LOSEV, P.R. (Chelyabinsk); SENDEROV, G.K., starshiy nauchnyy sotrudnik (Chelyabinsk)

"Design and study of automatic brakes" by V.M.Kazarinov, B.L. Kavatskii. Reviewed by P.R.Losev, G.K.Senderov. Zhel.dor.transp. 44 no.7:95-96 Jl '62. (MIRA 15:8)

1. Zamestitel' nachal'nika sluzhby vagonnogo khozyaystva Yuzhno-Ural'skoy dorogi (for Losev). 2. Ural'skoye otdeleniye Vsesoyuznogo nauchno-issledovatel'skogo instituta zheleznodorozhnogo transporta Ministerstva putey soobshcheniya (for Senderov).

(Railraods--Brakes) (Automatic control)
(Kazarinov, V.M.) (Kavatskii, B.L.)

LOSEV, S.A.

AUTHOR: Losev, S.A., Engineer. 122-2-15/33

TITLE: The Determination of the Optimum Angular Shift of Milling Cutters in Gang Milling (Opredeleniye optimal'nogo ugla smeshcheniya frez pri mnogofrezernoy obrabotke)

PERIODICAL: Vestnik Mashinostroyeniya, 1958, No.2, pp. 46-50 (USSR).

ABSTRACT: Tests are reported designed to determine experimentally the best de-phasing angles of the separate milling cutters in a gang milling set-up so as to reduce the cutting torque fluctuation to a minimum. Careful tool grinding reduced the cutter eccentricity in these tests below 0.03 mm. Engineering steel (0.3% C) with a tensile strength of 48 kg/mm^2 and grey cast iron with a Brinell hardness of 130 were machined on a horizontal milling machine at depths of cut of 2-10 mm (corresponding to contact arcs of 10-45° and a range of advances per tooth between 0.05 and 0.2 mm. Most tests were carried out at cutting speeds of 15-40 m/min apart from one series of high-speed tests run at 150 m/min. No coolant was used. Strain gauges bonded to the cutter mandrel transmitted the cutting torque through a carrier wave system. The tests included gangs consisting of cylindrical, face, angle and form cutters. The relative angular positions were shown to cause large differences in tool life. An analysis is given following the realisation that fluctuations

Card1/2

122-2-15/33

The Determination of the Optimum Angular Shift of Milling Cutters in Gang Milling

in the instantaneous cross-section engaged by the gang are the main reason for uneven cutting torque. The geomtrical analysis includes the cases of form cutting by angle and radius cutters, the milling of slots with disc cutters having straight or helical teeth, surface milling with cylindrical cutters and the general case of arbitrary shape cutters. The improvement in the work of the milling machine is expressed by the improved utilisation of the power installed and by an increased efficiency (from 65 to 75%).
There are 5 figures, 1 table and 3 Russian references.

AVAILABLE: Library of Congress

Card 2/2

SOV/122-59-6-17/27

AUTHOR: Losev, S.A., Engineer

TITLE: On the Accuracy of Milling with Disc Cutters

PERIODICAL: Vestnik mashinostroyeniya, 1959, Nr 6, pp 63-64 (USSR)

ABSTRACT: The effects of the face wobble of the cutter, the axial wobble of the spindle assembly of the milling machine, the misalignment of the table feed motion and the overall stiffness of the machine on the accuracy in milling of slots and steps by disc-type milling cutters is examined analytically. A graph (Figure 2) shows the experimentally determined stiffness coefficient as a function of the cutting force. The wobble of the cutter and its mandrel were tested under load. The initial wobble of 0.03 mm increased under load to 0.06 mm. By reducing the length of the mandrel and by appropriate pre-loading of the cutter spindle roller bearings, the error of the axial dimensions could be reduced from 0.05 to 0.02 mm. In gang milling, the optimum relative phasing of the cutter teeth can substantially reduce the total cutting force (author's paper in this journal, 1958, Nr 2). The tests have shown that the misalignment of the table feed motion yields the

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SOV/122-59-6-17/27

On the Accuracy of Milling with Disc Cutters

greatest errors in the milling of deep slots. The best accuracy was achieved by lateral cutting-in. There are 3 figures.

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LOSEV, S.A., insh.

Even milling with form cutters. Vest.mash. 40 no.4:64-69
Ap '60. (MIRA 13:6)
(Metal cutting)

LOSEV, S ~~O.~~ A. Cand Tech Sci -- "Study of the optimum angle of displacement ~~angle~~ of milling cutters in multicutter machining ~~treatment~~." Len, 1961 (Min of Higher and Secondary Specialized Education RSFSR. Len Polytechnic Inst im M. I. Kalinin) (KL, 4-61, 198)

205

[redacted]

LARIN, A.P.; LOSEV, S.A.

Performance of "model 115" centrifugal pug mills. Ogneupory 27 no.8:363-364 '62. (MIRA 15:9)

1. Vsesoyuznyy institut ogneuporov.
(Mixing machinery) (Refractory materials)

LOSEV, S.A., kand.tekhn.nauk

Torsional vibrations during milling. Vest.mashinostr. 43 no.2:70-72 F '63. (MIRA 16:3)
(Metal cutting—Vibration)

LOSEV, S.A.; KOVALEV, N.M., kand. tekhn. nauk, retsenzent;
ZHURAVLEV, S.A., kand. tekhn. nauk, red.

[Multitool milling] Mnogoinstrumentnaia obrabotka frezerovaniem. Moskva, Mashinostroenie, 1965. 121 p.
(MIRA 18:5)

~~24(4)~~ 24.3950, 5.4100

66825

AUTHOR: Losev, S.A. SOV/155-58-5-33/37

TITLE: On the Absorption of Ultraviolet Radiation by Oxygen Heated up to the Temperature of Some Thousand Degrees

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 5, pp 197-200 (USSR)

ABSTRACT: The author investigates the absorption capacity of oxygen for temperatures of 2000 - 4000 degrees (generated by shock waves). The experiments in which G.M. Tekiyeva participated show that in the temperature interval 2500 - 4000 ^{0}K and for the wave length $\lambda \sim 2272$ Å the absorption capacity A (ratio of the intensities of the absorbed and of the falling light) lies about between 0.4 and 0.6 . The divergence of the results of measurement and the deviation from the theoretically calculated values is reduced to the fact that the light was not completely monochromatic. 4

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33

66825

On the Absorption of Ultraviolet Radiation by Oxygen Heated up to the Temperature of Some Thousand Degrees SOV/155-58-5-33/37

There are 2 figures, 1 table, and 15 references, 3 of which are Soviet, 6 American, 3 English, 2 German, and 1 Swiss.

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

SUBMITTED: February 21, 1958

4

Card 2/2

AUTHOR: Losev, S. A. SOV/20-120-6-35/59

TITLE: An Investigation of the Oxygen Dissociation Process Behind a Strong Shock Wave (Issledovaniye protsessa dissotsiatsii kisloroda za sil'noy udarnoy volnoy)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 120., Nr 6, pp. 1291 - 1293 (USSR)

ABSTRACT: This is an experimental investigation of the thermal dissociation rate behind a strong shock wave in oxygen. A shock tube served as source of the shock waves. This tube was described already earlier (Refs 1,2). The state of the gas behind the shock wave was measured by the degree of absorption of ultraviolet radiation by the oxygen which was heated due to the passage of the shock wave. At a certain distance from the front edge of the shock wave the temperature of the gas approaches (at $T < 4000^{\circ}K$) the temperature computed from the Hugoniot (Gyugonio) adiabatic in the case of equilibrium dissociation and in the absence of losses caused by a heat exchange and by friction. It was possible to determine the temperature distribution immediately behind the front of the shock wave from the absorption of the light.

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When the velocity of the shock wave was 2,7 - 3 km/sec and the pressure in front of the shock wave was 7,6 torr the temperature immediately behind the shock wave has a maximum. It furtheron decreases. It approaches the value computed from the Hugoniot adiabatic. The dimensions of this zone decrease when the velocity of the shock wave and the pressure are increased. If the pressure is high, no noticeable dissociation is found and the maximum of the temperature behind the shock wave is missing. The evidence obtained agrees with that advanced by other authors. From the dimensions of the non-equilibrium zone it is possible to compute the constant of the dissociation velocity of oxygen. According to the considerations presented the dissociation mainly is caused by a direct decomposition of O_2. Further tests concerning this problem are considered desirable. There are 3 figures.

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

An Investigation of the Oxygen Dissociation Process Behind a Strong Shock Wave SOV/20-120-6-35/59

PRESENTED: March 7, 1958, by V. N. Kondrat'yev, Member, Academy of Sciences, USSR

SUBMITTED: March 5, 1958

1. Oxygen--Ionization 2. Shock waves--Chemical effects 3. Gas ionization--Velocity

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05453
SOV/120-59-3-24/46

AUTHORS: Losev, S. A., and Generalov, N. A.

