2.5000,5.4700,10.0000,24.5300

77337
SOV/57-30-1-16/18

AUTHOR: Kogarko, S. M.

TITLE: Amplification of Compression Waves During Interaction With Flame Front

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol 30, Nr 1, pp 110-119 (USSR)

ABSTRACT: Shchelkin (DAN SSSR, 23, 636, 1939), Zel'dovich (Teoriya goreniya gazob, Izd. AN SSSR, 1944; ZhTF, XVII, 3, 1947; ZhETF, 21, 1172, 1951), and Sokolik (ZhETF, 21, 1164, 1951) already investigated theoretically and experimentally the condensed wave and its amplification when such a wave is produced in front of a fast burning gaseous system. Nevertheless, many problems are left unsolved. The author investigated the origin and amplification of compression waves during combustion of hydrocarbon-air mixtures in a spherical container and tried to supply a qualitative explanation. The Experimental Setup and Method. The experimental setup is on Fig. 1. The differential indicator could register

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Amplification of Compression Waves During Interaction With Flame Front

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pressure variations with a sensitivity of 25-30 mm Hg per 1 mm on the film in an interval of 1 to 2 kg/cm^2 at an arbitrary pressure inside the chamber. Mixtures are introduced into the chamber after removing air. Experimental Results. At low pressures between 0.5 and 200 kg/cm^2 the burning is completely normal for arbitrary variation of α between 0.45 and 1.3. The pressure varies smoothly during the entire combustion process, and no sound is heard during the explosion. At pressures above 2 kg/cm^2 one observes changes during the combustion process at certain compositions of the mixture. Fluctuation of pressure starts taking place, and one hears a metallic sound. The intensity of oscillations and of sound increase with the increase in pressure. Experiments with Benzene. A photograph taken with an initial pressure of 8.0 kg/cm^2 and α = 0.78 showed the following behavior: From 0 to 1.9 kg/cm^2 rise in pressure, the pressure increased smoothly. Between 2.5 and 3.3 kg/cm^2 a weak

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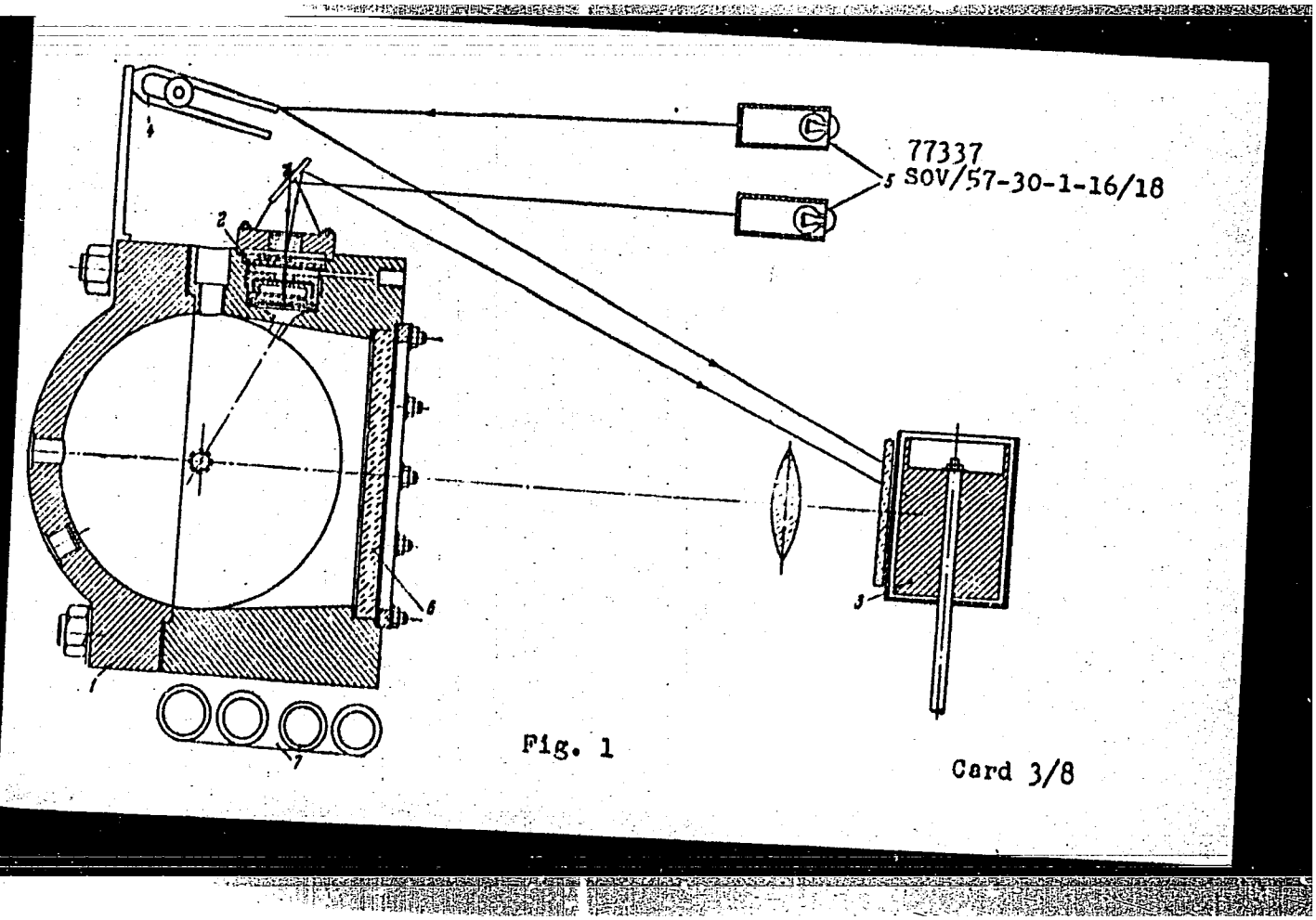

Fig. 1

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Fig. 1. Diagram of the experimental setup: (1) Explosion chamber; (2) differential indicator; (3) photorecording device; (4) tuning fork; (5) light sources; (6) aperture for photographing the flame front; (7) electric heater.

Caption to Fig. 1.

pressure wave is born which then increases in amplitude between 3.3 and 4.3 kg/cm^2. The rise continues above this value of the additional pressure. The recording of each subsequent pressure maximum is after the wave passed twice through the zone of flame. The author denotes the amplification of the wave after crossing twice the flame front by K^2. In the test just described $K^2 = 1.49$. The author verified that the registered variations were not variations of the average gas pressure but genuine reflected waves. Figure 5 shows results for K^2 and the minimum values of overpressure ΔP at which one starts observing

compression waves. Starting temperature was always t = 65 C and initial pressure 8.0 kg/cm^2. Tests with Aviation Gasoline. Results were similar to those with benzene. Tests with Artificial Shock Wave Created Behind the Wavefront. To study the behavior of waves at concentrations which do not generate waves by themselves or waves too weak to be registered the author used PbN_6 placed inside the chamber in a paper bag, to produce an artificial shock wave. The bag would ignite a few tenths of a millisecond after the passage of the flame wave, and for a PbN_6 charge, above a certain critical value, the author achieved strong artificial pressure waves which then increase in amplitude until the end of the combustion period. At the same time, the time of the combustion after the artificial explosion is shortened from 4 to 9 times, depending on the strength of the shock wave explosion. Discussion of Results. The author reasons that there cannot be any amplification of the wave neither in front of the flame front, where the gas is

Amplification of Compression Waves During Interaction With Flame Front

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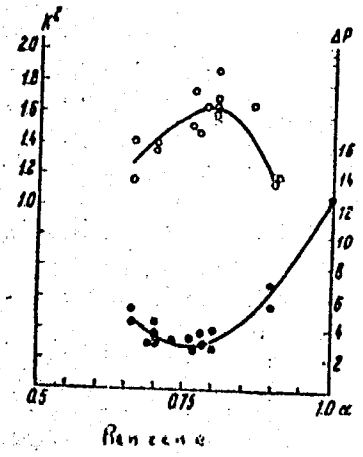

Fig. 5. Coefficient of amplification K^2 and the minimum pressure at which the first pressure wave is observed versus the mixture composition α for a benzene-air mixture explosion.

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still inert, nor behind it, where it is inert again. It can happen only inside the flame front and at the expense of the reaction taking place there. The mechanism of this amplification is described in the paper by Kogarko and Skobelkin (DAN SSSR, 120, Nr 6, 1958). Due to disturbances of the thermodynamic equilibrium of chemical reactions by the wave crossing the flame, one obtains raises in temperature and pressure inside the zone of burning which bring about the amplification of waves. This amplification should be proportional to the speed of reaction and consequently to the chemical composition of the mixture. Experiments agree with this conclusion. According to the theory, the amplification inside the plane should take place under any circumstances. Nevertheless, in case of nonturbulent propagation of the flame front the region of amplification is much smaller than the region of damping of the wave, and the wave is then damped. At a certain critical value of certain parameters, turbulence takes place allowing a true build-up

Amplification of Compression Waves During Interaction With Flame Front

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of amplitudes. This was also observed by the author. There are 7 figures; and 7 Soviet references.

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

SUBMITTED: February 11, 1958

Card 8/8

83563

S/020/60/134/001/015/021
B004/B060

11.6200

AUTHORS: Kogarko, S. M., Novikov, A. S.

TITLE: Study of Compression Waves in the Combustion of Gas Mixtures

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 1, pp. 125 - 127

TEXT: By way of introduction, the authors outline their theoretical considerations: If a compression wave arises in the zone of chemical reaction, temperature and density of the reaction mixture rise, and the reaction rate is sped up. The temperature rise is quicker than the dissipation of the energy released additionally from the reaction zone. The consequence is a pressure rise in the reaction zone and the appearance of additional waves which intensify the primary compression wave. These views were confirmed by experiments which were conducted by means of methane-oxygen and methane-air mixtures in glass tubes 10 mm in diameter. The compression wave was recorded on a rotating photofilm by means of a piezoelectric quartz indicator and a cathode-ray oscilloscope.

Ca[illegible]

83563

Study of Compression Waves in the Combustion of Gas Mixtures

S/020/60/134/001/015/021
B004/B060

The formation and intensification of compression waves were observed in methane-oxygen mixtures with a methane content between 7.5 and 53%. On a decrease of the methane content from 9.1 to 6.7% the maximum amplitude of the compression wave decreases rapidly, and no further intensification of the primary compression wave takes place on a further decrease in the methane content. Fig. 1 shows the compression wave in $CH_4 + 2O_2 + 8O_2$ and $CH_4 + 2O_2 + 8N_2$. The reaction rate drops in the latter case, and the compression wave is very weak. With a view to studying the influence of the frequent passage of the compression wave through the reaction zone, experiments were conducted in tubes of different lengths (Table 1, Fig. 2). The maximum amplitude becomes smaller when the tube is shortened. There is a critical length at which the amplitude vanishes. For $CH_4 + 2O_2 + 8O_2$ this length is 42 mm. There are 2 figures, 1 table, and 3 references: 2 Soviet and 1 German.

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

Card 2/5

28881
S/180/61/000/004/020/020
E071/E180

11.7350

AUTHORS: Kogarko, S.M., and Basevich, V.Ya. (Moscow)

TITLE: On the mechanism of combustion of sprayed liquid fuel in a turbulent flow

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 4, 1961, 137-142

TEXT: It was shown in the authors' previous work (Ref.2: V.Ya. Basevich, S.M. Kogarko, Izv. AN SSSR, OTN, Energetika i avtomatika, 1959, No.2, p.13) that combustion takes place according to a diffusion mechanism in respect of fuel droplets. This mechanism would be violated if part of the fuel was evaporated in the flame zone without immediate combustion, thus leading to an accumulation of fuel in some part of the flame zone. In the above mentioned work the possible amount of the vapour phase was assessed from the difference in the amount of the liquid phase and the amount of combustion products. This assessment is liable to errors; therefore in the present work the authors made an evaluation of vapour concentration in the flame zone of atomised fuel and

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28881
S/180/61/000/004/020/020
E071/E180

On the mechanism of combustion of ....

1) the mechanism of combustion is diffusive in respect of fuel drops. No disturbances of this mechanism, leading to an accumulation of fuel vapour in the flame zone, were observed. 2) If fuel vapours form in front of the flame zone, they burn either by a simultaneous diffusion with oxygen towards the combustion zone of fuel drops, or they form an independent zone of combustion. 3) In weak mixtures, a preliminary partial evaporation of the fuel is permissible only if it leads to the formation of an independent combustion zone, as otherwise the evaporated fuel cannot be completely burned.

There are 7 figures, 1 table and 5 references: 3 Soviet-bloc and 2 non-Soviet-bloc. The English language reference reads:

Ref.1: C. Graves, M. Gerstein. Some aspects of combustion of liquid fuel. Combustion Res. and Reviews, p.25. London, Butterworths Sc. Pb., 1955.

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

SUBMITTED: January 16, 1961

Card 3/3

28881
S/180/61/000/004/020/020
E071/E180

On the mechanism of combustion of ....

