite means and variances; 3) the inspection of the occurrence of failures begins at some moment in time which is infinitely remote from the moment at which the complex

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USSR

SOLYANIK, B.L. and YASTREBENETSKIY, M.A., Moscow, Avtomatika i Telemekhanika,
No 12, 1970, pp 68-76

was first turned on. The authors used a model of a Poisson process to des-
cribe the occurrence of failures. They obtained the distribution of the
number of failures when the equipment being controlled is switched off randomly,
as was previously specified, and they also discuss a model which describes
the occurrence of failures when the complex is also subjected to other random
external factors whose effect on the occurrence of failures may be equal or
even greater.

2/2

USSR

SOLYANIK, R. G., FEDOROV, Yu. V., and RAPOPORT, I. A., Tomsk Scientific
Research Institute of Vaccines and Sera, Tomsk, and Institute of Chemical
Physics, Academy of Sciences USSR, Moscow

"The Mutagenic Effect of Some Alkylating Compounds on the Virus of Eastern
Equine Encephalomyelitis"

Abstract: The mutagenic effect of N-nitrosomethylurea, formaldehyde, 1,4-bis-
diazoacetylbutane, and dimethylsulfate on the virus of eastern equine
encephalomyelitis was studied, using strain 2627 of this virus obtained from
the Institute of Virology imeni D. I. Ivanovskiy, Academy of Medical Sciences
USSR. The cultures of chicken embryo cells were prepared by trypsinization.
The virus clones were isolated by the platelet method. The intracellular
virus was treated with the mutagens at the moment of its replication. The size
of negative colony platelets and the pathogenicity of the virus upon intraperi-
toneal injection of mice were used as criteria of the mutagenic effect. A
change in the size of platelets was observed only upon treatment with formalde-
hyde or dimethylsulfate. The mutants isolated upon treatment of the virus with
dimethylsulfate showed a less pronounced residual pathogenicity (the titer of the
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USSR

SOLYANIK, R. G., et al, Genetika, Vol 8, No 3, Mar 72, pp 164-165

majority of them was < 1.0) than those obtained on treatment with N-nitroso-methylurea or formaldehyde (titer 1.5-2.0) - i.e., dimethylsulfate had a stronger mutagenic effect as far as pathogenicity was concerned. No mutations were obtained upon subjecting the virus to the action of 1, 4-bis-diazoacetylbutane.

SOLYANIK, R. G., FEDOROV, Yu. V., and RAPOPORT, I. A., Tomsk Scientific Research Institute of Vaccines and Sera, Institute of Chemical Physics, Academy of Sciences USSR, Moscow

UDC 575.24: 636.1

"Genetic Characteristics of Eastern Equine Encephalomyelitis Virus Mutants Induced by Alkylating Compounds"

Moscow, Genetika, Vol 8, No 5, 1972, pp 109-114

Abstract: Characteristics of attenuated mutants obtained from treating the pathogenic strain with alkylating compounds are described. Mutants were tested for degree of uniformity in regard to size of negative colonies and pathogenesis for white mice. Mutants induced with dimethylsulfate were uniform in both respects, while those induced with N-nitrosomethylurea and formaldehyde showed molecules of varied size, and of varying degrees of virulence. Through additional selection, subclones with desirable uniform characteristics were obtained. The pathogenicity of a virus variant for sensitive animals is an extremely important genetic characteristic, and this experiment showed that it is possible to obtain an Eastern equine encephalomyelitis virus mutant with decreased peripheral activity, apathogenic for susceptible animals. Correlation was noted between capacity to cause viremia and the pathogenicity of the

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USSR

SOLYANIK, R. G., et al., Genetika, Vol 8, No 5, 1972, pp 109-114

virus upon peripheral methods of infection, as the pathogenic variant was
detected in the blood sooner and for a longer time in titers much higher than
those of the attenuated variant. No strong correlation between virulence and
thermoresistance was found. There were thermolabile and thermostable attenu-
ated variants. Most of the variants of lowered virulence for the animals
remained immunogenic, showing a pronounced resistance index and general
stability.