TITLE: Measurement of the Temperature of a Gas Behind a Shock Wave (Ob izmerenii temperatury gaza za udarnoy volnoy)

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 3, pp 108-110 (USSR)

ABSTRACT: The D lines of Na are used in emission and absorption in this work; a powerful flash lamp is used to provide the light for use in absorption. Fig 1 illustrates the system used; 1 is the shock tube, 2 is the beam of light from the flash lamp, 3 is a screen (which covers one window in the shock tube), 4 is a spectrometer, 5 are prisms, and 6 are photomultipliers. The Na flash lasts for 60-100 µsec (with a shock wave moving in Ar at 2.3 km/sec). The instruments are calibrated by means of a tungsten lamp whose brightness temperature is known; Planck's formula (p 109) is used to get T_x, the temperature of the gas, while a (the absorbing power) is derived from the measurements with the flash lamp. Fig 2 shows the records obtained from the sodium emission and from the flash lamp (sodium absorption). Fig 3 shows the measured temperature (top points) and absorbing

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05453
SOV/120-59-3-24/46

Measurement of the Temperature of a Gas Behind a Shock Wave

power (bottom points) as functions of distance fr.m the shock-wave front. (The broken line is that predic..d by the Guigonio adiabatic.) The methoa is usable up to 5000°K or so; it gives results accurate to about 200°K. There are 3 figures, and 2 references of which 1 is Soviet and 1 English.

ASSOCIATION: Fizicheskiy ' ıl'tet MGU (Physics Dept. of the Moscow State Uni\ .ty)

SUBMITTED: February 24, .

Card 2/2

SOV/120-59-5-45/46

AUTHORS: Losev, S.A. and Generalov, N.A. (Abstractors)

TITLE: Correction to the Paper "On Measuring the Gas Temperature Behind a Shock Wave"

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 5, p 150 (USSR)

ABSTRACT: Correction to the above paper published in the 1959, Nr 3 issue of this journal, p 108.

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69278
S/051/60/008/04/025/032
E201/E691

AUTHORS: Losev, S.A., Generalov, N.A. and Terebenina, L.B.

TITLE: On the Absorption of Ultraviolet Radiation Behind a Shock Wave in Air

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 4, pp 569-571 (USSR)

ABSTRACT: The absorptive power (in the ultraviolet region) of hot air behind the front of an incident shock wave was measured using a shock tube. The low-pressure chamber of the tube was filled with air at a pressure of 7.6-76 mm Hg. The high-pressure chamber was filled with hydrogen at a pressure of 12-80 atm. The shock-wave velocities varied from 2 to 3.5 km/sec and the gas temperature behind the shock-wave front was 2000-3300°C. The ultraviolet radiation was emitted in pulses by a DKSSh-1000 lamp; it passed through the shock tube and was recorded by a quartz monochromator with a Cornu prism and a photomultiplier FEU-18 coupled to an oscilloscope OK-17 M (a typical oscillogram is shown in Fig 1). The optical path inside the shock tube was 5 cm. The absorptive power of air behind the shock-wave front was measured at wavelengths of 2250-3400 Å. Control tests showed that ultraviolet emission by hot air and its impurities was not recorded by the photomultiplier. Scattered light was allowed for in calculations of the

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69278

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E201/E691

On the Absorption of Ultraviolet Radiation Behind a Shock Wave in Air

absorptive power; it accounted for 5-15% of the signal at short wavelengths and for about 5% of the signal at long wavelengths. The results (Fig 2) show that the absorptive power rises from ~0.05 at ~3400 Å to ~0.55 at ~2300 Å. In the 2800-3200 Å region absorption maxima can be seen. The absorptive power was found to rise with increase of pressure and temperature, particularly at longer wavelengths. As before (Refs 1-3), the absorption was due to oxygen and nitrogen oxide bands. There are 2 figures and 6 references, 2 of which are Soviet and 4 English.

SUBMITTED: August 4, 1959

Card 2/2

86276

S/188/60/000/005/005/010
B019/B056

11.5100

AUTHOR: Losev, S. A.

TITLE: The Equilibrium State of the Gas Behind a Shock Wave in Oxygen, Nitrogen and Their Mixtures With Xenon

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 3, fizika, astronomiya, 1960, No. 5, pp. 47 - 52

TEXT: The thermodynamic parameters behind a plane shock wave in O_2, N_2, and their mixtures with Xe are calculated under the assumption of an instantaneous establishment of equilibrium. The author gives the laws of conservation of mass, momentum, and energy, assumes an ideal mixture, the validity of the Dalton law, takes the law of mass action and the condition for the conservation of the number of atoms of one kind into account. These equations represent a system which is analytically practically insolvable. Therefore, the calculations were carried out on a high-speed computer for $T_0 = 293^{\circ}K$ at pressures of 0.1, 0.01, and 0.001 atm. The temperature, the pressure, the density, the rate of flow,

Card 1/2

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R000930610001-1"

The Equilibrium State of the Gas Behind a Shock Wave in Oxygen, Nitrogen and Their Mixtures With Xenon

86276
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B019/B056

the concentration of the dissociated gas component at M = 8 - 18 in O_2-Xe mixtures were calculated. The gram atom conditions of the mixtures were 0, 0.2, 0.5, and 1.5 (0 corresponds to pure oxygen and/or nitrogen). It was found that the addition of xenon to oxygen or nitrogen leads to a noticeable rise of temperature and to an increase of the degree of dissociation of the basic gas. The author thanks N. P. Trifonov, G. S. Roslyakov, and Ye. A. Zhogolev. There are 2 figures, 2 tables, and 4 references: 2 Soviet and 2 US.

X

ASSOCIATION: Kafedra molekulyarnoy fiziki (Department of Molecular Physics)

SUBMITTED: February 24, 1960

Card 2/2

82523

11.3000
5.4130

S/020/60/133/04/26/031
B004/B056

AUTHORS: Losev, S. A., Generalov, N. A.

TITLE: The Nonequilibrium State Behind a Shock Wave in Air

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 4, pp. 872 - 874

TEXT: The authors carried out their experiments by means of a shock tube, the high-pressure chamber of which was filled with hydrogen (40 - 130 atm), and the low-pressure chamber with air (4.4 - 7.6 torr). The velocity of the shock wave was measured by means of ionization pickups, and amounted to between 2.4 and 3.7 km/sec. In a previous paper (Ref. 2), the authors had proved that the air behind the shock wave shows considerable absorption of ultraviolet light. This property was utilized for studying the state of the air behind the shock wave. The distribution of the absorbability of air for 10 to 2200 Å was investigated. The oscillogram in Fig. 1 shows that immediately behind the shock wave considerable absorption occurs, which decreases at a further distance from the shock wave and then remains constant. In order to find out by what component

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The Nonequilibrium State Behind a Shock Wave in Air

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of the air this absorption is caused, experiments were carried out with N_2, O_2, and 21% O_2 - 79% Ar. The absorption observed at 2200 Å could be ascribed to O_2 molecules. It is caused by transitions from the excited vibrational level $X^3\Sigma_g^-$ to the level $B^3\Sigma_u^-$, and depends on the O_2 concentration. The dissociation region of O_2 is characterized by the distance $l_{0.5}$ from the front of the shock wave, in which absorbability drops to 0.5. The experimentally determined connection between $l_{0.5}$ and temperature is represented in Fig. 2. $l_{0.5}$ decreases with rising temperature. The authors discussed the reactions which may cause a change of the O_2 concentration in the air, and write down the following reaction equations: $O_2 + O_2 \rightarrow 2O + O_2$ (I); $O_2 + O \rightarrow 3O + O$ (II); $O_2 + N_2 \rightarrow 2O + N_2$ (III); $O_2 + N \rightarrow 2O + NO$ (IV). For the purpose of judging the influence exerted by nitrogen, the dissociation rate of O_2 in pure oxygen (equations I, II)

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The Nonequilibrium State Behind a Shock Wave in Air

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was compared with that in air (equations III, IV). At equal partial pressure, the dissociation rate of O_2 in air is greater than in pure oxygen. As shown in Fig. 2, the nonequilibrium zone of O_2 dissociation in air is broader than in oxygen. The total dissociation rate of O_2 in air at 3500 °K is $3 \cdot 10^8$, and at 4000 °K it is $1 \cdot 10^9$ $(\text{mole/cm}^3)^{-1} \cdot \text{sec}^{-1}$. There are 2 figures and 8 references: 3 Soviet and 5 American.