1) the mechanism of combustion is diffusive in respect of fuel drops. No disturbances of this mechanism, leading to an accumulation of fuel vapour in the flame zone, were observed. 2) If fuel vapours form in front of the flame zone, they burn either by a simultaneous diffusion with oxygen towards the combustion zone of fuel drops, or they form an independent zone of combustion. 3) In weak mixtures, a preliminary partial evaporation of the fuel is permissible only if it leads to the formation of an independent combustion zone, as otherwise the evaporated fuel cannot be completely burned.
There are 7 figures, 1 table and 5 references: 3 Soviet-bloc and 2 non-Soviet-bloc. The English language reference reads:
Ref.1: C. Graves, M. Gerstein. Some aspects of combustion of liquid fuel. Combustion Res. and Reviews, p.23. London, Butterworths Sc. Pb., 1955.

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

SUBMITTED: January 16, 1961

Card 3/3

11.7200

S/057/61/031/002/009/015
B020/B056

AUTHORS: Kogarko, S. M., Ryzhkov, D. L.

TITLE: Investigation of the amplification of compression waves in combustion

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 2, 1961, 211-216

TEXT: It was the purpose of the present work to study the possibility of amplifying compression waves formed during combustion in a closed volume, in combustion of mixtures of fuels and air, enriched in oxygen, at reduced pressure. The experimental arrangement used is described in detail in Ref. 2. For measuring the pressure change in the vessel during combustion and the compression waves, an optical and mechanic differential indicator and a piezo quartz indicator with an eigenfrequency of about 25 kc/sec was used. The piezo-quartz indicator was connected to the cathode oscillograph ЭНО-1 (ENO-1), on whose screen also the change in pressure in the explosion vessel was recorded on the photographic film. The fuel content α in the mixture was varied within the range of 0.56 to 1.75. The results obtained by studying the amplification factor

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89163

of the compression waves K^2 for the initial pressure P_o = 760 mm Hg during the combustion of benzene in nitrogen-oxygen mixtures having a varying oxygen content in dependence on the composition of the mixture are given in Fig. 3. Fig. 4 graphically shows the investigation of the change in K^2 in dependence on initial pressure during the combustion of benzene in nitrogen-oxygen mixtures having an oxygen content of 40 and 45%. Fig. 5, by way of comparison, graphically shows the dependence of K^2 on the composition of the mixture α for benzene and hexane during combustion in a nitrogen-oxygen mixture at O_2 = 40% and an initial pressure of 760 mm Hg.

From the results obtained it follows that during relaxation in the combustion zone, temperature and pressure rise. The amplification coefficient of the compression waves K^2 rises considerably with an increase of the oxygen content and, at 45% it attains a value of about 1.65; the highest value of K^2 is found during the combustion of a mixture with a composition varying between $0.65 \leq \alpha \leq 0.75$. Compression waves occur and are most easily amplified during the combustion of enriched fuel

mixtures ($0.65 \leq \alpha \leq 0.75$). With a given oxygen content in the N_2-O_2 mixture, the highest combustion temperature in mixtures is attained with $0.90 \leq \alpha \leq 0.95$. At constant combustion temperature within the range investigated in which the initial density of the mixture changes, K^2 changes nearly linearly with increasing density. The amplification coefficient of the compression waves in the combustion of various fuels in the same N_2-O_2 mixture with 40% O_2 depends on the chemical structure of the fuel.

There are 5 figures and 2 Soviet-bloc references.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR, Moskva (Institute of Chemical Physics of the AS USSR, Moscow)

SUBMITTED: January 27, 1960

26546
S/076/61/035/008/010/016
B110/B101

11.7200

AUTHORS: Kogarko, S. M., and Basevich, V. Ya. (Moscow)

TITLE: Model of the combustion zone of a turbulent flame

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 8, 1961, 1794 - 1798

TEXT: None of the various planar and spatial model representations of the combustion zone of homogeneous mixtures in a turbulent flow is universally accepted. The authors established that the nonreactive mixture in the combustion zone had a temperature near the initial temperature, which was a point in favor of a planar model.. Objections were raised against this statement. According to Ye. S. Shchetinkov et al. (O turbulentnom gorenii gomogennoy smesi, Oborongiz, 1956, p. 31) a perturbation of planar combustion is probable. An attempt is made here to explain the observations by the planar model, and the effect of the feed of combustion products upon the luminosity of the turbulent flame is examined. The system shown in Fig. 1 consists of an air compressor, electric heater 1, mixer for fuel feed 2, H_2O and CO_2 feed 3, and sealed combustion chamber 4 with quartz side walls, in which the two-dimensional flame flare

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S/076/61/035/008/010/016
B110/B101

is stabilized by means of two hydrogen burners. The luminosity was recorded from a major distance by means of a photomultiplier with a light filter. The other system (II) was similar to (I), but an auxiliary burner for the combustion of some fuel was in the place of 2, and the mixer was in the place of 3. The combustion chamber was open and a directional two-dimensional flare burned at the wedge-shaped stabilizer. The luminosity was determined both photographically and photometrically. In accordance with the authors (Ref. 11: Izv. AN SSSR. Otd. tekhn. nauk, energ. i avtom., No. 3, 138 - 144, 1960), the maximum of darkening in a certain cross section behind the stabilizer was taken as the measure of intensity. Consumption was determined by diaphragms and pilot tubes, and the excess-air α was additionally determined by chemical analysis and the temperature of the combustion products. The relative light yield of the flame per unit of converted fuel at various velocities of flow v of [redacted] gas and pr[redacted]ture (25°C initial temperature) with turbulence degree 12 % was measured on (I) (Fig. 2). The drop of the relative light yield with a rise of velocity was caused by the poor mixture (α = 5.63), and no turbulent flame property was responsible for it. The opposite was established in case of air-hydrogen mixtures. A drop of intensity in

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Model of the combustion...

system II was caused by small additions of reaction products of the propane-butane flame with equal excess-air coefficients to sewer gas. A quick rise of intensity was established on (II) by addition of reaction products of the hydrogen flame with free atoms and radicals. In (I), CO_2 and H_2O were added to the fuel mixture; a CO_2 addition $\geq$ 30% of its amount in the combustion products had little effect. 0 - 12% of H_2O addition reduces the maximum luminosity by 10 - 15%. The authors have shown that an addition of combustion products of the diffusing hydrogen flame augments the luminous intensity of the turbulent hydrocarbon-air flame. Here, additions of reaction products of the hydrocarbon-air flame reduce the luminous intensity. Thus, the action of the combustion products depends upon the ratio: active radical particles (A) versus stable reaction products (H_2O) (B). (A) raises the luminous intensity, while (B) reduces it. This also entails a rise of the relative light yield with an increase of velocity in case of hydrogen-air flames, and the drop of it in case of hydrocarbon-air flames. Since the feed of active radical particles of the hydrogen flame raises the propagation velocity of the flame in the turbulent flow, a feed of reaction products cannot be

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Model of the combustion...

expected to raise the velocity perpendicular to the surface element. With equal propagation velocity of the turbulent flame, a feed of higher concentrations of active particles into the hydrocarbon-air flame caused in many cases a lesser relative velocity rise than a small feed into the hydrogen-air flame. Divergences among the lines of maximum luminous intensity for some radicals and excited molecules are explained as follows: the initial mixture intermixes with the combustion products, amount to $\leq$ 10% of the fresh mixture. Thus, different actions of reaction products upon the luminous intensity of radicals and molecules effects separation in the zone of luminous-intensity maxima. Stable (H_2O, CO_2) and unstable combustion products effect extinction. The dissimilar changes of the relative light yield with a rise of velocity at different wavelengths, especially with O_2 and CO_2, point to a stronger mixing at the beginning of the zone. There are 5 figures, 2 tables, and 11 references: 6 Soviet-bloc and 5 non-Soviet-bloc. The three most important references to English-language publications read as follows: Ref. 3: M. Summerfield et al., Jet Propulsion, 25, 377, 1955. Ref. 6: J. H. Grover et al., ARS Journal, 29, 275, 1959. Ref. 8: R. R. John: Jet Propulsion, 27, 169, 1957.

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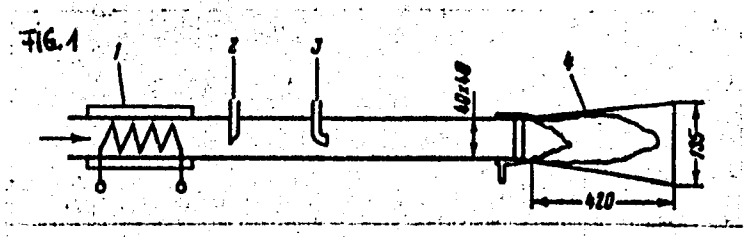
26546
S/076/61/035/008/010/016
B110/B101

Model of the combustion...

ASSOCIATION: Akademiya nauk SSSR Institut khimicheskoy fiziki g. Moskva (Academy of Sciences, USSR, Institute of Chemical Physics, Moscow)

SUBMITTED: December 14, 1959

Fig. 1. Scheme of burner.



Card 5/6

28292
S/076/61/035/010/011/015
B106/B110

11.7200

AUTHORS: Kogarko, S. M., Mikheyev, V. V., and Basevich, V. Ya.

TITLE: Effect of active particles of combustion products on the limits of inflammability in a turbulent flow

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 10, 1961, 2341 - 2347

TEXT: In continuation of earlier papers on the effect of active particles (O, H, OH) on spontaneous inflammation, stabilization of flame, and rate of propagation in a turbulent flow (Ref. 1: S. M. Kogarko, M. I. Devishev, V. Ya. Basevich, Zh. fiz. khimii, 33, 2345, 1959; Ref. 2: S. M. Kogarko, M. I. Devishev, V. Ya. Basevich, Dokl. AN SSSR, 127, 137, 1959; Ref. 3: V. Ya. Basevich, M. I. Devishev, S. M. Kogarko, Izv. AN SSSR, Otd. tekhn. n., No. 3, 138, 1960), the authors studied the effect of active particles formed in the combustion products of hydrogen and hydrocarbons (O, H (atomic), OH) on the limits of inflammability of fuel gases in a turbulent air flow. Fig. 1 shows the scheme of the experimental plant. The tube had a rectangular section of 40 by 70 mm^2. No initial concentration of active particles was to occur at inflammation in the experiments,

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in which hydrogen was burnt in burner 2. The distance between burner 2 and ignition point (2000 mm) allowed recombination of the active particles before reaching the ignition point. In the combustion in burner 3 which was only 400 mm distant from the ignition point, the active particles reached the ignition point. The concentration of active particles could be changed by introducing surfaces with different coats (quartz, carbon black, graphite, potassium tetraborate) between burner and ignition point. The degree of turbulence of flow was 7 - 10%, scale 3 - 5 mm (Ref. 3, see above). In a series of experiments, a butane-propane mixture was burnt with air instead of hydrogen. This required a special burner. In most cases, the ignition of fuel gases was initiated by sparks of an energy of 0.02 joules with an electrode spacing of 1.8 mm; in some cases, for comparison, by a burner or heated body. n-butane, a mixture of 77% n-butane and 23% isobutane, hydrogen, and sewer gas (mainly methane) were used as fuel gases. In the experiments, the upper and lower limits of inflammability and flame stabilization of the fuel-air mixture were determined by corresponding regulation of fuel supply. These studies showed that in all cases (ignition by spark, by a burner, by a heated body; different temperatures; different flow rates; different fuel gases) an increase in initial concentration of active particles led

Effect of active particles...

to a considerable decrease of the lower limit of inflammability of the fuel-air mixture. This extension of limits of inflammability increases with rising concentration of active particles and can be explained by the rise of reaction rate in the initial stage of combustion. The upper limit of inflammability was not changed by the active particles. It is assumed that the reason therefore was only an insufficient concentration of active particles and the low range of flow rates (10 - 50 m/sec) at which the experiments were carried out. There is no reason to assume that the upper limit of inflammability is not increased by the effect of active particles. In the combustion of hydrocarbons obviously fewer active particles are formed than in the combustion of hydrogen, since in the former case the limits of inflammability of fuel gases are not so wide. The concentration change of active particles in the flow by introduction of surfaces with different coats changes the limits of inflammability according to the probability of recombination of active particles on the introduced surface. In the case of ignition by burner the limits of inflammability are higher than in the case of spark ignition and are still considerably widened by introduction of active particles. There are 8 figures, 3 tables, and 6 references: 4 Soviet and 2 non-Soviet. The two references to English-

Card 3/4

language publications read as follows: I. R. Arthur, Nature, London, 164, 537, 1949; C. P. Fenimore, G. W. Jones, J. Phys. Chem., 62, 178, 1958.

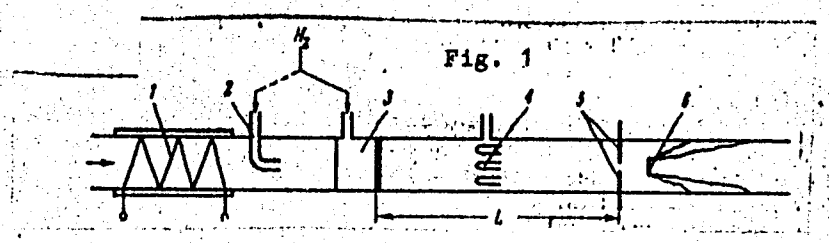
ASSOCIATION: Akademiya nauk SSSR Institut khimicheskoy fiziki (Academy of Sciences USSR Institute of Chemical Physics)

SUBMITTED: March 4, 1960

Fig. 1. Scheme of the plant.