2/2

USSR

SOLYANIK, R. G., PODOPLEKIN, V. D., and FEDOROV, YU. V., Tomsk Scientific Research Institute of Vaccines and Sera

"Experimental Mutability of Venezuelan Equine Encephalomyelitis Virus. I. Properties of Mutants Induced by Alkylating Compounds"

Abstract: The mutability of various properties of Venezuelan equine encephalovirus was investigated experimentally. Mutations were induced by three alkylating compounds: formaldehyde, nitrosomethylurea, and ethylenimine.

Nitrosomethylurea possesses the greatest mutagenic activity (frequency of mutations induced -- 42.5%), while the activity of the two other mutagens is essentially identical (formaldehyde -- 33.6%, and ethylenimine -- 33.3%). Formaldehyde has the widest spectrum of mutations, inducing changes not only in pathogenic properties but also in formation of small plaques (1mm or less in diameter). Changes in the apthogenic properties of Venezuelan equino encephalomyelitis virus are associated with modifications of certain other properties of this microbe, which can be utilized for evaluating the attenuation of the cultured variants.

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SOLYANIK, R. G., PODOPLEKIN, V. D., iand FEDOROV, YU. V., Tomsk Scientific
Research Institute of Vaccines and Sera, Tomsk

"Experimental Modifiability of the Virus of Venezuelan Equine Encephalo-
myelitis. II. Characteristics of Mutants Obtained by the Action of Nitrous
Acid"

Abstract: The mutability of the virus of Venezuelan equine encephalomyelitis
under the effect of HNO_2 was studied. The extracellular virus was treated
for 5 min with 4M HNO_2. The mutagen induced formation of strains with an
altered pathogenicity, but no change in the size of negative plaques only.
The relation between pathogenicity and the size of negative plaques that had
been established in earlier work was retained (cf. Solyanik et al, Genetika,
7, No 5, p 130, 1971). Eleven of the 52 strains isolated on treatment with
HNO_2 showed reduced virulence. Nine of the 11 strains were unstable to
culturing on chicken embryo cells, reverting to their initial pathogenicity
after four passages. Two of the modified strains (A-30 and A-31) were non-
pathogenic to mice, guinea pigs, and rabbits on subcutaneous infection, while
exhibiting pronounced antigenic and immunogenic properties. They were stable
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USSR

SOLYANIK, R. G., et al., Genetika, Vol 7, No 7, Jul 71, pp 109-113

on heating at 50°C for 30 min, but were inactivated on being kept for 10 min at 60° C. Strains A-30 and A-31 are being studied from the standpoint of possible application as vaccines.

2/2

UDC 539.384/.385

USSR

SOLYANIK-KRASSA, K. V.

"Twisting of a Beam With a Conical Portion"

Izv. Leningr. elektrotekhn. in-ta (News of Leningrad Electrical Engineering Institute), 1972, No. 109, pp 17-19 (from RZh-Mekhanika, No 3, Mar 73, Abstract No 3V80)

Translation: The twisting of a rod consisting of cylindrical and conical segments is considered. The twisting load is applied on the plane ends. The side surfaces of the rod are considered free from load. The Mitchel stress function representing the solution of the problem is sought in the form of the sum of two trigonometric series with unknown coefficients. The author indicates that determination of the unknown coefficients can be reduced to an infinite system of linear equations, the regularity of which can be proved. An infinite system of linear equations is not obtained in the paper, however. B. L. Abramyan.

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USSR

UDC   621.317.761

VITOSLAVSKIY, E. P., VUL'CHIN, Yu. G., IMSHENETSKIY, V. V.,
MARTYNIV, M. S., and SOLYANKO, B. V.

"UHF Frequency Meter"

Moscow, Otkrytiya, izobreteniya, promyshlennyye obraztsy, tovarnyye
znaki, No. 33, 1971, p 155

Abstract: This frequency meter contains an electronic counter,
tuned oscillators, a mixer, and two AFC circuits. To simplify
the circuit and the measuring process, the reference frequency
inputs of both phase detectors are connected to the output of
one of the time-base divider stages of the counter. The input
of this stage is connected to the mixer output.

Measuring, Testing, Calibrating

USSR

UDC 536.24:536.42

KIRICHENKO, YU. A., SOLYANKO, V. E., TSYBUL'SKIY, V. V., YAKOVLEV, YE. V.