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

PRESENTED: March 17, 1960 by V. N. Kondrat'yev, Academician

SUBMITTED: March 15, 1960

Card 3/3

28370
S/124/61/000/008/011/042
A001/A101

24.4300
26.2112

AUTHORS: Generalov, N.A., Losev, S.A.

TITLE: Investigating non-equilibrium phenomena behind the shock wave front in air

PERIODICAL: Referativnyy zhurnal. Mekhanika, no. 8, 1961, 13, abstract 8B79 ("Zh. prikl. mekhan. i tekhn. fiz.", 1960, no. 2, 64 - 73)

TEXT: The authors studied the establishement of equilibrium behind the shock wave front in air. Shock waves were produced in a shock tube. The high-pressure chamber was 1 m long, and the low-pressure chamber 3.5 m long. The inner diameter of the tube was 5 cm. The tube working section with windows was placed at a distance of 2.5 m from the diaphragm separating the chambers of high and low pressure. Hydrogen under 40-130 atm pressure served as the working gas. The speed of the shock wave was measured by means of ionization sensors located in the working section at 10.7 cm distance from each other. The state of air behind the shock wave discontinuity was investigated by measuring the absorption of the ultraviolet radiation passing beam $\lambda = 2200$ A within the range $\Delta\lambda = 10$ A. At temperatures 2500-4000°C which were obtained in experiments, this radiation

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28370

Investigating non-equilibrium phenomena ... S/124/61/000/008/011/042 A001/A101

was absorbed mainly by molecular oxygen (Schumann-Runge bands). Absolute measurements of absorbing ability at various temperatures were carried out by measuring light attenuation in the equilibrium zone behind the shock wave front, whose temperature was calculated from the front velocity by means of the impact adiabatic curve. A xenon tube was served as a source of ultraviolet radiation with continuous spectrum. The width of the beam was 0.5 mm, its height was 5 mm. The light passing through the tube working section was recorded with a photomultiplier. The signal was supplied to an oscillograph. Resolution in time was 0.2 μ/sec. The authors present oscillograms of absorption distribution behind the shock wave front at the air initial pressure 0.01 atm and velocities of the front 2.43, 2.97 and 3.29 km/sec. Absorption increases immediately behind the shock wave discontinuity on account of air heating there, and then decreases tending to a constant value in correspondence with the temperature drop in the non-equilibrium zone in which oxygen dissociation proceeds. The non-equilibrium zone is characterized by absorption reducing by half from the maximum value behind the shock wave discontinuity to a value corresponding to establishment of equilibrium; the size of this zone is $\sim$1.3 cm at the velocity of the front D = 2.8 km/sec and 0.5 cm at D = 3.7 km/sec (at atmospheric pressure behind the wave). The experimental values of the thickness of the non-equilibri-

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A001/A101

Investigating non-equilibrium phenomena ...

um zone agree satisfactorily with calculations of the other authors (Duff R.E., Davidson, H., J. Chem. Phys., 1959, v. 31, no. 4, 1018-1027). Analogous experiments were conducted in pure oxygen in order to estimate the effect of nitrogen on oxygen dissociation. It turned out that effectiveness of O_2-N_2 collisions for oxygen dissociation is less than effectiveness of O_2 - O_2 collisions.

Yu. R.

[Abstracter's note: Complete translation]

Card 3/3

S/053/61/074/003/001/002
B102/B209

AUTHORS: Losev, S. A., Osipov, A. I.

TITLE: Study of non-equilibrium effects in shock waves

PERIODICAL: Uspekhi fizicheskikh nauk, v. 74, no. 3, 1961, 393-434

TEXT: The propagation of intense shock waves in a gas is entailed by rather essential phase conversions leading to a violation of statistical equilibrium. The present paper deals with such problems. The authors give a synoptic discussion on the most important techniques and results of theoretical and experimental studies concerning the individual relaxation processes in shock waves. The introductory sections present a theoretical consideration of balancing with respect to the individual degrees of freedom. These considerations are based on the kinetic theory of gases (Maxwellian distribution, balancing with respect to the vibrational degrees of freedom, theory of vibrational relaxation; balancing with respect to the rotational degrees of freedom, theory of rotational relaxation; balanced dissociation (thermal); balanced ionization). In the following (sections 4, 5) the authors discuss the experimental results of the study of the

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gaseous phase in shock waves. These investigations are performed by means of shock tubes, discharge chambers, pulsed and other devices. The authors are particularly concerned with operation and techniques of shock tubes since they make it possible to obtain the maximum of results concerning high-temperature relaxation kinetics on most simple conditions. Only endothermal processes in gases are discussed. The data are taken almost exclusively from western publications. In particular, the authors discuss the following techniques by means of shock tubes: Measurement of gas density according to Ref. 69 (§§ 4, 5) by means of a schlieren method and its photographic and photoelectric varieties, by means of an interferometer, determination of gas density from electron beam scattering (this method is used at low pressures), and according to the absorption of soft X radiation; measurement of the gas component concentration (behind shock wave) from the analysis of the absorption spectrum; measurement of the radiative intensity, determination of the spectral and time characteristics of emission, study of the process behind the wave front; measurement of gas temperature (behind the front) by gaging the natural radiation of the gas, by gaging the light source according to its temperature; measurement of the electron concentration according to the Langmuir probe method, according to the shift and broadening of the spectral line contour due to the Stark effect, according to the displacement of the magnetic field lines, and, finally, by means of the method of microradiowaves (determination of the shf absorption); measurement of pressure utilizing the piezo-effect according to S. G. Zaytsev (piezoelectric transmitter with $BaTiO_3$ ceramics). Measurement of the flow velocity by means of a Tepler device and other methods. In the last section of the article, the results are summarized, discussed, and compared, partly in the form of tables. Mention is made of R. I. Soloukhin, Ya. B. Zel'dovich, Yu. P. Rayzer, A. S. Kompaneyets, L. D. Landau, E. Teller, A. A. Brandt, R. Kh. Kurtmulayev, T. V. Bazhenova, Yu. S. Lobastov, N. A. Generalov, and S. S. Semenov as well as the Institut mekhaniki AN SSSR (Institute of Mechanics of the USSR). There are 12 figures, 7 tables, and 191 references: 67 Soviet-bloc and 114 non-Soviet-bloc. The three most important references to English-language publications read as follows: R. N. Schwartz, K. F. Herzfeld, J. Chem. Phys. 22, 767 (1954); E. Resler, S. C. Lin, A. Kantrowitz, J. Appl. Phys. 23, 1390, (1952); D. R. White, J. Fluid Mech., 4, 585 (1958).

32306
S/020/61/141/004/012/019
B101/B110

26.1130
26.2114

AUTHOR: Losev, S. A.

TITLE: Dissociation rate of oxygen molecules at high temperatures

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 4, 1961, 894 - 896

TEXT: A partial problem of the interaction of molecules is dealt with. This interaction arising at high temperatures, especially behind a shock wave, leads to dissociation of molecules. The dissociation rate of O_2 molecules was measured at $7000^{\circ}K$. The method has already been described by the author (Ref. 2: DAN, 120, no. 6, 1291 (1958)); the shock tube employed had been described in: N. A. Generalov, S. A. Losev, Prikl. mekh. i tekhn. fiz., no. 2, 64 (1960). The distribution of absorptive power A of O_2 behind the front of the shock wave was measured. In the spectral range chosen (λ = 2275 Å) light is only absorbed by vibrational, excited O_2 molecules ($\nu'' \sim 4.5$). Therefore, the occurrence of absorption corresponds to the excitation of initial levels; decrease of absorption corresponds to
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Dissociation ra'.. of oxygen molecules... B101/B110

dissociation. The first measurements were conducted at $T < 3000 - 4000^{\circ}K$; they yielded a dependence $A(T, n_{O_2})$. The values obtained were extrapolated to higher temperatures according to the Boltzmann distribution law. It was found: $A = n_{O_2}\varphi(T)$ (1), where $\varphi(T)$ is the temperature dependence found. According to the law of conservation of energy, the following equation holds: $n_{O_2} = p\left\{(D/2kT) + 5/2 - (mV^2/4kT)\left[1 - (\varrho_0/\varrho)^2\right]\right\}/\left\{D/2 + 5kT/2 + (mV^2/4)\left[1 - (\varrho_0/\varrho)^2 - h(T)\right\}\right.$ (2). D = dissociation energy; k = Boltzmann constant, m = mass of O_2 molecules, h(T) = enthalpy of O_2 molecules, V = velocity of wave; p = pressure of gas, ϱ = density of gas behind the wave front, and ϱ_0 = density before the wave front. Since the terms in brackets < 0.015, mean values were set for ϱ_0/ϱ. Thus, the relationship between T, V, and A, as well as the distribution of T behind the wave front in the zone of dissociation, were obtained from Eqs. (1) and (2). For molar parts $\xi_{O_2} = n_{O_2}(kT/p)$, the following is written:
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32306

$d\xi_{O_2}/dt = -(1 + \xi_{O_2})(p/kT)\left[K_d(O_2, O_2)\xi^2_{O_2} + K_d(O_2, O)\xi_{O_2}(1 - \xi_{O_2})\right]$ (3).