Legend: (1) Electrical heating; (2,3) hydrogen diffusion burner, (4) mixing device; (5) electrodes; (6) stabilizer.

Fig. 1



Card 4/4

27882
S/020/61/140/001/021/024
B130/B101

11.7100

AUTHORS: Kogarko, S. M., and Ivanov, B. A.

TITLE: Pressure limit of a spontaneous expansion of the reaction zone in acetylene

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 1, 1961, 165-167

TEXT: The authors determined the minimum pressure at which a spontaneous expansion of the reaction zone of C_2H_2 throughout the volume of the gas still takes place. They pointed out the technical importance of the boundaries of the reaction zone, especially in the case of C_2H_2. The decomposition of acetylene at different initial pressures was studied in a steel tube of 1500 mm length and 160 mm diameter. Four plexiglass windows in the tube served for observing the expansion of the reaction zone. The expansion along the tube was photographed. A steel tube of 20 m length and 400 mm diameter served for control tests. The acetylene decomposition was initiated either with a red-hot Nichrome coil by discharging a capacitor in the acetylene space studied, or by combustion of a small quantity of explosive in a rubber container. The experimental determina-

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27882
S/020/61/140/001/021/024
B130/B101

Pressure limit of a spontaneous ...

tion of the minimum pressure did not depend on the ignition applied. It was shown that a spontaneous expansion of the reaction zone in acetylene still takes place at 0.76 at. The deviation of this lower value from those given in the literature (1.35-1.40 at) is due to the insufficient ignition used by other scientists. An expansion rate of reaction of 30 m/sec was measured in the 20-m tube. There are 2 figures.

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

PRESENTED: April 5, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: March 31, 1961

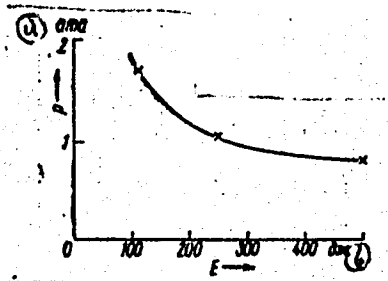

Fig. 2. Dependence of the initial pressure limit of acetylene on the energy of ignition spark in the tube 160 mm in diameter.
Legend: (a) atm; (b) joule.

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30724

S/020/61/141/003/012/021
B101/B117

11.7700

AUTHORS: Basevich, V. Ya., and Kogarko, S. M.

TITLE: Effect of oxygen atoms on low-temperature burning

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 3, 1961, 659-661

TEXT: The study is based on the assumption of a uniform mechanism for atomic and ordinary flames, and on the importance of the initial concentration of active centers. The effect of atomic O on the velocity of flame propagation at low pressure was investigated. Further, it should be established whether the lower pressure limit of burning can be lowered to the range of atomic flames. The oxygen atoms were obtained by glow discharge, and entered the reaction vessel through a 4 mm nozzle. The fuel gas, industrial propane + butane, entered the reaction vessel through an annular clearance (width 1 mm) concentric with the nozzle. Ignition occurred in the reaction vessel by an electric spark, energy ~0.45 joules. A net of 15 μ thick wire was attached before the nozzle, thus causing recombination of the O atoms. Recombination heat and gas temperature were measured with a thermocouple (diameter 0.2 mm). The gas

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was sucked from the reaction vessel through a receiver by means of a fore-pump. The visible velocity of flame propagation was photorecorded through a slit. Tests were made: (1) with glow discharge switched off; (2) with glow discharge switched on, and a net before the nozzle; partial or total recombination occurred; this was observed with the aid of the afterglow of NO_2, forming from N_2 residues in the oxygen, and the thermocouple recording; temperature of the thermocouple joint with maximum discharge current ($i_2 \leq 900$ ma) was $< 60^\circ C$; without a net, it was $420^\circ C$; (3) with glow discharge switched on and without a net. In the first test series, the spacing between glow electrodes was 170 mm. Fig. 2a shows the visible velocity U_{vis} of the flame as a function of the coefficient α of the excess oxygen, P = 43 mm Hg. The spark discharge was chosen so strong that no self-ignition occurred with rich mixtures ($\alpha = 0.75$). This explains the apparently low effect of oxygen atoms in this range. Fig. 2b shows U_{vis} as a function of pressure at $\alpha = 3$. Fig. 2c shows U_{vis} as a function of the spark discharge intensity. U_{vis} remained constant in a discharge with net, or with glow discharge switched off. The second test

KOGARKO, S.M., doktor tekhn.nauk; BORODULIN, A.A.; BOKHON, Yu.A.; KOMAROV, V.N.; LYAMIN, A.G.; MIKHAYLOV, V.A.; SVISTUNOV, V.G.

Propagation of the chemical reaction zone in acetylene in large diameter pipes. Khim.prom. no.7:496-501 Jl '62. (MIRA 15:9)

1. Institut khimicheskoy fiziki AN SSSR i Gosudarstvennyy institut po proyektirovaniyu zavodov kauchukovoy promyshlennosti.
(Acetylene) (Gas pipes) (Combustion)

34755
S/020/62/142/003/023/027
B101/B110

11.1210
11.7200

AUTHORS: Ivanov, B. A., and Kogarko, S. M.

TITLE: Upper concentration limit for flame propagation in mixtures of acetylene with oxygen or air

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 3, 1962, 637-638

TEXT: Experiments were conducted to clarify the contradiction between data found by the authors (Ref. 1: DAN, 140, no. 1 (1961)) and H. F. Coward, G. W. Jones (see below). Accurate measurement of the spark energy required for igniting pure C_2H_2 showed: a spark energy of ~1 joule was sufficient at 1.6 at. At the minimum pressure for acetylene ignition (0.65 at), the spark energy was ~1200 joules. The effect of admixed N_2, air, or O_2 was studied (Fig. 2). Conclusions: (1) Small O_2 admixtures increase the explosion danger as compared with pure C_2H_2; (2) small air additions reduce the explosion danger; (3) the data found in Ref. 1 for the concentration limits of O_2 and air in C_2H_2 correspond to the initiation

Card 1/3

energy used for igniting acetylene. Photorecording of the flame propagation velocity in various mixtures showed that the visible flame velocity reflected qualitatively the dependence of the ignition energy on the mixture composition. There are 3 figures and 2 references: 1 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: H. F. Coward, G. W. Jones, Bureau of Mines, Bull. 503 (1952).

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

PRESENTED: August 26, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: August 22, 1961

S/020/62/143/005/009/018
B142/B102

AUTHORS: Yevdokimov, G. S., Kaplan, B. L., Kogarko, S. M., Lovlya, S. A., Novikov, A. S., and Solodilov, L. N.

TITLE: The generation of elastic vibrations by the detonation of gaseous mixtures under water

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 5, 1962, 1085-1086

TEXT: A new way of generating shock waves was developed for the purpose of seismic prospecting under the ocean using the echo method. This method is based on detonating mixtures of gases (H_2/O_2 or propane/O_2) instead of solid explosives. By this means the pressure on the shock wave front is about four times lower than when trinitrotoluene is used, because the gas mixture is less dense and the velocity of detonation is lower, so that no fish are killed. The action of gaseous explosives was checked in several tests carried out in the Sea of Azov at a depth of 7-9 m. The gas mixture was ignited under water in a special steel container of 230 l volume. An exhaust valve above the water surface enabled the reaction products to be

Card 1/2

The generation of elastic vibrations...

controlled. The reflected waves were recorded in the seismographic station. Comparative explosions using trinitrotoluene showed that the explosion of 230 l propane/oxygen mixture produces the same seismic effect as 1 kg trinitrotoluene. The H_2O_2 mixture was less effective. There is 1 figure.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut geofizicheskikh metodov razvedki (All-Union Scientific Research Institute of Geophysical Exploration Methods); Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: June 7, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: May 17, 1961

Card 2/2

KOGARKO, S.M.; IVANOV, B.A.; GRUNIN, A.Ye.

Concentration limits of flame propagation in an acetylene-air mixture. Dokl.AN SSSR 145 no.6:1308-1310 Ag '62. (MIRA 15:8)

1. Institut khimicheskoy fiziki AN SSSR. Predstavleno akademikom V.N.Kondrat'yevym.

(Acetylene) (Flame)

IVANOV, B.A. (Moskva); KOGARKO, S.M. (Moskva)

Spread of the chemical reaction zone in pure acetylene and mixtures with other gases. PMTF no.3:59-66 My-Je '63. (MIRA 16:9)
(Gases--Thermodynamic properties) (Combustion)

TOPIC TAGS: acetylene flame, flame front, flame propagation, concave flame, [illegible] flame, acetylene decomposition flame

[illegible] The shape of the front of an acetylene flame propagating in a hori- [illegible] mm long and 50 mm in diameter at [illegible] atm pressure has been [illegible] of ionization gauges [illegible] measurements made with oscilloscopes and time-resolved photo- [illegible] of the flame front [illegible]