"Device for Studying Heat Exchange when Boiling Cryogenic Liquids"

Tr. Fiz.-tekhn. in-t nizk. temperatur AN USSR (Works of the Physico-Technical Low-Temperature Institute of the Ukrainian SSR Academy of Sciences), 1970, vyp. 1, pp 255-264 (from RZh-Mekhanika, No 11, Nov 71, Abstract No 11B689)

Translation: A device permitting the study of a broad class of heat exchange problems during boiling and investigation of heat exchange during boiling of both pure oxygen and oxygen containing a dissolved gas in the temperature range of 65-120° K and at pressures of 0.025-10 absolute atmospheres insuring visual observation and movie photography of the processes taking place is described. The device comprises an operating vessel of 5 liter capacity surrounded by three shells forming buffer, thermostating and vacuum tanks, successively. The vacuum tank and the thermostating tank filled with liquid nitrogen form a special type of dewar protecting the operating vessel from external heat fluxes and insuring the required temperature level of the liquid in the working vessel by pumping nitrogen vapor out of the thermostating tank. Cooling the gas fed to the working vessel and dissolving it in a liquid are carried out by means of a bubbling and circulating system placed in the thermostating and vacuum tanks. The buffer

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USSR

KIRICHENKO, YU. A., et al., Tr. Fiz.-tekhn. in-t nizk. temperatur AN USSR, 1970, vyp. 1, pp 255-264

tank separates the working vessel from the thermostating vessel and can be evacuated or filled with the heat exchange gas. The working vessel and the shells of all the surrounding tanks are equipped with peepholes with flat glass.

Preliminary heat exchange data for the boiling of liquid nitrogen from a horizontal tubular steel heater were obtained on the device. The design of the device permits studies to be performed during boiling not only of oxygen but also a number of other cryogenic liquids. The bibliography has 10 entries.

2/2

USSR

UDC 539.3

UZDALEV, A. I., SOLYANOVA, O. N.

"Bending of a Biaxial Plate by a Load Distributed Along the Contour"

V sb. Raschet prostranstv. sistem v stroit. mekh. (Calculation of Three-Dimensional Systems in Structural Mechanics -- Collection of Works), Saratov, Saratov University, 1972, pp 59-62 (from RZh-Mekhanika, No 3, Mar 73, Abstract No 3V185)

Translation: An approximate solution is given for the problem of the transverse bending of a thin doubly connected plate rigidly fastened along the circular inner contour on the basis of the small parameter method. The inner contour is a curved rectangle. The external load (generalized intersecting forces) is applied along the outer contour. The quantity characterizing the deviation of the outer contour of the plate from a circle is used as the small parameter. The results of numerical calculations are given for specific plates. G. A. Van Fo Fy.

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USSR

UDC 537.32

KITS, I. I., STADNYK, B. I., SOLYANYK, L. M., STOLYARCHUK, P. G.

"The Possibility of Using VR-10/20 Thermocouples in Corrosive Substances"

Moscow, Teplofizika Vysokikh Temperatur, Vol 11, No 1, Jan-Feb 73, pp 150-153.

Abstract: The influence of various quantities of inert gas on the thermo-
electric properties of the VR-10/20 thermocouple is experimentally studied.
Data are presented on the instability of VR-5, VR-10 and VR-20 tungsten-
rhenium thermocouples in neutral media; the influence of the inert gas flow
rate on the indications of the thermocouple is studied and the optimal value,
not influencing the indications of the thermocouple, is established as a func-
tion of temperature.

1/2   007
TITLE--STEREOCHEMISTRY OF HETEROCYCLES. IV. 2,SUBSTITUTED 5,ALKYL,1,3,DITHIANES -U-
AUTHOR-(05)-VOSTROVA, L.N., SOMCHINSKAYA, V.N., BOGATSKAYA, Z.O., MAMONTOV, V.P., DAVIDENKO, T.I.
COUNTRY OF INFO--USSR

SOURCE--KHIM. GETEROTSIKL. SOEDIN. 1970, (4), 462-5

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--STEREOCHEMISTRY, HETEROCYCLIC SULFUR COMPOUND, ORGANIC SYNTHESIS, BROMINATED ORGANIC COMPOUND

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--3006/0935

STEP NO--UR/0409/70/000/004/0462/0465

CIRC ACCESSION NO--AP0134662

CIRC ACCESSION NO--AP0134662
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT.   BY THE METHOD OF BOGATSKAYA (1962)
WERE SYNTHESIZED CH $SUB2$ BRCHRCH $SUB2$ R (R, B.P., D PRIME20, N PRIME20
SUBD, AND PERCENT YIELD GIVEN): SHOWN ON MICROFICHE.   FACILITY:
ODESS. GOS. UNIV. IM. MECHNIKOVA, ODESSA, USSR.