Here, $K_d(O_2, O_2)$ and $K_d(O_2, O)$ are the constants of the dissociation rate of O_2 molecules in $O_2 - O_2$ and $O_2 - O$ collisions, respectively. For $K_d(O_2, O)$, data were taken from Refs. 4 and 5 (see below). The values calculated which widely stray due to measuring errors are represented in Fig. 2. Proceeding from the Arrhenius equation $K_d = PZ\exp\{-(D/kT)\}$, the following is derived: $K_d(O_2, O_2) = 2\cdot 10^{-2}(D/kT)^3 Z\exp\{-(D/kT)\}$ (4), where Z is the number of collisions of a molecule per unit volume per sec. On the basis of literature data of P values for O_2 - Ar and $O_2 - O_2$ collisions, and according to their own experimental data, the authors found that $\alpha = P(O_2,O_2)/P(O_2,Ar)$ strongly decreases with rising temperature. α is approximately equal to 30 - 40 at 2500°K, $\alpha \sim 5 - 10$ at 7000°K. According to Ye. Ye. Nikitin (DAN, 132, no. 2, 395 (1960)), taking account of the

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transfer of rotational energy in $O_2 - O_2$ collisions yields $\alpha \sim 20$ independent of temperature. For this reason, further studies are necessary. N. A. Generalov is thanked for cooperation. There are 3 figures and 9 references: 6 Soviet and 3 non-Soviet. The references to English-language publications read as follows: Ref. 4: M. Camac, A. Vaughan, J. Chem. Phys., 34, no. 2, 460 (1961); Ref. 5: S. R. Bayron, J. Chem. Phys., 30, no. 6, 1380 (1959); Ref. 8: D. Matthews, Phys. Fluids, 2, no. 2, 170 (1959).

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

PRESENTED: June 28, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: June 22, 1961

Legend to Fig. 1: (1) Distribution of absorptive power A; (2) distribution of temperature; (3) distribution of concentration ξ_{O_2} of molecular O_2 (molar part of O_2) behind the front of a shock wave which propagates in O_2 at a

32306
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B101/B110

velocity of 4.1 km/sec. $\bar{T}$, $\bar{\xi}$ are equilibrium values for temperature and concentration, respectively; ξ is the position of the shock wave. Pressure 0.11 atm. Laboratory time.

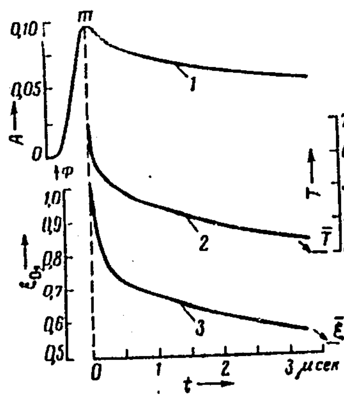

Fig. 1

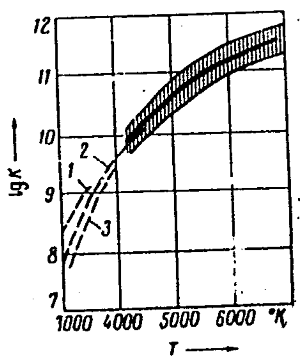

Fig. 2

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Dissociation rate of oxygen molecules... B101/B110

Fig. 2. log K of the constant of dissociation rate of O_2 (dimension of K: cm^3/mole·sec). Dashed lines: (1) according to Ref. 2; (2) according to Ref. 8; (3) according to Ref. 5.

X

Card 6/6

32315
S/020/61/141/005/007/018
B104/B102

11.1105
26.2114

AUTHORS: Losev, S. A., and Generalov, N. A.

TITLE: Investigation of vibrational excitation and decay of oxygen molecules at high temperatures

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 5, 1961, 1072-1075

TEXT: Molecules may decay as a result of very heavy collisions, without vibrational excitation. It may be assumed that with increasing temperatures τ_{dis} and τ_{col} approach each other. In this case $\tau_{dis} \gg \tau_{col}$. τ_{col} is the duration of a collision, τ_{dis} the time required for a dissociation. This approach is explanatory for the change occurring in processes as a result of molecular collisions. In studying shock waves, the region behind the wave front is usually divided into separate "zones" of vibrational excitation, and dissociation is usually neglected. By considering dissociation the gaseous state is essentially changed. Basing on experiments of the authors, the separation of the effects referred to is studied at temperatures of $T \leq 7000-8000^{\circ}C$. According to W. H. Dorrance (J. Aero-

Card 1/4

Space Sci., 28, no. 1, 43 (1961)) for oxygen the relation $\tau_{dis} \sim \tau_{col}$ is reached already at 6500°K. According to M. Camac and A. Vaughan (J. Chem. Phys., 34, no. 2, 460 (1961)), $\tau_{dis} \sim \tau_{col}$ is reached in a mixture of 21.5% O_2 and 78.5% Ar at $T \sim 8000$°K. The authors assume that an O_2 molecule decays only by transition from the κ-th "effective" level differing from the limit of dissociation of the molecule by γkT (γ is a constant parameter). Hence, the transition probability in a continuous spectrum will be unity for this level only, and zero for all others. Values for τ_{col} up to $T \sim 10{,}000$°K are obtained from the equation $dE_k/dt = (E(T) - E_k)/\tau_{col}$, where E(T) denotes the vibrational energy equilibrium per unit mass of gas at the temperature T, E_k the vibrational energy per unit mass behind the front of the shock wave. On the basis of these τ_{col} values, the mean time between two collisions is obtained as a function of an adiabatic factor $\omega\tau_{st}$ (τ_{st} is the duration of one collision, ω the cyclic frequency of vibrations). It is shown that the decay of a molecule is determined by the population N_k of the k-th level. The exact value of N_k can be

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S/020/61/141/005/007/019
B104/B102

determined from complex kinetic equations (Ye. Ye. Nikitin, ZhFKh, 33, no. 3, 572 (1959); Ye. V. Stupochenko et al., ZhFKh, no. 7, 1526 (1959)) valid behind the shock wave. Using the equation

$$\frac{dn_{O_2}}{dt} = -K'(T)n_{O_2}^2 - K''(T)n_{O_2}n_O \quad (5)$$

the distribution of the gasdynamical and thermodynamical characteristics behind the front of the shock wave with simultaneously existing vibrations and molecular decay can be determined from the equation (1), from the momentum and mass equations, from the equations of energy conservation, and from the equation of state. n_O is the number of oxygen molecules per unit volume, $K'(T)$ and $K''(T)$ are the constants of the decay rates for $O_2 - O_2$ and $O_2 - O$ vibrations, respectively. For constant pressure behind the shock wave, the population N_i of the vibrational levels of the O_2 molecule was numerically determined by the Runge-Kutta method for a shock wave propagation rate of 4 km/sec. The difference between $N_{i(exp)}$ and $N_{i(comp)}$ $(N_{i(exp)} \gtrsim N_{i(comp)})$ is attributed to deviations from the Boltzmann distribution at these ...

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S/020/61/141/005/007/018
B104/B102

Investigation of vibrational ...

It is concluded that the "zones" of vibrational relaxation and of dissociation are not yet superposed at T $\leq$ 7000-8000°C. The authors thank Ye. V. Stupochenko and A. I. Osipov for advice, and discussions. There are 3 figures and 15 references: 8 Soviet and 7 non-Soviet. The three most recent references to English-language publications read as follows: W. H. Dorrance, J. Aero-Space Sci., 28, no. 1, 43 (1961); M. Camac, A Vaughan, J. Chem. Phys., 34, no. 2, 460 (1961); S. T. Vanderlice; E. A. Mason, W. G. Maish, J. Chem. Phys., 32, no. 2, 515 (1960).