Card 1/2

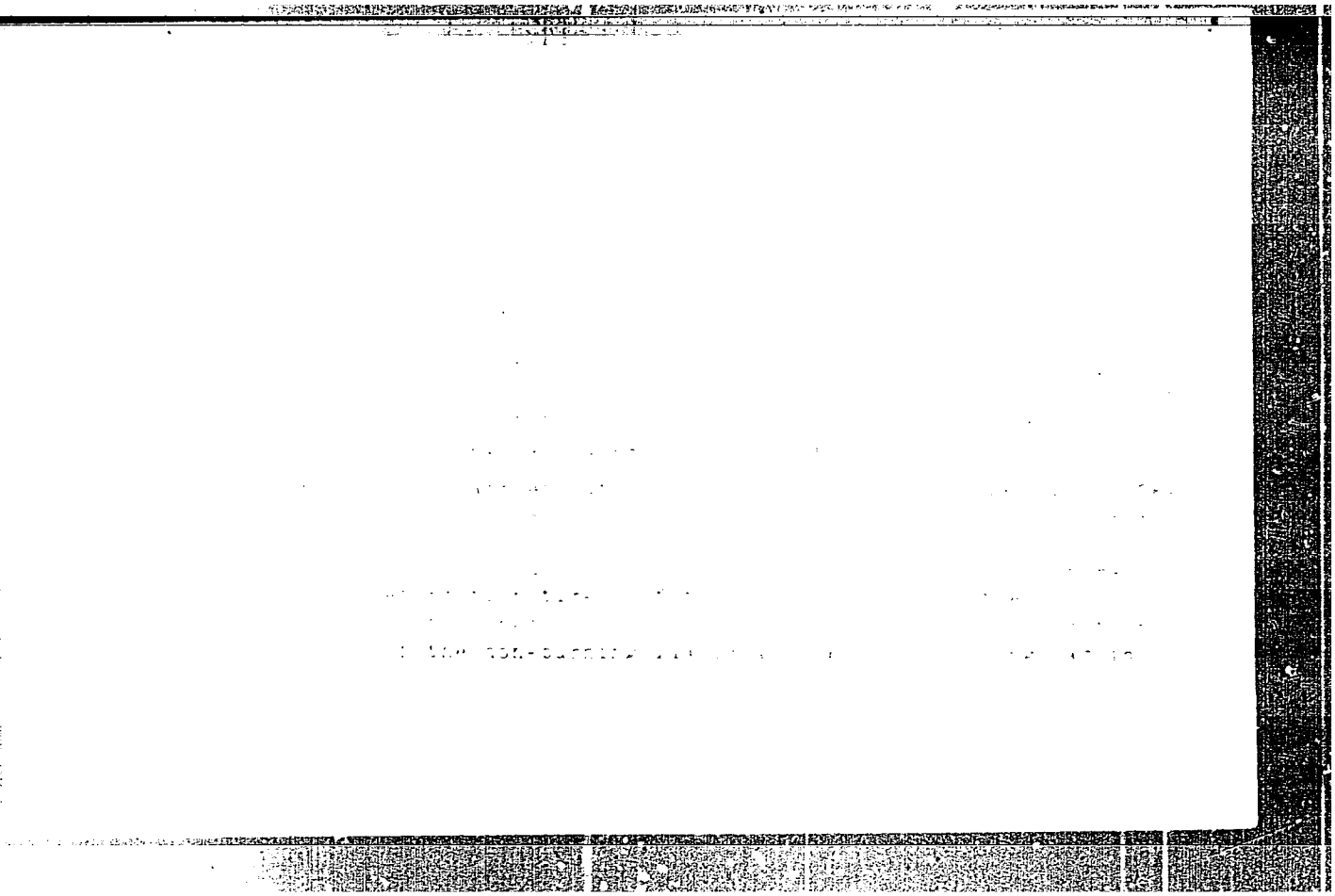
AT3006129

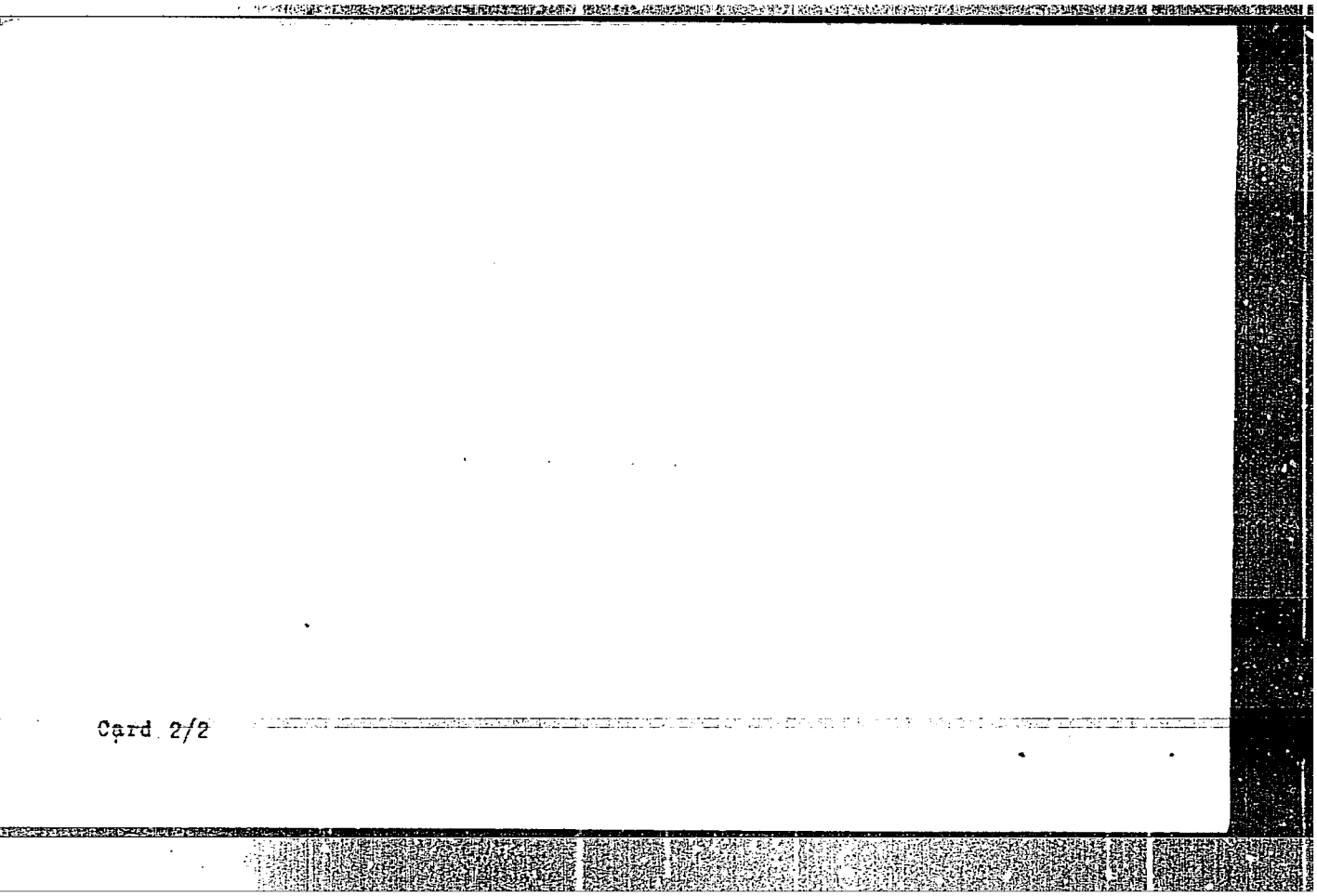
[redacted], the flame front is normal. The existence of a stable [redacted] indicated that other slow-burning mixtures may exhibit a transi- [redacted] flame front [redacted]

[redacted] DATE ACQ: 11Sep63 ENCL: 00

[redacted] NO REF SOV: 003 OTHER: 001

Card 2/2





Card 2/2

[illegible] MIXTURES IN SHOCK [illegible]

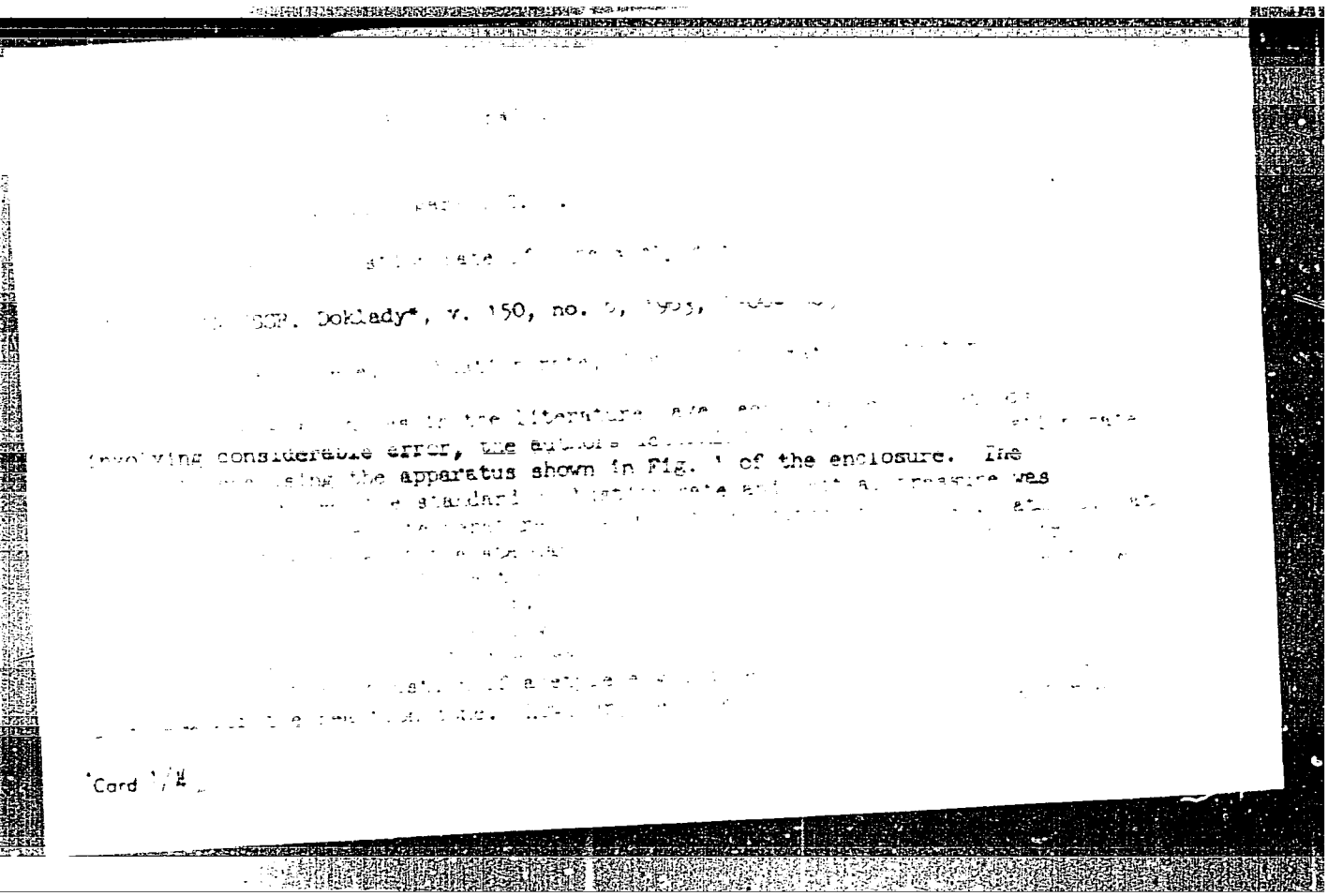
Borisov A. A., S. M. Kogarko, and A. V. Lyubinov. IN Akademiya nauk

[illegible] Apr 1961 [illegible]

[illegible] measure and gas [illegible] the [illegible] mixtures containing [illegible]

[illegible] strongly diluted mixtures or mixtures containing excess methane, [illegible] stage is apparently controlled by the thermal decomposition [illegible] study was made at the Institute of [illegible] Academy

Card 1/1



DOKLADY*, v. 150, no. 5, 1963,

involving considerable error, the apparatus shown in Fig. 1 of the enclosure. The

Card 1/2

sub ?, the reaction does not [illegible]

Institut khimicheskoy fiziki Akademii nauk SSSR [illegible] Academy of Sciences USSR

Feb ? DATE ACQ. [illegible] ENCL: [illegible]

NO REF SOV: 000 OTHER: 002

Card 2/4

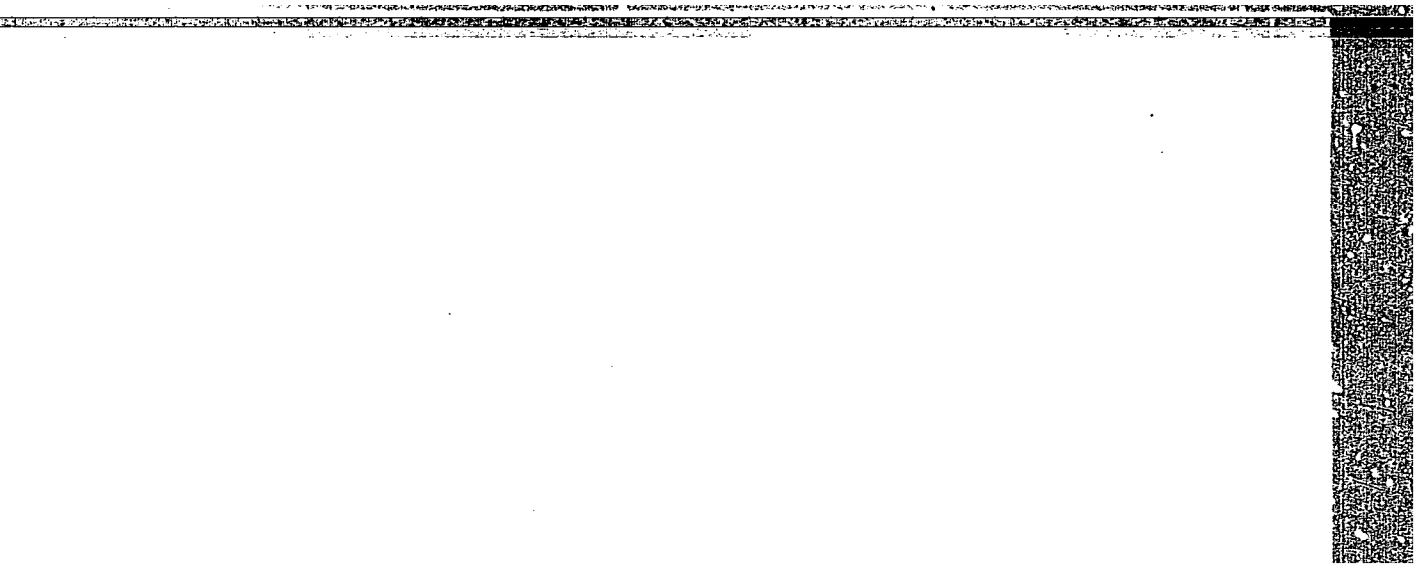
IVANOV, B.A. (Moskva); KOGARKO, S.M. (Moskva)

Study of the normal speed of propagation of a flame and the limit diameters in the decomposition of pure acetylene in vertical tubes. PMTF no.2:164-166 Mr-Ap '64. (MIRA 17:8)

KOGARKO, S.M.; LYAMIN, A.G.; MIKHAYLOV, V.A.; Prinimal uchastiye: BOKHON, Yu.A.

Performance of scrubbers with a packing used as flame-intercepting device in acetylene pipes. Khim. prom. no. 4: 275-282 Ap '64. (MIRA 17:7)

1. Institut khimicheskoy fiziki AN SSSR, i Gosudarstvennyy proyeknyy i nauchno-issledovatel'skiy institut promyshlennosti sinteticheskogo kauchuka.