UNCLASSIFIED

SOMENKOV, V. A.

NEUTRON DIFFRACTION ANALYSIS OF NIOBIUM NITRIDE Nb₄N₃

In recent years, a large number of phase transitions of the order-dis-
order type have been detected in solid interstitial solutions accompanied by
the formation of MeX [1]; Me₂X [2]; Me₄X₃ [3], and other superlattices. This
fact offers the possibility of stating the problem of whether some of the in-
terstitial phases with a composition close to stoichiometric for the mentioned
superlattices are ordered deduction solid solutions on a chemical compound
base. A series of data are in favor of this point of view. For example, in
reference [3], the neutron diffraction method was used to detect a high-tem-
perature phase transition in Me₄C₃ carbides (Me — Nb, Ta), which permits con-
sideration of the lattices of these compounds as superlattices occurring from
a disordered deduction solid solution on the basis of the chemical compound
MeC with an NaCl type lattice. These superlattices have cubic symmetry and
are antisomorphic to Nb₄N. It is of interest to discover to what degree the
indicated arguments are also valid for other interstitial phases with close
stoichiometry.

In particular, Brauer and Jander [4] demonstrated by the x-ray method
for Nb₄N₃, that the metal atoms in the Nb₄N₃ form a tetragonal lattice with
c/a = 0.98. Terao [5] used electron diffraction to discover the existence
of superlattice peaks, and on the basis of analysis of the extinguishing law,
he proposed an Nb₄N₃ model. The experimental and theoretical values of the
intensity were not compared in [5]. Accordingly, the purpose of this experi-
ment was more precisely to define the lattice of Nb₄N₃ and study its
possible variation with a rise in temperature by means of neutron diffraction
— the most reliable method of localizing the light atoms in the presence of
heavy atoms.

UNCLASSIFIED   PROCESSING DATE--27NOV70

1/2   022

TITLE--STRUCTURE OF MANGANESE VANADIUM ALLOYS CLOSE TO EQUIATOMIC
  COMPOSITION, IN RELATION TO THE MAGNETIC PROPERTIES -U-

AUTHOR-(03)-KUCHIN, V.M., SOMENKOV, V.A., SHILSHTEYN, S.SH.

COUNTRY OF INFO--USSR

SOURCE--FIZIKA METALLOV I METALLOVEDENIE, FEB. 1970, 29, (2), 404-406

DATE PUBLISHED-------70

SUBJECT AREAS--MATERIALS

TOPIC TAGS--ALLOY STRUCTURE, MANGANESE ALLOY, VANADIUM ALLOY, NEUTRON
  DIFFRACTION, MAGNETIC MOMENT, ALUMINUM CONTAINING ALLOY, ORDERED ALLOY,
  MAGNETIC PROPERTY

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--3003/0349   STEP NO--UR/0126/70/029/002/0404/0406

CIRC ACCESSION NO--AP0129581
                         UNCLASSIFIED

UNCLASSIFIED   PROCESSING DATE--27NOV70

CIRC ACCESSION NO--AP0129581
ABSTRACT/EXTRACT--(U) GP-0-   ABSTRACT.   THE STRUCTURE OF MN,V AND MN,V,AL
ALLOYS WAS STUDIED BY NEUTRON DIFFRACTION AND THE RESULTS WERE
INTERPRETED IN TERMS OF THE PECULIAR MAGNETIC PROPERTIES OF THESE
MATERIALS.   SUPERSTRUCTURAL REFLECTIONS APPEARED ON THE NEUTRON
DIFFRACTION PATTERNS OF MN,V ALLOYS PREPARED FROM ALUMINOTHERMAL V,
PRESUMABLE AS A RESULT OF TRACES OF AL.   THE ADDITION OF SIMILAR TO
5PERCENT AL TO MN,V ALLOYS LED TO THE FORMATION OF AN ORDERED STRUCTURE
WITH A SPONTANEOUS MAGNETIC MOMENT, THE AL APPARENTLY STABILIZING THE
MAGNETIC PHASE.