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

PRESENTED: June 28, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: June 22, 1961

Card 4/4

S/207/63/000/001/025/028
E032/E114

AUTHORS: Generalov, N.A., and Losev, S.A. (Moscow)

TITLE: Vibrational relaxation and molecular interaction in oxygen at high temperatures

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no.1, 1963, 145-150

TEXT: This is a continuation of previous work (N.A.Generalov, Vestn. Mosk. un-ta, no.2, 1962, 51) in which an account was given of measurements of vibrational relaxation times in oxygen. It is now emphasised that the presence of impurities in the gas under consideration greatly affects the measured relaxation time. The results reported by V. Blackman (Vibrational relaxation in oxygen and nitrogen, J.Fluid Mech., v.1, no.1, 1956, 61) are said to be subject to this source of error. The experimental results reported earlier for carefully purified oxygen at temperatures between 1200 and 6600 °K, which were obtained by absorption spectroscopy of the region behind the shock wave, are now interpreted in terms of the relaxation theory of L.D. Landau and E. Teller (Physik Z. Sow., v.10, 1936, 34). Comparison of the experimental results with

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this theory shows that the effective spherically symmetric potential representing the $O_2 - O_2$ interaction is:

$$U = 20\ 300 \exp(-3.97\ r)\ \text{eV} \qquad (7)$$

which holds in the range $0.66 \leqslant E \leqslant 2.25$ eV and $2.28 \leqslant r \leqslant 2.60$ Å, where E is the kinetic energy of the colliding molecules. This result is thought to be consistent with viscosity measurements at low energies. The above expression for the interaction potential may be used to calculate all the transport coefficients and the gas kinetic cross-section for collisions in molecular oxygen at temperatures between 7600 °C and 2600 °C. On the other hand, the good agreement with viscosity results below 1300 °K may indicate that interpolation to the region between 1300 °C and 7600 °C may also yield satisfactory results. It is noted that J.C. McCoubrey, R.C. Milward and A.R. Ubbelohde (Transition probabilities for the transfer of vibrational energy, Trans. Farad. Soc. v.57, part 9, 1961, 1472) evaluated the constants in the interaction potential but their result is too high because they did not take into account the effect of the

orientation of the colliding molecules on the relaxation time and the appreciable effect of attractive forces. Moreover, they made use of Blackman's experimental data which are too high owing to the presence of impurities.
There are 5 figures.

ASSOCIATION: Moskovskiy universitet
(Moscow University)

SUBMITTED: July 2, 1962

L 13092-63 BDS/EWT(1) AFFTC/ASD
ACCESSION NR: AP3003406 S/0051/63/015/001/0027/0030

AUTHOR: Generalov, N.A.; Losev, S.A.; Maksimenko, V.A.

52

TITLE: Absorption of ultraviolet radiation by highly heated carbon dioxide

SOURCE: Optika i spektroskopiya, v.15, no.1, 1963, 27-30

TOPIC TAGS: ultraviolet absorption, carbon dioxide, shock wave heating

ABSTRACT: The authors employed a procedure developed by them earlier (Nauch. dokl. vyssh. shkoly*, Fiz.-mat.nauki, No.5, 197, 1958 and Optika i spektroskopiya, Sbornik 2, p.15, 1963) to study absorption of ultraviolet by carbon dioxide heated up to about 6300°K by shock waves. The shock waves produced by release of hydrogen and helium at 15 to 100 atmospheres were propagated in a 50 mm diameter shock wave tube plated on the inside with chromium. The initial pressure of the carbon dioxide varied from 0.76 to 13.5 mm Hg. An oscillographic technique was employed. The radiation source was a pulse operated DKSSh-1000 xenon discharge tube; the wavelength dependence of the absorption was studied in the range from 2170 to 3550 Angstrom. The velocity of the shock wave at 3 meters from the diaphragm separating the high and low pressure sections ranged from 1.5 to 4.25 km/sec. Plots for the

L 13092-63
ACCESSION NR: AP3003406

absorption as a function of wavelength, gas temperature versus velocity and absorption cross section versus temperature are reproduced. It is found that Beer's law is obeyed. The question of dissociation of carbon dioxide molecules at high temperatures will be considered in a separate paper. Orig.art.has: 4 figures.

ASSOCIATION: none

SUBMITTED: 3Dec62 DATE ACQ: 30Jul63 ENCL: 00

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

Card 2/2

GENERALOV, N.A.; LOSEV, S.A.

Probability of impact generation of vibrations of two-atomic molecules. Izv. AN SSSR. Ser. fiz. 27 no.8:1110-1112 Ag '63. (MIRA 16:10)

1. Kafedra molekulyarnoy fi[illegible] Fizicheskogo fakul'teta Moskovskogo gosudarstvennogo universiteta im. M.V.Lomonosova.

45169
S/020/63/148/003/013/037
B125/B102

5.2440

AUTHORS: Generalov, N. A., Losev, S. A.

TITLE: Determination of intermolecular interaction forces from results of investigating vibration relaxation in oxygen

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 3, 1963, 552-554

TEXT: The effective potential U of the $O_2 - O_2$ interaction forces is calculated from the results of a series of measurements of the vibration relaxation time τ. The measurements were made at 1200 to 6600°K using the methods of S.A. Losev and N.A. Generalov (DAN, 141, no. 5, 1072 (1961)) and N.A. Generalov (Vestn. Mosk. univ., no. 2, 51, (1962)). The relation for τ in the model comprising two diatomic molecules reads

$$\tau = \frac{\sqrt{3}}{64\pi^3}\left(\frac{L}{r_c}\right)\frac{h\chi^3}{p\chi^2}\,\frac{\exp\left\{3\chi - \frac{\Delta E}{2kT} - \frac{3L^2\alpha}{8r_c} - \frac{4}{\pi}\sqrt{\frac{\chi}{T}\,\frac{\varepsilon}{k}}\right\}}{[1-\exp(-\Delta E/kT)]} \qquad (1).$$

L is the internuclear distance in the molecule, r_c the distance between

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the centers of mass of the molecules, p the pressure of the gas, μ the reduced mass of the colliding molecules, α characterizes the interaction between the atoms of different colliding molecules, and $\chi = \left[(2\pi^4\mu\delta E^2)/(\alpha^2 h^2 kT)\right]^{1/3}$. The center of repulsive forces with a potential of $V = V_0\exp(-\alpha R)$ is at the center of the atoms and the center of the attractive forces at that of the molecules. Rearranging (1) and taking logs yields an expression of the type $\psi\left[\alpha, r_c, T, \tau(T)\right] = (c/\alpha^{2/3})T^{-1/3}$. c is a molecular constant. With the method of least squares one obtains $\psi = 233.2T^{-1/3} - 1.88$. Relation (1) is assumed to be valid when its right-hand side is multiplied by an accuracy factor A. A is the section on the ψ-axis in a $\psi(T^{-1/3})$ graph cut off by the straight line $\psi - \ln A = (c/\alpha^{2/3})T^{-1/3}$. For A one obtains 0.154 ± 0.031. Hence $\alpha_M = 3.97 \pm 0.07$ Å^{-1}, and $U_0 = 20{,}300$ ev. The effective potential thus obtained is $U = 20{,}300\exp(-3.97r)$ ev; it holds for intermolecular distances of $2.28 \leqslant r \leqslant 2.60$ Å. There are 2 figures.

Card 2/3

Determination of intermolecular ... S/020/63/146/003/013/037
B125/B102

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

PRESENTED: July 2, 1962, by V.N. Kondrat'yev, Academician

SUBMITTED: June 12, 1962

Card 3/3

L 12415-63 EPR/EPA(b)/EPF(c)/EWP(q)/EWT(m)/BDS AFFTC/ASD Ps-4/Pd-4/Pr-4
RM/WW/JD/JW

ACCESSION NR: AP3001409 S/0020/63/150/004/0839/0841

76
74

AUTHOR: Losev, S. A.; Generalov, N. A.; Maksimenko, V. A.

TITLE: The investigation of the decomposition of carbon dioxide molecules at high temperatures

21

SOURCE: AN SSSR. Doklady, v. 150, no. 4, 1963, 839-841

TOPIC TAGS: decomposition of carbon dioxide

ABSTRACT: The distribution of absorptive capabilities of heated CO sub 2 which is distributed in the tube behind the shock wave, has been measured. The absorption was studied in the ultraviolet region with Lambda = 2380 angstrom and Lambda = 3000 angstrom. It was assumed that the excitation of the oscillations of the CO sub 2 molecules takes place much more rapidly than the decomposition, since the increase of absorption in front of the shock wave is associated with the excitation of CO sub 2 molecule oscillations, and the decrease of absorption is associated with the decomposition of CO sub 2. The obtained relationship of speed of decomposition of the CO sub 2 molecules points to the fact that the decomposition of CO sub 2 molecules takes place by means of a bimolecular

L 12415-63
ACCESSION NR: AP3001409

2

reaction. It is important to note that the measured results of decomposition speed of CO_2 studied at two different wave lengths also coincide. "The authors express deep appreciation to O. H. Vinogradova for the chromatographic purification of the CO_2 used in our study." The orig. art. has: 3 graphs and 1 figure.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 09Jan63 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 003 OTHER: 005

Card 2/2

ACCESSION NR: AP4040947 S/0020/64/156/005/1057/1060

AUTHOR: Generalov, N. A.; Losev, S. A.; Osipov, A. I.