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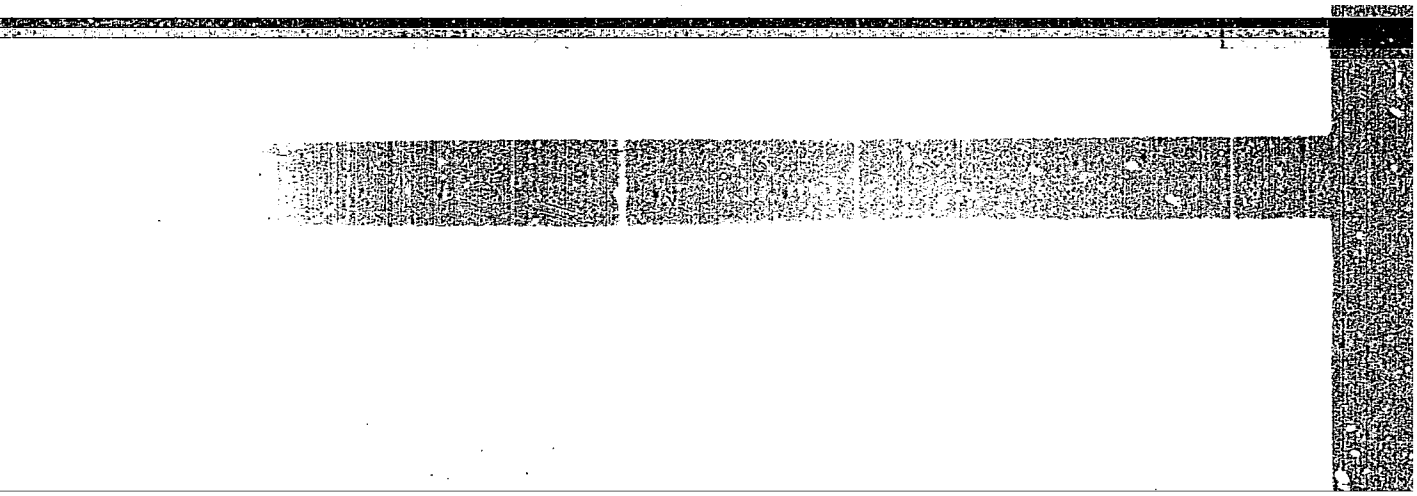

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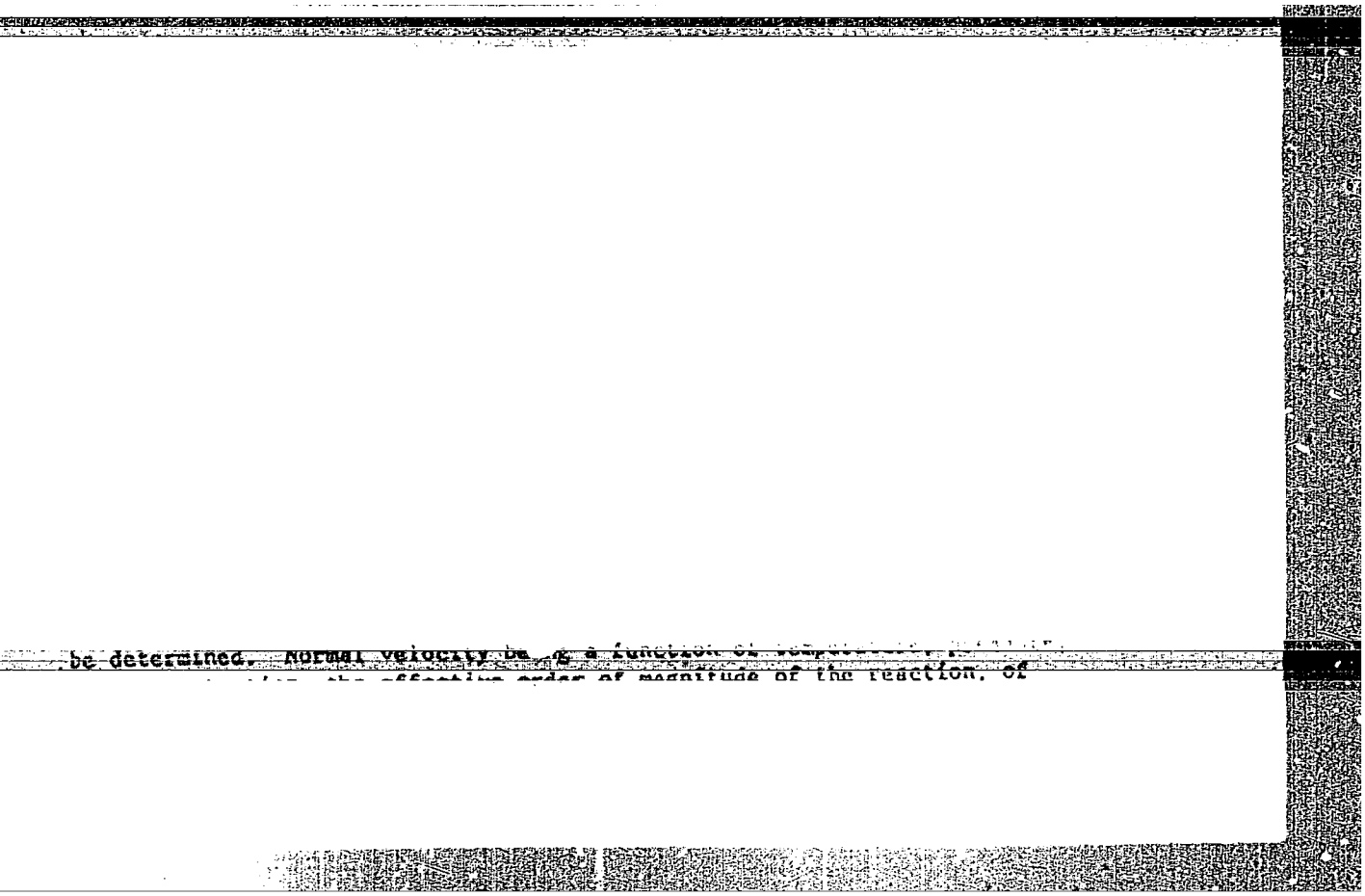
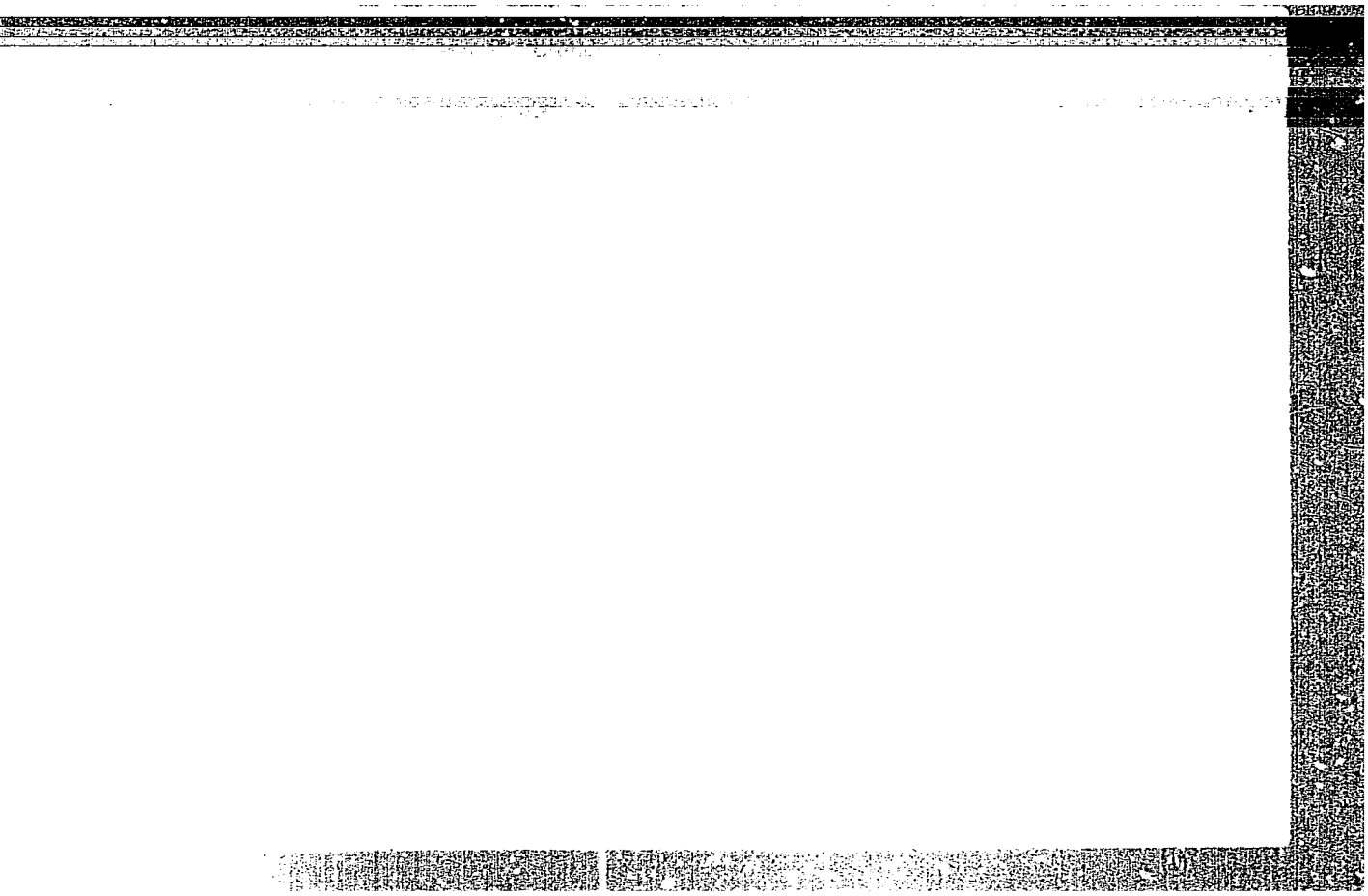


be determined. Normal velocity be g a function of

the effective order of magnitude of the reaction, of



GLIKIN, M.A.; KOGARKO, S.M.; STRIZHEVSKIY, I.I.

Study of the explosive decomposition of acetylene and acetylene nitrogen mixtures using a constant volume spherical bomb. Gaz. prom. 9 no.12:32-36 '64. (MIRA 18:3)

EWT(m)/EPF(c)/EWP(j)/T/EIC(m) RPL WW/JW/RM

ACC NR: AP5026022 SOURCE CODE: UR/0405/65/000/001/0015/0024

AUTHOR: Borisov, A. A.; Kogarko, S. M.; Skachkov, G. I. 68 B

ORG: None

TITLE: Self-ignition of methane-chlorine mixtures

SOURCE: Nauchno-tekhnicheskiye problemy goreniya i vzryva, no. 1, 1965, 15-24

TOPIC TAGS: methane, clorine, ignition, ignition lag, ignition test, exothermic effect, heat of reaction, chemical reaction kinetics, reaction rate

ABSTRACT: Studies of the kinetics of exothermic high temperature reactions often use methods related to the determination of ignition delays. Although the magnitude of such delays is easy to determine experimentally, the theoretical results yield only overall kinetic characteristics which may be used for qualitative estimates of the mechanism and the chemical reaction rate. In certain cases relationships between the ignition lag and the chemical reaction rate constants may be written down in the form of analytic expressions, which, however, must be analyzed as to their accuracy and applicability. The present authors carry out such an analysis on the example of the chlorination reaction of methane. Following the brief formulation of the problem, the authors 1) investigate experimentally the relatively large ignition lags in the low and intermediate temperature regions, 2) describe the details of the chlorination process viewing it as a classical $H_2 + Cl_2$ chain reaction (justified by the

Card 1/2

L 6487-66

ACC NR: AP5026022

results of photochemical and thermal chlorination studies), and discuss (on the basis of data from the literature) various problems concerning molecular dissociation, 3) emphasize the need for the establishment of a quantum mechanical model of the decay of diatomic molecules which would explain the magnitudes of pre-exponents which exceed by many times the number of collisions, and 4) discuss the origin and magnitude of the various components of the experimental error during reaction rate determinations. At high temperatures the values of the chlorine decomposition constant obtained by various indirect and direct methods are in good mutual agreement. This is not the case in the low temperature region where the ignition lag theory should be most accurate, and no satisfactory comparison of the theoretical and experimental data has yet been achieved. The recombination coefficient, k_r, of chlorine within the 600 — 1500K interval is given by $k_r = 10^{34.17 + 3600/T}$. Orig. art. has: 34 formulas and 7 figures.

SUB CODE: GC, FP / SUBM DATE: 30Dec64 / ORIG REF: 003 / OTH REF: 007

Card 2/2

L 4518-66 EWT(m)/EPF(c)/EWP(j)/T/EWA(c) RPL WW/JW/JWD/WE/RM

ACC NR: AP5026063 SOURCE CODE: UR/0405/65/000/002/0022/0034

AUTHOR: Kogarko, S. M. (Moscow); Adushkin, V. V. (Moscow); Lyamin, A. G. (Moscow)

ORG: none

TITLE: Study of spherical detonation in gas mixtures

SOURCE: Nauchno-tekhnicheskiye problemy goreniya i vzryva, no. 2, 1965, 22-34

TOPIC TAGS: detonation, combustion, combustion instability, deflagration to detonation transition, spherical detonation

ABSTRACT: A comprehensive experimental study by high-speed photography and pressure recordings was made with mixtures of air or oxygen with methane, propane, and acetylene to determine the properties of spherical detonation waves induced by plane shock waves and explosive charges, and to investigate conditions of deflagration-to-detonation transition by electrical ignition. The stoichiometric mixtures in plastic balloons 0.7 to 3 m in diameter were detonated by 1—1000-g trotyl charges and by means of a normal shock wave which entered the center of the balloon through a conical attachment connected to the line used to fill the balloon or ignited electrically by means of a tungsten wire located in the center. Pressure recorders were placed inside the balloon and also in the surrounding atmosphere. The explosive-charge and shock-wave energies required to obtain a steady detonation wave were tabulated. Mixtures of propane and methane with air burned normally at velocities of

Card 1/2 UDC: 536.46+534.222.2

L 4518-66

ACC NR: AP5026063

1—10 m/sec. Methane-oxygen mixtures produced accelerated combustion and a maximum speed of 200 m/sec was obtained 18 μsec after ignition. Propane-oxygen mixtures produced a very fast transition to detonation and $1.5 \cdot 10^{-3}$ sec after ignition a detonation speed of 2300 m/sec was attained. This large difference in reactivity between the propane-oxygen and the methane-oxygen mixtures is attributed to kinetic factors. [PV]
Orig. art. has: 11 figures and 19 formulas.