UNCLASSIFIED

1/2   013   UNCLASSIFIED   PROCESSING DATE--11SEP70
TITLE--STRUCTURE OF TA SUB2 D -U-

AUTHOR--PETRUNIN, V.F., SOMENKOV, V.A., SHILSHTEYN, S.SH., CHERKOV, A.A.

COUNTRY OF INFO--USSR

SOURCE--KRISTALLOGRAFIYA, 1970, 15(1) 171-3

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--DEUTERIUM COMPOUND, TANTALUM COMPOUND, NEUTRON DIFFRACTION

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1936/0015   STEP NO--UR/0070/70/015/001/0171/0173

CIRC ACCESSION NO--AP0102115
                         UNCLASSIFIED

CIRC ACCESSION NO--AP0102115
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. BY MEANS OF A HIGH INTENSITY, HIGH
RESOLUTION NEUTRON DIFFRACTOMETER, POLYCRYST. TAD SUBO TIMES 53 WAS
STUDIED AT 80-400DEGREESK. ON THE NEUTRON DIFFRACTION PATTERNS, IN
ADDN. TO THE DIFFRACTION PEAKS OBSD. PREVIOUSLY BY WALLACE (CA 56:
12396G), SEVERAL WEAK REFLECTIONS ALSO WERE OBSD. ALL THE REFLECTIONS
MAY BE INDEXED IN A UNIT CELL WITH PARAMETERS A APPROXIMATELY EQUAL TO B
APPROXIMATELY EQUAL TO A SUBO ROOT BAR 2 AND C APPROXIMATELY EQUAL TO A
SUBO (A SUBO IS THE TA LATTICE PERIOD). THE WEAK HYPERFINE STRUCTURAL
REFLECTIONS ARE DESCRIBED BY THE RELATION K PLUS L EQUALS 2N. TAD SUBO
TIMES 53 BELONGS TO THE SPACE GROUP D PRIME6 OVER 2 MINUS A222; 4 TA
ATOMS ARE IN POSITION 4K AND 2 D IN 2A POSITION. THIS MODEL IS
CHARACTERIZED BY 1 PARAMETER X FOR METAL ATOMS; ITS VALUE OBTAINED BY
MINIMALIZATION OF DIVERGENCE FACTOR FOR HYPERFINE REFLECTIONS AT ROOM
TEMP. IS X EQUALS 0.012 (0.017 FOR THE TEMP. OF LIQ. N) FROM THE PERIOD
A OF THE ORTHORHOMBIC DEUTERIDE LATTICE.

1/2   024   UNCLASSIFIED   PROCESSING DATE--11SEP70
TITLE--ANTIFERROMAGNETISM OF SOME ALLOYS BASED ON GAMMA MANGANESE -U-

AUTHOR--SOMENKOV, V.A., KUCHIN, V.M.

COUNTRY OF INFO--USSR

SOURCE--FIZ. METAL. METALLOVED. 1970, 29(1) 207-9

DATE PUBLISHED-------70

SUBJECT AREAS--MATERIALS

TOPIC TAGS--MANGANESE ALLOY, ANTIFERROMAGNETIC MATERIAL, NICKEL ALLOY,
  INDUCTION FURNACE, NEUTRON DIFFRACTION, BRILLOUIN EFFECT, HELIUM, ZINC
  CONTAINING ALLOY, MAGNETIC STRUCTURE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1988/0628   STEP NO--UR/0126/70/029/001/0207/0209