TITLE: Vibrational energy relaxation of air molecules behind the front of a straight shock wave

SOURCE: AN SSSR. Doklady*, v. 156, no. 5, 1964, 1057-1060

TOPIC TAGS: vibrational relaxation, vibrational energy, shock wave, vibrational relaxation time, vibrational energy exchange

ABSTRACT: The vibrational relaxation of air molecules behind a shock wave front is considered. By calculating the distribution of vibrational energy of molecules behind the shock front in the air with and without the effect of exchange taken into account, conditions are determined under which the exchange of vibrational energy between molecules of a binary mixture of diatomic gases O_2 and N_2 is substantial. The equations are established describing the variation of vibrational energy of single components of a binary gas mixture due to the transitional energy into vibrational energy of one component and to the

ACCESSION NR: AP4040947

process of vibrational-energy exchange between molecules. The results of calculation made on a computer for shock wave velocities with M = 5, 9, and 20 are given in graphs and discussed. It is shown that the relative effect of the exchange decreases with an increase in shock wave velocity. Orig. art. has: 3 figures and 4 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 12Dec63 ATD PRESS: 3055 ENCL: 00

SUB CODE: ME NO REF SOV: 002 OTHER: 002

Card 2/2

STUPOCHENKO, Yevgeniy Vladimirovich; LOSEV, Staliy Andreyevich; OSIPOV, Aleksey Iosifovich; SAMUYLOV, Ye.V., red.

[Relaxation processes in shock waves] Relaksatsionnye protsessy v udarnykh volnakh. Moskva, Nauka, 1965. 484 p. (MIRA 19:1)

L 25719-66 EWT(1)/EWP(m)/EWT(m)/EWA(d)/EWP(t)/EWA(h) IJP(c) JD/WW

ACC NR: AP6002284 SOURCE CODE: UR/0188/65/000/006/0029/0036

AUTHOR: Generalov, N. A.; Losev, S. A.; Kosynkin, V. D.; Ovechkin, V. Ya.

ORG: Department of Molecular Physics, Moscow State University (Kafedra molekulyarnoy fiziki Moskovskogo universiteta)

TITLE: Investigation of the state of iodine molecules behind the front of a shock wave

SOURCE: Moscow. Universitet. Vestnik. Seriya III. Fizika, astronomiya, no. 6, 1965, 29-36

TOPIC TAGS: iodine, shock wave, shock tube, shock wave front, temperature dependence, absorption coefficient

ABSTRACT: This paper represents the first step in the investigation of phenomena which take place in iodine at temperatures exceeding considerably Θ_0. The experiments were conducted with a stainless steel shock tube. The experimental installation consists of a shock tube, a system for filling the tube with iodine, a system for measuring absorption and velocity of the shock wave front, a system for heating the shock tube, an evacuation system, and a system for measuring the shock tube wall temperature. The shock tube consists of a 1 meter long high pressure chamber, 50 mm in diameter, and a stainless steel low pressure chamber, 50 mm in diameter and 300 cm in length. For the evacuation of the low pressure chamber a VN-1 pump is used. Iodine vapors are removed by means of glass traps, filled with liquid nitrogen. The vacuum in the low pressure chamber reached 2×10^{-2} mm Hg in 10-15 minutes. The evacuation stages were controlled with a VIT-1 vacuum meter. A potentiometer of the PPTV-1 type was used to measure the electro-motive forces of the thermocouples. A sensitive

Card 1/2 UDC: 539.193: 546.15

L 25719-66

ACC NR: AP6002284 2

mirror device served as an indicator. A DKSSh-1000 bulb supplied light. The formed, parallel light beam was focused on a slit in the UM-2 monochromator. Behind the spectral instrument was located a FEV-12 photomultiplier, whose signal was fed to a M-95 macro-ampere meter. The velocity of the shock wave front was determined by the light absorption at two sections of the shock tube, located at 150 mm. from each other. A DESO-1 oscillograph was used for registering the photomultiplier signal in one of the channels. A light filter was used in the second channel for separating a specific segment of the spectrum ($\lambda \sim 5200$Å). The pass-band of the DESO-1 oscillograph was not less than 60 mc, and the linearity of the amplitude characteristic was observed up to 30 mm. The experiments proved that an increase in gas density leads to an increase in light absorption. This appears on the oscilloscope in the form of a skip in the pulse amplitude variation. At sufficiently high temperatures, a decay of iodine molecules takes place and, consequently, a drop in the gas temperature, accompanied by a growth in density, is observed. The authors obtained the dependence of the absorption coefficient of molecules for iodine ε_T on the temperature for the wave lengths $\lambda = 5050$Å and $\lambda = 4660$Å. An increase in the absorption capacity of iodine directly behind the front of the shock wave takes place at a sufficiently high velocity of the latter. The authors conclude that this variation of absorption is related to the decay of the I_2 molecules. The calculated results are obtained on the basis of Beer's law. The authors thank E. V. Stupochenko and A. I. Osipov for evaluating the results of their work. Orig. art. has: 7 formulas and 6 figures.

SUB CODE: 07, 20/ SUBM DATE: 09Jun64/ ORIG REF: 001/ OTH REF: 003

Card 2/2 90

L 45772-66 EWP(m)/EWP(j)/EWT(l)/EWT(m)/T RM/WW/JW/JWD

ACC NR: AP6030932 SOURCE CODE: UR/0207/66/000/004/0133/0138

81
B

AUTHOR: Losev, S. A. (Moscow); Terebenina, L. B. (Moscow)

ORG: none

TITLE: Kinetics of dissociation of carbon dioxide molecules behind a shock-wave front

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1966, 133-138

TOPIC TAGS: gas dissociation, dissociation constant, shock tube, shock wave, diatomic molecule, equilibrium flow, reaction rate, CARBON DIOXIDE, SHOCK WAVE FRONT

ABSTRACT: The kinetics of carbon dioxide dissociation at high temperatures (up to 6000K) are studied by considering the problem of gas molecule dissociation in flows behind a shock-wave front propagating in pure CO_2. It is assumed that equilibrium with respect to all internal degrees of freedom is established very rapidly behind the shock-wave front and that the following reactions developed:

$$CO_2 + CO_2 \underset{k_1'}{\overset{k_1}{\rightleftarrows}} CO + O + CO_2$$

$$CO_2 + O \underset{k_2'}{\overset{k_2}{\rightleftarrows}} CO + O_2$$

$$O_2 + M \underset{k_3'}{\overset{k_3}{\rightleftarrows}} O + O + M$$

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L 45772-66

ACC NR: AP6030932

0

where K_1 and K_1' - are constants of direct and reverse reaction rates. The distribution of thermodynamic properties and concentrations of gas components behind the shock-wave front were calculated by the Runge-Kutta method on a computer for 30 sets of shock wave velocities and gas pressures. The mole fractions of gas components at To = 4450K at p = 0.188 atm for various values of the second reaction rate constant K_2, and the specific reaction rates for three reactions are given in graphs. They show the early prevalence of the first reaction (1 μsec), then the development of the second which may overcome the first, while the effect of the third reaction is relatively small. The theoretical results were substantiated by experiments carried out with CO_2 in a shock tube. The state of the gas was determined by measuring the degree of absorption of ultraviolet radiation due to the passage of shock waves. An analysis of the results shows that dissociation process behind the shock wave front at velocities V ~ 30 to 4 km/sec at near-atmospheric pressure begins with the reaction $CO_2 + CO_2 \rightarrow CO + O + CO_2$, then very rapidly (in a fraction of a microsecond), enough oxygen atoms are produced to start the second reaction $CO_2 + O \rightarrow CO + O_2$. After 2—3 μsec, the rates of both reactions are practically equal and from then on the reaction $CO_2 + CO_2 \xrightarrow{K_{12}} 2CO + O_2$ takes place. Consequently, the part of the second reaction in the kinetics of CO_2 dissociation is significant. It is concluded that calculations carried out here confirm the possibility of experimental determination of the first reaction rate constant at the very beginning of the equilibrium zone ($t \leq 1$ μsec) where the part of the second reaction is still small. Orig. art. has: 5 figures and 28 formulas. [AB]

SUB CODE: 20/ SUBM DATE: 30Nov64/ ORIG REF: 003/ OTH REF: 002/ ATD PRESS: 5084.

Card 2/2

ACC NR: AM6008484 Monograph UR/

Stupochenko, YEvgeniy Vladimirovich; Losev, Staliy Andreyevich; Osipov, Aleksey Iosifovich

Relaxation processes in shock waves (Relaksatsionnyye protsessy v udarnykh volnakh) Moscow, Izd-vo "Nauka," 1965. 482 p. illus., biblio., index. 4000 copies printed.