SUB CODE: FP, ME, MA/SUBM DATE: 11Feb65/ ORIG REF: 006/ OTH REF: 002/ ATD PRESS: 4130

Card 2/2. 0010

105 0108

[illegible], O. A., Kogarko, S. M.

[illegible] None

TITLE: Ignition energy of pure acetylene and of its air mixtures at increased initial pressures

SOURCE: Nauchno-tekhni cheskiye problemy goreniya i vzryva, no. 2, 1965, 105-108

TOPIC TAGS: acetylene, ignition, ignition point, ignition test

ABSTRACT: Some researchers found at pressures of less than 1.6 atm.abs. that the ignition energy of pure acetylene is about 1,000 times larger than in ordinary two-[illegible] gaseous mixtures. Other experiments indicated that within the [illegible] range that energy decreases by a factor of 100 from its maximum [illegible] results of experiments [illegible] in [illegible] with the results obtained elsewhere.

Card 1/3 UDC: 536.46

0701 2012

L 6423-66
ACC NR: AP5026073

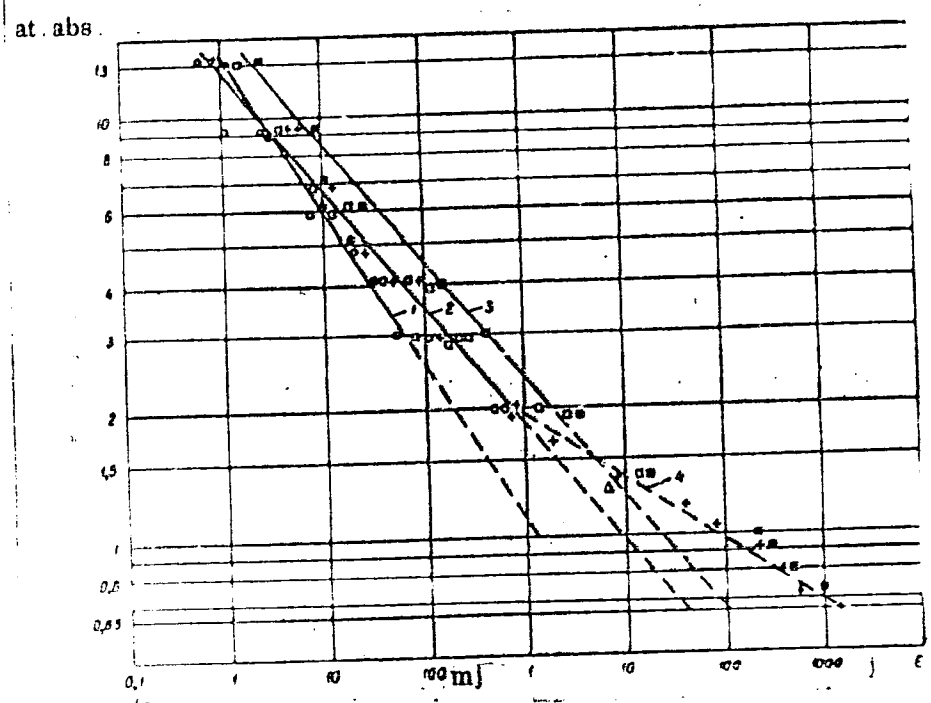


Fig. 1 Ignition energy of pure acetylene and of its mixture with air at various pressures.

- pure C_2H_2 [2],

- C_2H_2 + 17% of air [1]. (ref. 1: B.A. Ivanov, S.M. Kogarko, PMTF, 1963, 3: ref. 2: H. H. Nelson, The effect of pipe diameter on the thermal decomposition of acetylenes, 6-th Sympos. on Combust., 1957, p. 823)

Card 2/3

ACC NR: AP5026073

It is shown that whereas small additions of oxygen make the acetylene more explosive, there exists, at all pressures, a region of air addition amounts for which the mixture is [illegible] The paper concludes with a brief discussion of the possible explanation [illegible] Orig. art. has: 2 figures and [illegible]

SUB CODE: WA, FP, GC / SUBM DATE: 16Dec64 / ORIG REF: 003 / OTH REF: 002

Card 3/3

L 15269-66 EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b) IJP(c) JD/WW/JW/JWD

ACC NR: AP6004425 SOURCE CODE: UR/0414/65/000/003/0010/0019

AUTHOR: Borisov, A. A. (Moscow); Kogarko, S. M. (Moscow); Skachkov, G. I. (Moscow)

ORG: none

TITLE: Composite thermal and branched-chain autoignition in hydrogen-chlorine mixtures

SOURCE: Fizika goreniya i vzryva, no. 3, 1965, 10-19

TOPIC TAGS: combustion kinetics, hydrogen, chlorine, argon, gas dissociation, dissociation constant

ABSTRACT: The authors studied delays in combustion as a function of temperature in chlorine-hydrogen-argon mixtures in the 600-1400°K range. Mixtures of equal amounts of hydrogen and chlorine were studied with additions of 50% and 80% argon. Curves are given showing combustion delay as a function of temperature. An analytical expression is given for the rate constant of chlorine dissociation in terms of the various characteristics of branched-chain and thermal combustion in a mixed gas system. A comparison of the rate constants for thermal dissociation of molecular chlo-

UDC: 536.46

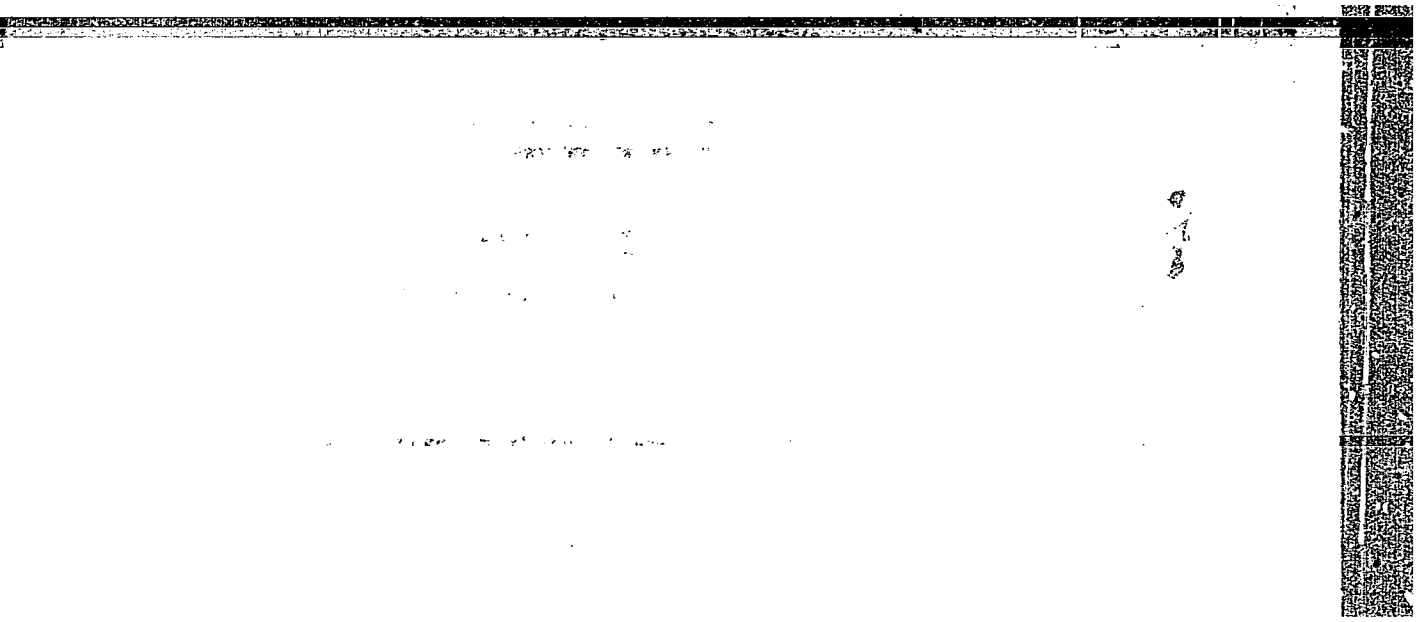
Card 1/2

L 15269-66
ACC NR: AP6004425

rine calculated from this formula with respect to the hydrogen-chlorine and methane-chlorine interactions shows satisfactory agreement at high temperatures. At lower temperatures, the rate constant for chlorine decay is considerably higher when calculations are made with respect to the hydrogen reaction than when the methane interaction is used. It is shown that the divergence in the rate constants calculated from data on thermal chlorination of methane and hydrogen cannot be explained by experimental error nor by errors in calculation. Two theoretical mechanisms are proposed to explain the contradiction. These two schemes are reduced to a single system. The heat balance equation for the process in adiabatic conditions is given. Analytical expressions are derived for calculating combustion delays. Orig. art. has: 5 figures, 9 formulas.

SUB CODE: 21/ SUBM DATE: 15Jan65/ ORIG REF: 006/ OTH REF: 002

Card 2/2



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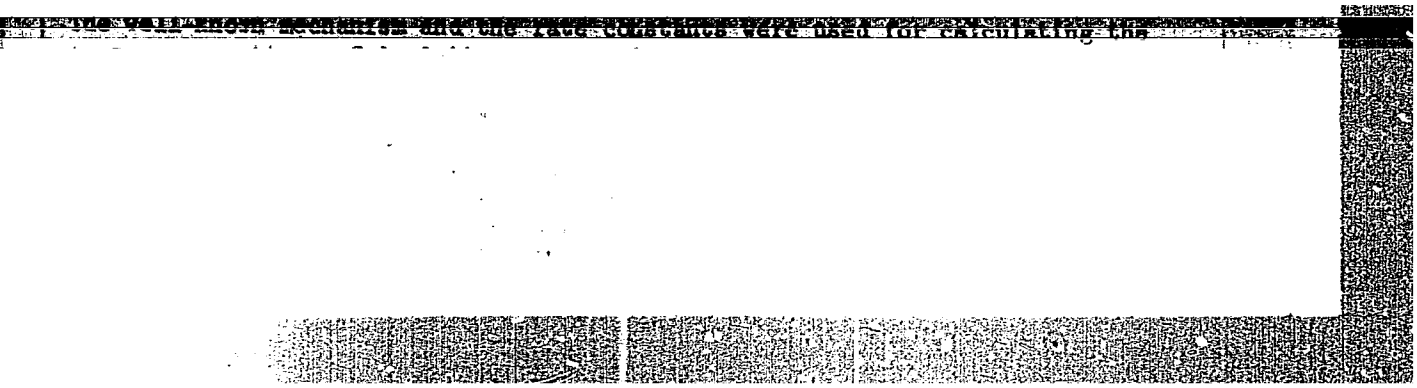