CIRC ACCESSION NO--AP0105607
                      UNCLASSIFIED

CIRC ACCESSION NO--AP0105607
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE STUDY OF THE MAGNETIC
   STRUCTURE OF ANTIFERROMAGNETIC ALLOYS OF TRANSITIONS D METALS MAKES IT
   POSSIBLE TO DET. THE CONDITIONS UNDER WHICH LOCALIZED MAGNETIC MOMENTS
   CAN EXIST IN THE CRYSTALS. NEUTRON DIFFRACTION OF BINARY ALLOYS OF D
   METALS BASED ON GAMMA MN WAS USED TO BRING OUT THE EFFECT OF THE
   IMPURITIES OF THE 2ND COMPONENT ON THE PROPERTIES OF THE METALLIC
   ANTIFERROMAGNET. MN ALLOYS CONTG. 10, 15, 20, 25, AND 40 AT. PERCENT
   NI, AS WELL AS MN ALLOYS CONTG. 3.5 AND 5.6PERCENT AT. ZN AND 40, 50,
   56, AND 60 AT. PERCENT FE, WERE USED. THE ALLOYS WERE MELTED IN AN
   INDUCTION FURNACE IN A HE ATM. AND QUENCHED IN WATER TO STABILIZE THE
   GAMMA PHASE. NEUTRON DIFFRACTION SHOWED THAT ALL THE ALLOYS STUDIED
   WERE AT. DISORDERED SYSTEMS WITH GIVEN MAGNETIC ORDERING. THE PRESENCE
   OF DIFFUSION PEAKS ON THE NEUTRON DIFFRACTION PATTERNS IS ASSOCD. WITH
   THE AT. SHORT RANGE ORDER, WHICH INCREASES WITH INCREASING CONTENT OF
   THE 2ND COMPONENT. THE TEMP. DEPENDENCE OF THE INTENSITY OF THE
   MAGNETIC SUPERSTRUCTURE PEAK IS SATISFACTORILY DESCRIBED BY A BRILLOUIN
   TYPE FUNCTION. INASMUCH AS THESE ALLOYS CONSIST OF RELATIVELY SIMILAR
   (WITH REGARD TO THE STRUCTURE OF THE 3D BAND) ATOMS, THE SPIN SYSTEM CAN
   APPARENTLY BECOME ORDERED INDEPENDENTLY OF THE EXACT CONFIGURATION OF
   THE ATOMS IN THE LATTICE OF THE ALLOY. THE DETG. ROLE IN THESE
   ANTIFERROMAGNETIC ALLOYS IS PLAYED BY THE INTERACTION OF THE D ELECTRONS
   AND NOT THE S AND THE D ELECTRONS.

1/3   022
UNCLASSIFIED
TITLE--SYNTHESIS OF 1 METHYLPYRAZOLE AND 1 METHYL 2 PYRAZOLINEALDEHYDES
   AND THEIR ACETALS -U-
PROCESSING DATE--20NOV70

AUTHOR-(02)-SHAPRANOVA, N.I., SOMIN, I.N.

COUNTRY OF INFO--USSR

SOURCE--KHIM. GETEROTSIKL. SOEDIN. 1970, (3), 404-6

DATE PUBLISHED--------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--ORGANIC SYNTHESIS, PYRAZOLE, ALDEHYDE, ACETAL, IR SPECTRUM