TOPIC TAGS: gas relaxation, vibrational relaxation, relaxation process, relaxing flow, shock tube, shock wave, shock wave heating, shock wave structure, strong shock wave, gas dissociation, radiation heat transfer, nonequilibrium flow, equilibrium flow, thermodynamic equilibrium, gas dynamics, thermal dissociation

PURPOSE AND COVERAGE: This book is intended for scientific personnel concerned with the problems of gasdynamics, high-temperature thermal physics, chemical physics, and also for candidates and senior students of these specialties. The present state of experimental and theoretical investigations of relaxation processes taking place in shock waves in gases and air is described and analyzed. Particular attention is paid to physical aspects of relaxation phenomena and to elucidation of patterns in processes taking place in the establishment of statistical equilibrium with respect to various degrees of freedom. It contains a foreword and six chap-

Card 1/4 UDC: 533.601.172

ACC NR: AM6008484

ters. The first chapter deals with general problems and presents a qualitative description of the relaxation process and the fundamentals of experimental methods. The second deals with shock tubes as a means for generating and studying strong shock waves and related phenomena. Chapter three deals with the experimental methods used for investigating nonequilibrium phenomena taking place in shock waves. Chapter four is devoted to a theoretical analysis of relaxation processes and available experimental data. Chapter five deals with nonequilibrium phenomena taking place behind a shock front in air. Chapter six briefly outlines the gas flow properties in relaxation and contains a brief analysis of gaskinetic methods for deriving equations of equilibrium and relaxation hydrodynamics and methods of the thermodynamics of irreversible processes. The authors are grateful to N. A. Generalov, Yu. P. Rayzer, and E. V. Samuylov for valuable comments.

TABLE OF CONTENTS [abridged]:

ACC NR: AM6008484

ACC NR: AM6008484

SUB CODE: 20/ SUBM DATE: 11Nov65/ ORIG REF: 208/ OTH REF: 418

Card 4/4

LOSEV, S., inzh., laureat Leninskoy premii

Damping noises in a distributor box. Za rul. 20 no.1:24
Ja '62. (MIRA 15:2)
(Automobiles--Transmission devices--Vibration)

LOSEV, S.A.

Investigating the 1000-ton UZTM hydraulic press. Ogneupory 27 no.3:131-133 '62. (MIRA 15:3)

1. Vsesoyuznyy institut ogneuporov.
(Hydraulic presses)

LOSEV, S.A.

Clay crusher operations at refractory plants. Ogneupory 30 no.2:8-10 '65. (MIRA 18:3)

ALL, VNIIO
1. Vsesoyuznyy institut ogneuporov.

LOSEV, S.B., inzhener; CHERNIN, A.B., kandidat tekhnicheskikh nauk, dotsent.

Practical method of calculating transient processes during faults in lines with distributed parameters. Elektrichestvo no.4:14-21 Ap '57. (MLRA 10:5)

1. Teploelektoproyekt.

(Electric lines)

LOSEV, S.B.; SMELYANSKAYA, B.Ya.; FEDOSEYEV, A.M., prof., doktor tekhn. nauk, red.; LEPESHINSKAYA, Ye.V., red.; AKHLAMOV, S.N., tekhn. red.

[International electrical engineering dictionary] Mezhdunarodnyi elektrotekhnicheskii slovar'. Izd.2. Moskva, Gos.izd-vo fiziko-matem.lit-ry. Group 16. [Relay protection] Releinaia zashchita. 1960. 114 p. (MIRA 13:5)

1. International Electrotechnical Commission.
(Dictionaries, Polyglot) (Electric relays--Dictionaries)

LOSEV, S.B., inzh. (Moskva); CHERNIN, A.B., kand.tekhn.nauk (Moskva)

Investigation of a three-phase directional resistance relay in shortcurcuit and partial-phase operating conditions. Elektrichestvo no.6:29-38 Je '60. (MIRA 13:7)
(Electric relays)

LOSEV, S.B.

Problems of accomplishing long-distance protection of electric lines against all types multiphase damages. Elektrichestvo no. 12:47-58 D '60. (MIRA 14:1)
(Electric lines) (Electric protection)

LOSEV, S.B., inzh.

Certain problems concerning the behavior of the high-frequency protection systems of 400 to 500 kv. lines in the presence of electromagnetic transients. Elektrichestvo no.2:20-26 F '62. (MIRA 15:2)

1. Vsesoyuznyy gosudarstvennyy institut po proyektirovaniyu teplovykh elektrostantsiy.

(Electric power distribution--High tension)
(Electric protection)

L 9828-66 [illegible])/EWA(h)

ACC NR: AP6003970 SOURCE CODE: UR/0104/65/000/005/0093/0093

AUTHOR: Sarkisov, M. A.; Rokotyan, S. S.; Uspenskiy, B. S.; Sharov, A. N.; Zhulin, I. V.; Fedoseyev, A. M.; Korolev, M. A.; Kheyfits, M. E.; Yermolenko, V. M.; Petrov, S. Ya.; Azar'yev, D. I.; Krikunchik, A. B.; Polyakov, I. P.; Sazonov, V. I.; Khvoshchinskaya, Z. G.; Kartsev, V. L.; Smelyanskaya, B. Ya.; Kozhin, A. N.; Losev, S. B.; Dorodnova, T. N.; Rubinchik, V. A.; Smirnov, E. P.; Rudman, A. A.

ORG: none

50

B

TITLE: Abram Borisovich Chernin

SOURCE: Elektricheskiye stantsii, no. 5, 1965, 93

TOPIC TAGS: electric engineering, electric engineering personnel

ABSTRACT: An engineer since 1929, A. B. Chernin has worked for years in developing new techniques and equipment for relay protection of electric power systems. In this 60th birthday tribute, he is credited with leading the group which produced the directives on relay protection, contributing to the development of a method for calculating transient processes in long distance 400-500 kv power transmission lines and with aiding in planning of the electric portions of power stations, substations and power systems. The results of his engineering and scientific work have been published 46 times, he is a doctor of technical sciences (since 1963), and has taught for 30 years at the Moscow Power Institute. Orig. art. has: 1 figure. [JPRS]

SUB CODE: 09 / SUBM DATE: none

HW

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LOSEV, S.M.

[Steam turbines; study tables] Parovye turbiny; uchebnye tablitsy. Moskva, Gos. energ. izd-vo, 1946. 12 fold. tables (in portfolio)
(Steam turbines) (MLRA 7:10)

LOSEV, S.M.

LOSEV, S.M., inzhener-podpolkovnik; LEVENSON, I.S., redaktor; CHAROV, A.D., tekhnicheskiy redaktor.

[Steam turbines and condenser installations; theory, construction and use] Parovye turbiny i kondensatsionnye ustroistva; teoriia, konstruktsii i ekspluatatsiia. Izd. 7., perer. Moskva, Gos. energ. izd-vo, 1947. 372 p. (MLRA 7:5)
(Steam turbines) (Condensers (Steam)

LOSEV, S.M.

[Steam turbines and condensing apparatus; theory, design and operation] Parovye turbiny i kondensatsionnye ustroistva; teoriia, konstruktsii i ekspluatatsiia. Izd. 8., perer. Moskva, Gos. energ. izd-vo, 1954. 368 p. (MLRA 7:7)
(Steam turbines) (Condensers(Steam))

LOSEV, S.M.

LOSEV, S.M.

[Steam turbines; instruction charts] Parovye turbiny; uchebnye tablitsy. Moskva, Gos. energ. izd-vo, 1957. 3 p. and 20 tables (in portfolio). (MIRA 11:3)

(Turbines)

14(6) PHASE I BOOK EXPLOITATION SOV/2723

Losev, Sergey Mikhaylovich

Parovyye turbiny i kondensatsionnyye ustroystva; teoriya, konstruktsii i ekspluatatsiya (Steam Turbines and Condensers; Theory, Design and Operation) 9th ed., rev. Moscow, Gosenergoizdat, 1959. 384 p. Errata slip inserted. 21,000 copies printed.

Ed.: L.N. Sinel'nikova; Tech. Ed.: G.Ye. Larionov.

PURPOSE: This is a textbook for service personnel of steam-turbine installations. It may also be used by students of power-engineering schools taking courses on steam turbines.

COVERAGE: The book deals with the theory, construction, and operation of steam turbines, condensers, and auxiliary equipment. Special attention is given to turbines manufactured in the Soviet Union and turbines in general use at Soviet electric power stations. Separate chapters are devoted to the description of turbine and condenser malfunctions and methods of eliminating them. The book contains a number of drawings and schematic diagrams of turbines and

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auxiliary equipment. The author thanks Docent N.G. Morozov for his assistance in preparing this edition. There are no references.