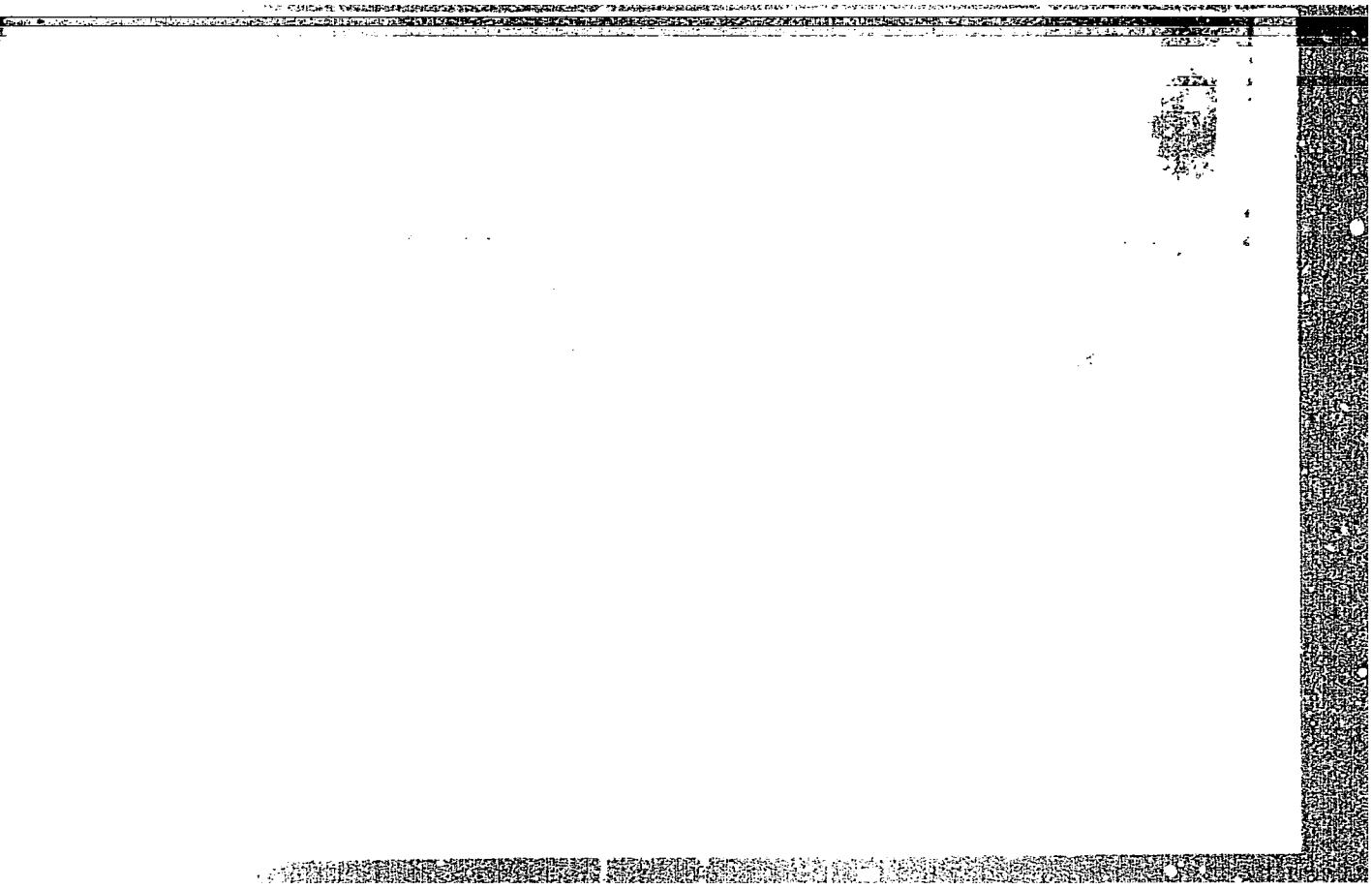

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L 11113-66 EPA/EWT(m)/T/EWA(c) WW/JW/JWD/WE
ACC NR: AP6002163 SOURCE CODE: UR/0195/65/006/006/0968/0976

AUTHOR: Basevich, V. Ya.; Kogarko, S. M. 44 55 44 55 63 03

ORG: Institute of Chemical Physics, AN SSSR (Institut khimicheskoy fiziki AN SSSR) 44 55

TITLE: The phenomenology of atomic-oxygen flames

SOURCE: Kinetika i kataliz, v. 6, no. 6, 1965, 968-976

TOPIC TAGS: flame, combustion, propulsion, combustion kinetics, reaction mechanism

ABSTRACT: Hydrocarbon combustion at low pressures is a problem of practical importance. Atomic flames are examples of combustion at low pressure (on the order of a few mm). The purpose of this work was the investigation of atomic oxygen flames, the causes of their origin and the factors which affect the extent of combustion. The following experimental apparatus was used:

Card 1/3 UDC: 662.611

ACC NR: AP6002163

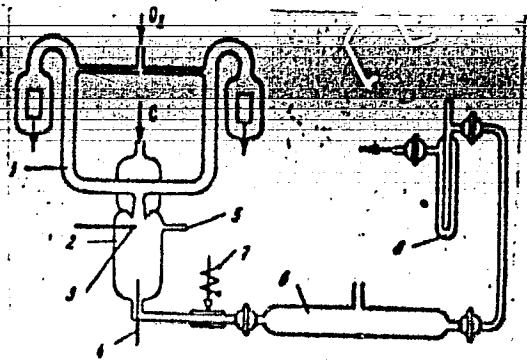

Fig. 1. Diagram of the apparatus

1 - Discharge tube; 2 - reservoir; 3, 4 - thermocouples; 5 - pressure measurement tap; 6 - sampling tube; 7 - electromagnetic valve; 8 - cold trap; C - fuel feed

The main hydrocarbon-combustion products in atomic flames are identical with those of conventional flames: H_2O, CO_2, CO and H_2. In addition, very small amounts of incomplete combustion products are present. Analysis of the tabulated combustion data indicates that the completeness of combustion increases with the increasing rate of the primary reactions of oxygen atoms. The ratio of the reaction products to the amount of atomic oxygen introduced indicates that a chain reaction takes place. Termination, however, predominates apparently over chain branching, since a flame cannot be sustained under experimental conditions without a constant supply of oxygen atoms. The reaction probably

Card 2/3

consists of straight-chain processes, without autocatalysis. A correlation exists between the extent of the reaction (extent of conversion) and the ratio of the primary-reaction rate W for oxygen atoms and the critical rate of self-heating W_{cr}. The extent of conversion increases with increasing W/W_{cr}. The authors feel that such an explanation, considering only the primary reaction, is sketchy rather than comprehensive. Complete analysis of the generation of atomic flames and of the existence of partial combustion in them is contingent on the knowledge of the mechanism of hydrocarbon oxidation in the course of combustion. Orig. art. has: 5 figures and 1 table. [VS]

SUB CODE: 21/ SUBM DATE: 09Jan64/ ORIG REF: 010/ OTH REF: 012
ATD PRESS: 4176

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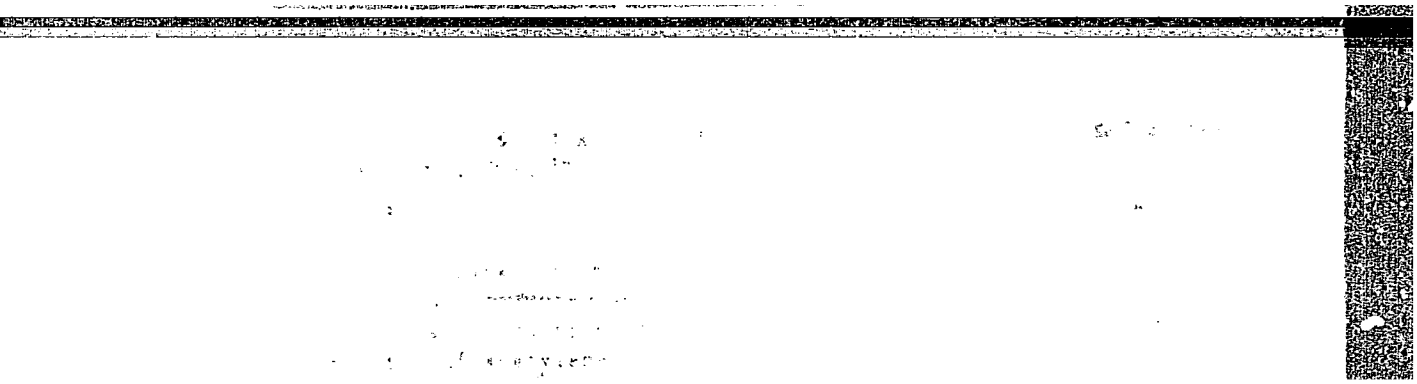

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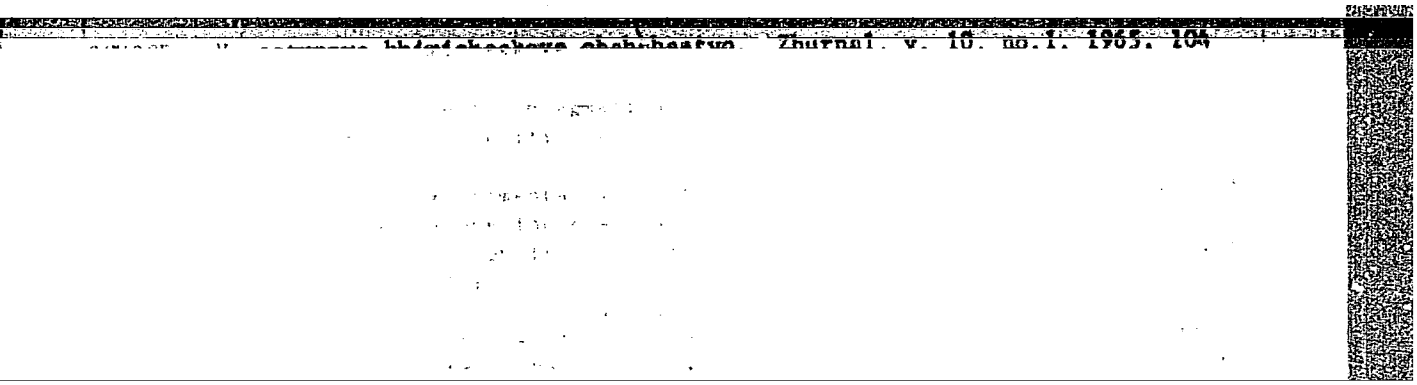

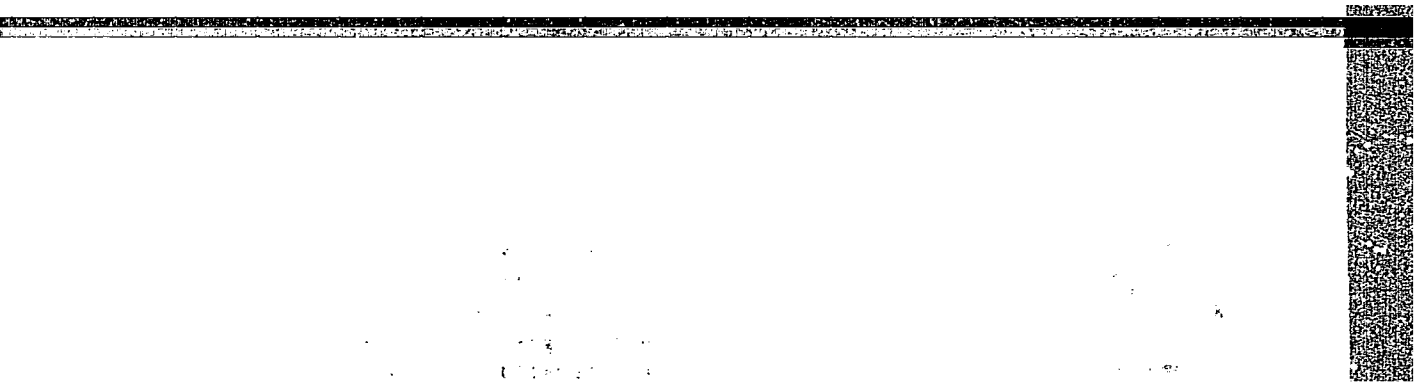

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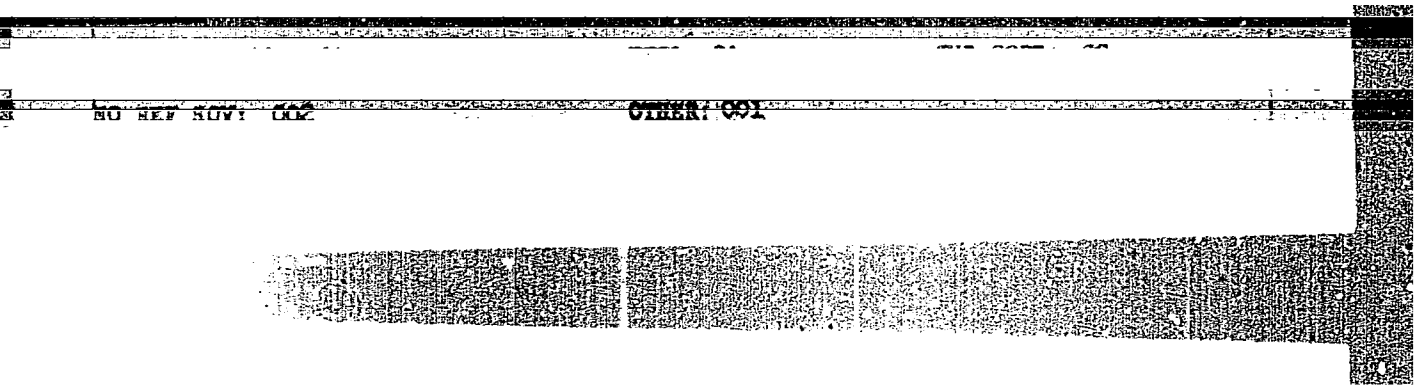