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--3001/0212

STEP NO--UR/0409/70/000/003/0404/0406

CIRC ACCESSION NO--AP0126003
UNCLASSIFIED

CIRC ACCESSION NO--AP0126003
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. TO A SOLN. OF 2.85 G MENHNH SUB2
IN 20 ML H SUB2 O WAS ADDED 5.23 G CH SUB2:CHCOCH(OET)SUB2 AND THE MIXT.
EXTD. 12 HR WITH ETHER TO YIELD 78PERCENT I (X EQUALS (OET)SUB2) (II), B
SUB8 95-7DEGREES, N PRIME20 SUBD 1.4540.   A SOLN. OF 3.33 G II IN 18 ML
N HCL WAS KEPT 3 HR AND MADE ALK. TO YIELD 63PERCENT I (X EQUALS O), B
SUB3 70-3DEGREES, N PRIME20 SUBD 1.5410; OXIME HCL M. 162-3DEGREES (ABS.
ETOH). SIMILARLY WAS OBTAINED 64PERCENT III (X EQUALS (OET)SUB2) (IV),
B SUB18 95-8DEGREES, N PRIME20 SUBD 1.4525. IV.MET, M. 120-1DEGREES
REARRANGED ACCORDING TO B. V. JOFFE AND K. N. ZELENIN (1963) GAVE
98PERCENT ME SUB2 NCH(CH SUB2 CN)CH(OME)SUB2 B SUB4 86DEGREES, N PRIME20
SUBD 1.4430. II (5.53 G) IN 30 ML ANHYD. C SUB6 H SUB6 TREATED STEPWISE
WITH STIRRING WITH PB (OAC)SUB4 GAVE AFTER 2.5 HR 78PERCENT 4,5 DEHYDRO
ANALOG (V) CF II, B SUB3 101-4DEGREES, N PRIME20 SUBD 1.4645.
HYDROLYSIS OF V GAVE 75PERCENT 4,5 DEHYDRO ANALOG OF I (X EQUALS O), B
SUB2 72-4DEGREES, N PRIME20 SUBD 1.5132. A SOLN. OF 6.6 G 1
METHYLPYRAZOLE IN 40 ML ANHYD. ETHER WAS TREATED AT MINUS 10DEGREES WITH
5.8 G BULI IN 40 ML PETROLEUM ETHER, THE SUSPENSION STIRRED 1.5 HR AT
ROOM TEMP., 8.03 G DMF IN 10 ML ANHYD. ETHER ADDED, AND THE WHOLE
REFLUXED 1 HR, THE KEPT OVERNIGHT, TO YIELD 43PERCENT 4,5 DEHYDRO ANALOG
(VI) OF III (X EQUALS O), B SUB4 50-3DEGREES, N PRIME20 SUBD 1.5012;
OXIME HCL, M 164.5-5.5DEGREES (ETOH). VI (1.1 G) AND 1.4 G CH(OET)SUB3
IN 5 ML ANHYD. ETOH, TREATED WITH A FEW DROPS 30PERCENT HCL ETOH GAVE
AFTER 20 HR 71PERCENT 4,5 DEHYDRO ANALOG (VII) OF III (X EQUALS
(OET)SUB2), B SUB1 86-90DEGREES, N PRIME20 SUBD 1.4690.

3/3   022   UNCLASSIFIED   PROCESSING DATE--20NOV70
CIRC ACCESSION NO--AP0126003
ABSTRACT/EXTRACT--THE REACTION OF ME SUB2 NCH(CH SUB2 CN)CH(CET)SUB2 AND
  MENHNH SUB2.H SUB2 SO SUB4 (30PERCENT EXCESS) GAVE 81PERCENT MIXT., B
  SUB1 92-3DEGREES, N PRIME20 SUBD 1.4667, OF V AND VII.   SOME IR DATA ARE
  GIVEN.

UNCLASSIFIED

1/2   010   UNCLASSIFIED   PROCESSING DATE--16OCT70
TITLE--AMINO ACIDS COMPOSITION OF DIFFERENT RYE VARIETIES PREVALENT IN THE
USSR -U-
AUTHOR--SOMIN, V.I.

COUNTRY OF INFO--USSR

SOURCE--VOPROSY PITANIYA, 1970, NR 3, PP 48-54

DATE PUBLISHED--------70

SUBJECT AREAS--AGRICULTURE, BIOLOGICAL AND MEDICAL SCIENCES

TOPIC TAGS--CEREAL CROP, AMINO ACID, CHEMICAL ANALYSIS, ION EXCHANGE
CHROMATOGRAPHY, PROTEIN

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1998/0005   STEP NO--UR/0244/70/000/003/0048/0054
CIRC ACCESSION NO--AP0120705
                        UNCLASSIFIED