TABLE OF CONTENTS:

PART II. PRINCIPLES OF TURBINE-UNIT OPERATION

AVAILABLE: Library of Congress

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LOSEV, Sergey Mikhaylovich; MELEYEV, A.S., red.

[Steam turbines and condensing systems; theory, design, and operation] Parovye turbiny i kondensatsionnye ustroistva; teoriia, konstruktsii i ekspluatatsiia. Izd.10, pe-rer. Moskva, Izd-vo "Energiia," 1964. 375 p. (MIRA 17:8)

ACCESSION NR: AT4038922 S/2634/64/000/071/0125/0140

AUTHOR: Betin, V. V.; Losev, S. M.; Shirokov, K. P.

TITLE: Aerial photography of marine ice floes

SOURCE: Moscow. Gosudarstvenny*y okeanograficheskiy institut. Trudy*, no. 71, 1964. Issledovaniye izmenchivosti ledovitosti nekotory*kh morey (Investigating the variability in ice formation on some seas), 125-140

TOPIC TAGS: oceanography, drift ice, ice floe, aerial photography, ice flow photography, marine ice

ABSTRACT: This extensive article is in four parts. In the first section, the authors discuss aerial photographic field work in general terms. Cartographic and reconnaissance factors are considered which must precede the actual photographic operations. Recommendations are given regarding the linear value of the base for various frame formats, scale and camera types. Tack length is also considered for situations involving photography along the shore, along the fast ice line (shore ice) and over open water. It is pointed out that an extremely desirable condition when selecting the routing is the possibility of a two-way connection or orientation of that routing with certain fixed features (islands,

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capes, promontories, fast ice zone, etc.). The time intervals between subsequent sorties are to be so scheduled that not less than 50% of the floating ice area recorded on the pictures of a preceding tack is represented on the next succeeding aerial photography routing. The use of the smallest possible scale is recommended and the reasons why, in aerial photographic work involving the study of ice drift, this scale should always be minimal for given resolution of the equipment, corresponding meteorological conditions and dimensions of the ice floes to be photographed are explained. The importance of parallel observations over surface currents in the gaps between floes is noted. Recommendations are given with respect to the depth of immersion of float buffers and the point is made that this depth should correspond to the thickness of the ice. The authors note that it is advisable to carry out aerial photography in parallel with two cameras capable of simultaneously photographing at two scales: 1 : 20,000 - 1 : 40,000 for the ice drift proper and 1 : 5,000 for the disposition of the floats. The second part of the article analyzes the results of the aerial photography performed in the Gulf of Finland in 1961. This material was broken down into three groups. The first group contains materials obtained in photo passes made along the coast or the edge of the fast ice (coast ice); the second group contains material from cantilever extensions; the third group contains the material from

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closed passes, resting at fixed reference points on both ends. The data processing of the information from all three groups is discussed in this section. The authors point out that the determination of the elements of ice drift on the basis of the materials of each of these groups is possible through the use of graphic photo-triangulation. However, for the first group, under certain conditions, the problem may be simplified somewhat with no appreciable loss of accuracy in the results obtained. For this purpose, it is sufficient to limit oneself to the use of conventional photo. layouts (aerial mosaics, in this case), mounted from contact prints, without recourse to the plotting of photo-triangulation nets. Since the problem of the processing of aerial photography material on drift ice is of definite interest, the authors have considered it necessary to consider the peculiarities of this problem in detail as they apply to each of the three cases. The third section of the paper deals with method accuracy. The ice drifting elements, obtained as a result of the processing of the material for each of the three groups above, naturally contain errors. Since the character of these errors and their magnitude will be somewhat different in each separate case, the degree of accuracy in the results derived will also be different. For all three processes, the accuracy in the determination of the speed and direction of the drift will increase as the route length decreases, as the duration of the time interval between sorties increases and as the drift speeds

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increase. Since the speed of the drift is independent of human intervention, in order to obtain drift material of given accuracy only the first two elements can be varied. It is not always possible to reduce the route length, since this is limited by the region under study. Consequently, all other conditions being equal, the accuracy of the derived information can be enhanced solely by increasing the time interval between contiguous tacks. The problem is analyzed mathematically in the article. In the example considered by the authors (exposure scale 1 : 20,000; base number 23 - 25; time between sorties about 1 hour; drift on the order of 0.5 km/hour) the errors in the center section of the photo passes were not more than 15% for the speed of drift, and not more than 10% for the direction. The fourth and final section of the article gives a detailed description of the use of repetitive aerial photography for the study of ice drifting in Kursh Bay (Kurshkiy zaliv) and in the adjacent area of the Baltic Sea. The ice was photographed over the same routes which were so layed out that it was possible, at least along the edge of the picture, to obtain an image of the coastal strip of dry land. In this way, a point of reference on the coast line was provided for all pictures and the position of the ice flows was strictly coordinated on the basis of orientation markers on the shore. This section is supplemented with charts and maps. The data on ice drifting obtained in this

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operation make it possible to recommend the method for wide use in the investigation of ice drifting both in open as well as in coastal waters. The general conclusions reached by the authors in this article can be summarized as follows: 1. The use of the method of repeated aerial photographic tacks permits the establishment of the laws of ice drifting as a function of wind conditions, while at the same time embracing all the varieties of ice encountered at sea. 2. Experience in the use of aerial photography for the study of ice drift conditions makes it possible to recommend this method for practical utilization. 3. Aerial photography operations can be carried out over routes enclosed between two objects on dry land, by cantilever extension routes or by routes running along the coast line or edge of the fast ice (coast ice). 4. The smallest scales permissible under the given weather conditions, flow dimensions and resolving power of the photographic equipment in use should be employed. 5. Before photographing an ice drift from the air, it is expedient to drop special floats containing a charge of fluorescent material in the intervals between the floes. In this connection, the exposure should be made on two scales: on a small scale for the ice drift proper, and on a larger scale for the disposition of the floating markers. 6. Meteorological conditions (cloud formation, visibility, illumination) place the same constraints on the use of aerial photography for the study of ice drifting as on its other applications. Problems relating to the accuracy of the determin-

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ation of ice drift elements at sea by the method of vertical aerial photography require further development and refinement. Orig. art. has: 5 figures and 12 formulas.

ASSOCIATION: Gosudarstvenny*y okeanograficheskiy institut, Moscow (State Institute of Oceanography)

SUBMITTED: 00 DATE ACQ: 04Jun64 ENCL: 00

SUB CODE: ES NO REF SOV: 005 OTHER: 000

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LOSEV, V., starshiy tekhnik (Kiyev)

Against underestimating the value of narrow gauge lines. Zhel. dor. transp. no.1:73-74 '47. (MIRA 13:2)
(Railroads, Narrow gauge)

KURCHITSER, M., inzh.; LOSEV, V., inzh.

"TVV" streetcar with a tower for servicing contact networks. Zhil.-kom. khoz. 12 no.5:12-13 My '62. (MIRA 15:10)

(Streetcars)

KURCHITSER, M.I.; LOSEV, V.A.

The ATM-2 repair truck for servicing streetcars. Gor. khoz. Mosk. 34 no.11:29-30 N '60. (MIRA 13:11)

1. Akademiya kommunal'nogo khozyaystva imeni K.D.Pamfilova.
(Streetcars--Maintenance and repair)

LOSEV, V.A.

Role of the allergic factor in development and course of experimental reflex hypertension. Medych.zhur.24 no.1:72-78 '54. (MLRA 8:10)

1. Institut eksperimental'noi biologii i patologii im. akad. O.O.Bogomol'tsya, viddil eksperimental'noi patologii.
(HYPERTENSION, experimental,
allergic factor in reflex hypertension)
(ALLERGY, experimental,
allergic factor in reflex hypertension)

LOBB, V. A.

...nan. Role of the ...
experimental renal hypertension ...

repeated sensitization ...
silver rings on the arteries ... 30—61 mm Hg.
same time in control rats ... accelerate the development of
Preliminary sensitization ...

Kiev Medical Stomatological Inst, Chair Pathological Physiology

GOREV, N.N.; LOSEV, V.A.

Course of hyperergic inflammation in animals with experimental hypertension. Fiziol.zhur. (Ukr.) 2 no.3:55-67 My-Je '56. (MIRA 9:10)
(ANAPHYLAXIS) (HYPERTENSION)

LOSEV, V.A., Cand Med Sci--(diss) "On the role of the allergic factor in the development and course of experimental hypertension." Kiev, 1958. 11 pp (Acad Sci UkSSR. Department of Bio Sci), 150 copies (KL, 49-58, 127)

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LOSEV, V.A., assistent (Kiyev)

Central nervcus system function in patients with paradentosis.
Probl.stom. 4:21-28 '58. (MIRA 13:6)
(REFLEXES) (GUMS--DISEASES)