CIRC ACCESSION NO--AP0120705
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE AMINO ACIDS COMPOSITION OF
SUMMARY PROTEING IN 15 SPECIMENS OF RYE BELONGING TO 10 SOVIET VARIETIES
CULTIVATED IN DIFFERENT AREAS OF THE USSR WAS STUDIED BY USING ION
EXCHANGE RESINS PARTITION CHROMATOGRAPHY. NO SIGNIFICANT DISTINCTION
CORROBORATED STATISTICALLY WERE DISCLOSED, THIS ATTESTING TO THIS
ABSENCE OF ANY MARKED EFFECT OF THE RYE VARIETIES AND CONDITIONS
ATTENDING THEIR CULTIVATION ON THE AMINO ACIDS COMPOSITION THEREIN.
SMALL (LYING WITHIN THE ERROR OF THE METHOD) FLUCTUATIONS IN THE AMINO
ACIDS COMPOSITION OF SUMMARY PROTEINS IN THE RYE OF DIFFERENT VARIETIES
AND IN SPECIMENS OF A SINGLE VARIETY CULTIVATED IN DISSIMILAR CLIMATIC
AND SOIL CONDITIONS CAN, APPARENTLY, TAKE PLACE DUE TO THE COMBINED
EFFECT OF SUCH FACTORS AS A SHARP VARIATION IN THE CONTENT OF SUMMARY
PROTEINS IN THE GRAIN (IN THIS PARTICULAR CASE FROM 5.6 TO 14.4PERCENT)
AND DIVERGENCES IN THE CORRELATION OF DIVERSE TYPES OF PROTEINS
CONTAINED IN THE RYE (GLOBULINS, ALBUMINS, GLUTELINES, ETC), WHICH, AS
IS KNOWN, HAVE DIFFERENT AMINO ACIDS COMPOSITION.   FACILITY:
GRUPPA KHIMII PISHCHEVYKH PRODUKTOV INSTITUTA PITANIYA AMN SSSR, MOSCOW.

UNCLASSIFIED

1/2   010   UNCLASSIFIED   PROCESSING DATE--23OCT70
TITLE--FREE AMINO ACIDS CONTENT IN SPRING WHEAT GRAIN -U-

AUTHOR-(02)-YEKIMOVSKIY, A.P., SOMIN, V.I.

COUNTRY OF INFO--USSR

SOURCE--VOPROSY PITANIYA, 1970, NR 3, PP 58-62

DATE PUBLISHED--------70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES

TOPIC TAGS--WHEAT, AMINO ACID, CHROMATOGRAPHIC ANALYSIS

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1997/2054

STEP NO--UR/0244/70/000/003/0058/0062

CIRC ACCESSION NO--AP0120697
                    UNCLASSIFIED

2/2   010   UNCLASSIFIED   PROCESSING DATE--23OCT7(
CIRC ACCESSION NO--AP0120697
ABSTRACT/EXTRACT--(U) GP-0-   ABSTRACT. AMINO ACIDS COMPOSITION WAS
 STUDIED WITH THE AID PARTITION (COLUMN) CHROMATOGRAPHY WITH SULFONATED
 PLOYSTERENE CATION EXCHANGE RESINS, AND TOTAL FREE AMINO ACIDS WERE
 DETERMINED IN THREE SPECIMENS OF HOME GROWN SPRING WHEAT (VARIETIES:
 "MINSKAYA", "KHARKOVSKAYA 46", "GORKOVSKAYA 20") WITH A VIEW TO
 CLARIFYING THE SIGNIFICANCE, OF FREE AMINO ACIDS IN THE TOTAL AMINO ACID
 BALANCE OF RIPE WHEAT GRAIN. FREE AMINO ACIDS WERE EXTRACTED WITH
 80PERCENT ETHYL ALCOHOL, FOLLOWED BY A 3 FOLD CHLOROFORM PRECIPITATION
 OF PROTEINS. FREE AMINO ACIDS WERE FOUND TO COMPRISE ALTOGETHER AROUND
 0.03PERCEN OF AMINO ACIDS CONTAINED IN THE WHEAT GRAIN PROTEINS.
 FACILITY: INSTITUT PITANIYA AMN SSSR, MOSCOW.

UNCLASSIFIED

1/2   011   UNCLASSIFIED   PROCESSING DATE--23OCT70
TITLE--REMOVAL OF AMMONIA FROM A CITRATE BUFFER -U-

AUTHOR--SUMIN, V.I.

COUNTRY OF INFO--USSR

SOURCE--LAB. DELO 1970, (2), 116-17

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--AMMONIA, CITRIC ACID, ION EXCHANGE CHROMATOGRAPHY

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1997/0332   STEP NO--UR/9099/70/000/002/0116/0117

CIRC ACCESSION NO--AP0119309
                    UNCLASSIFIED