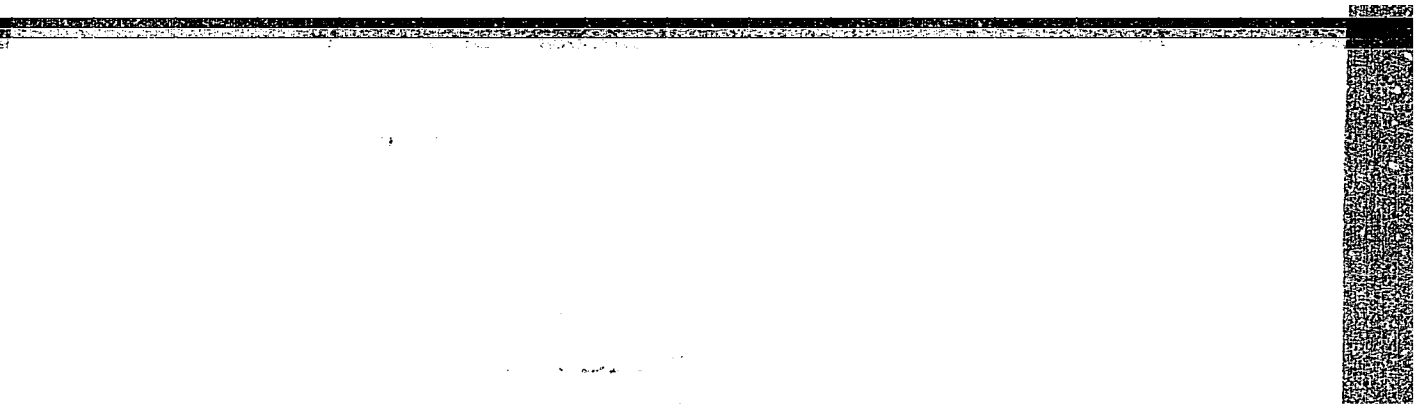

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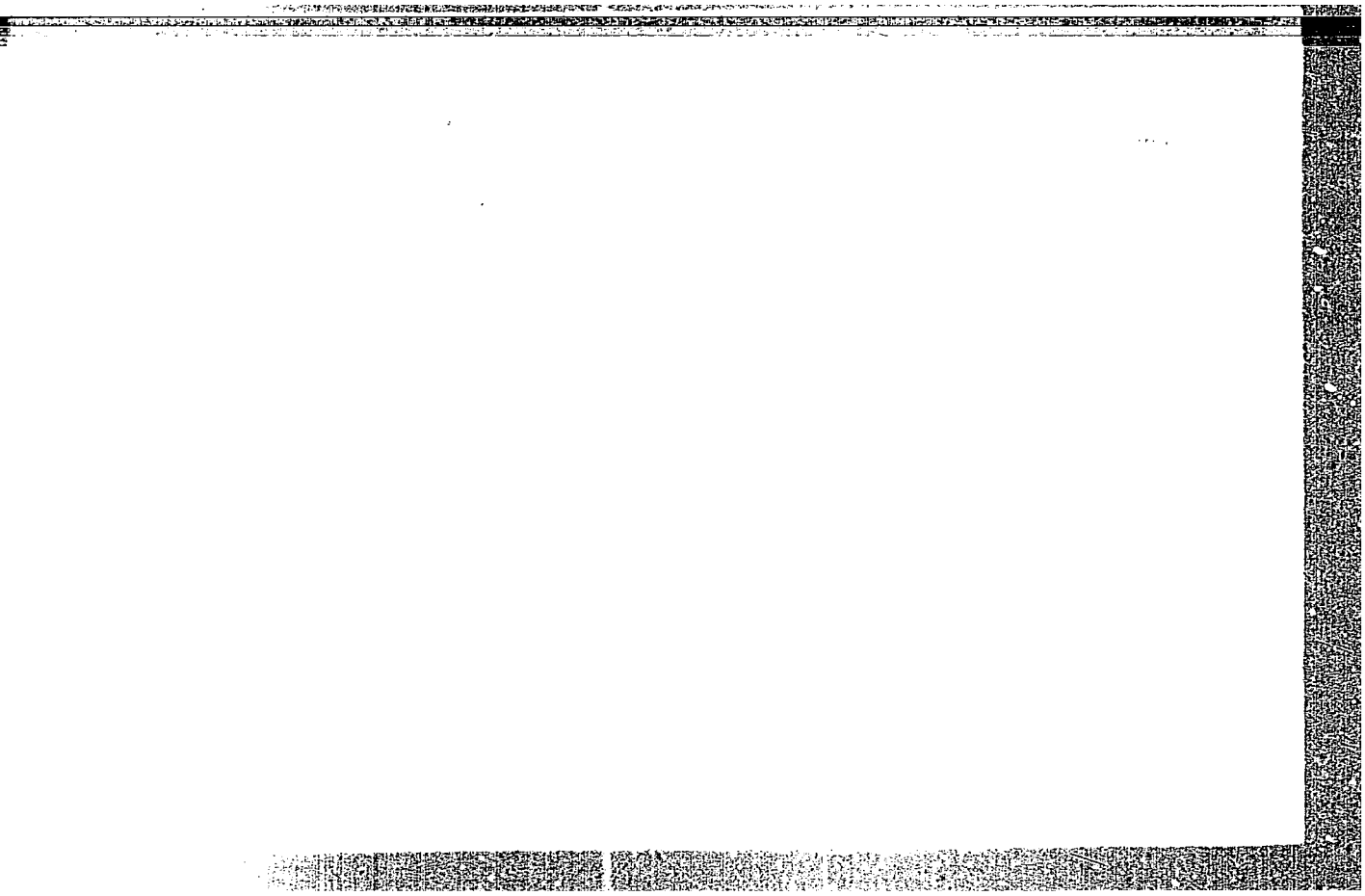
KOGARKO, S.M.; LYAMIN, A.G.; MIKHAYLOV, V.A.

Studying the decomposition of acetylene and the flame passage through a packed scrubber at low pressures. Khim. prom. 41 no.8:621-625 Ag '65. (MIRA 18:9)

1. Institut khimicheskoy fiziki AN SSSR.



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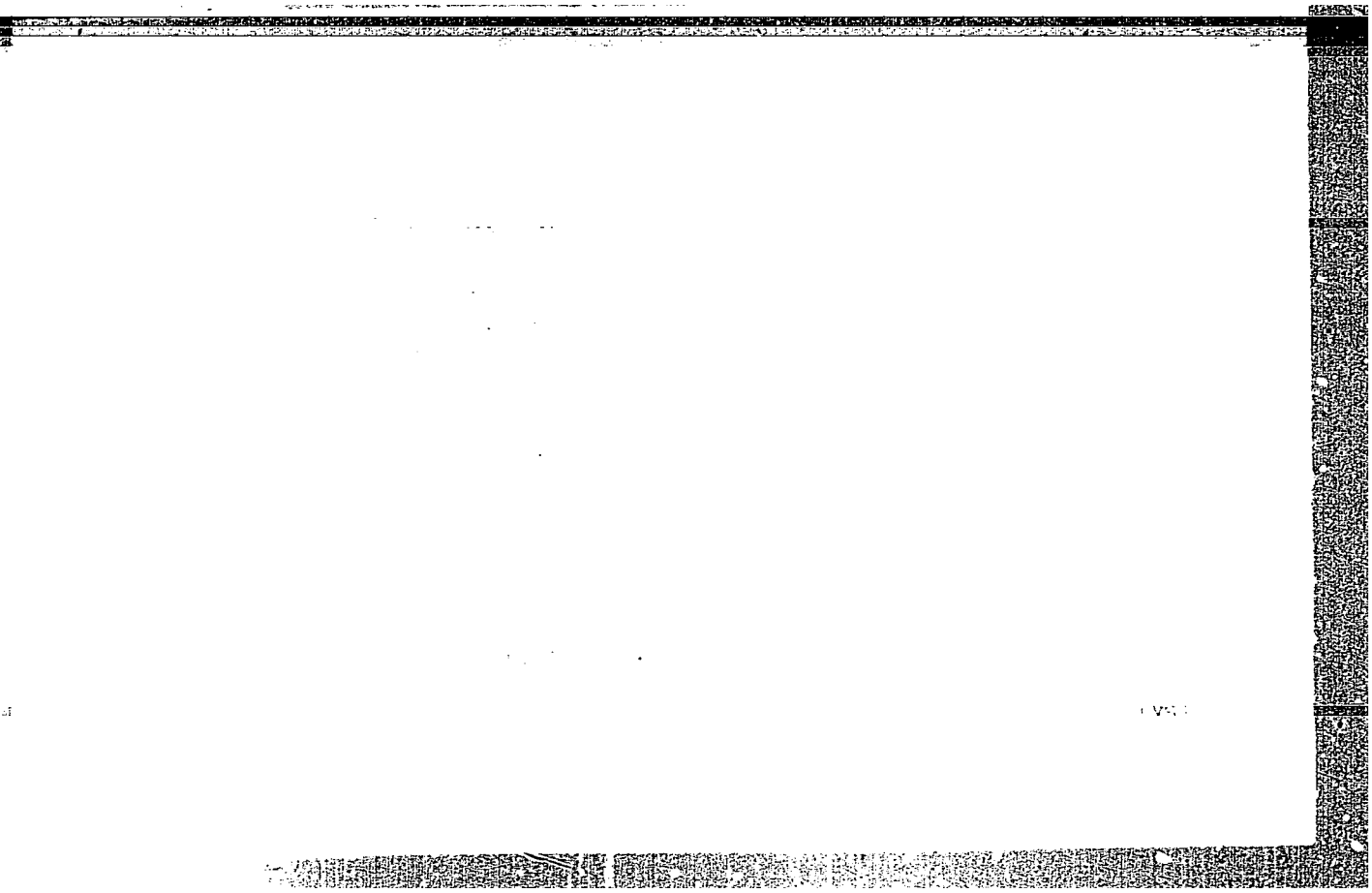

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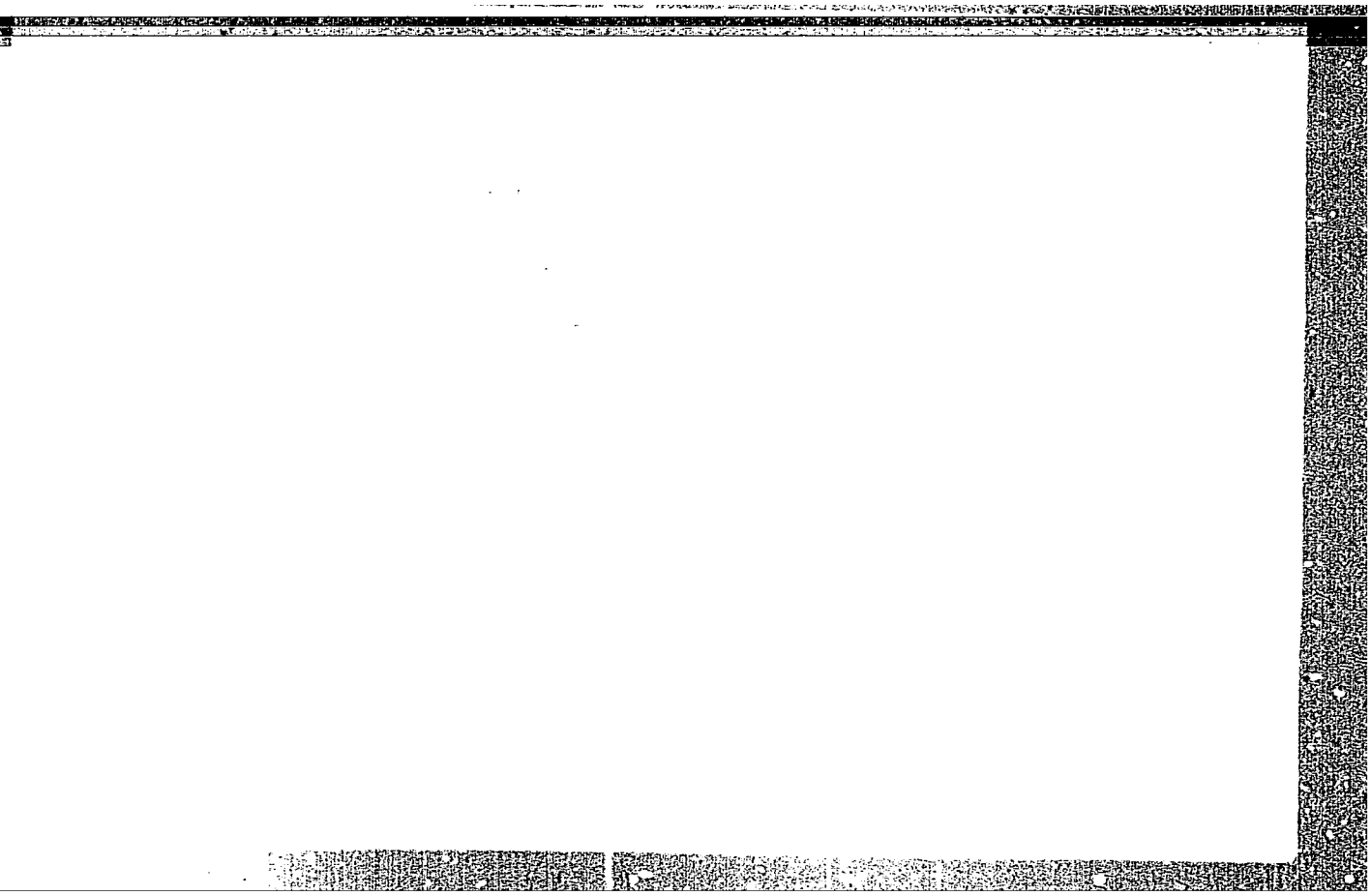

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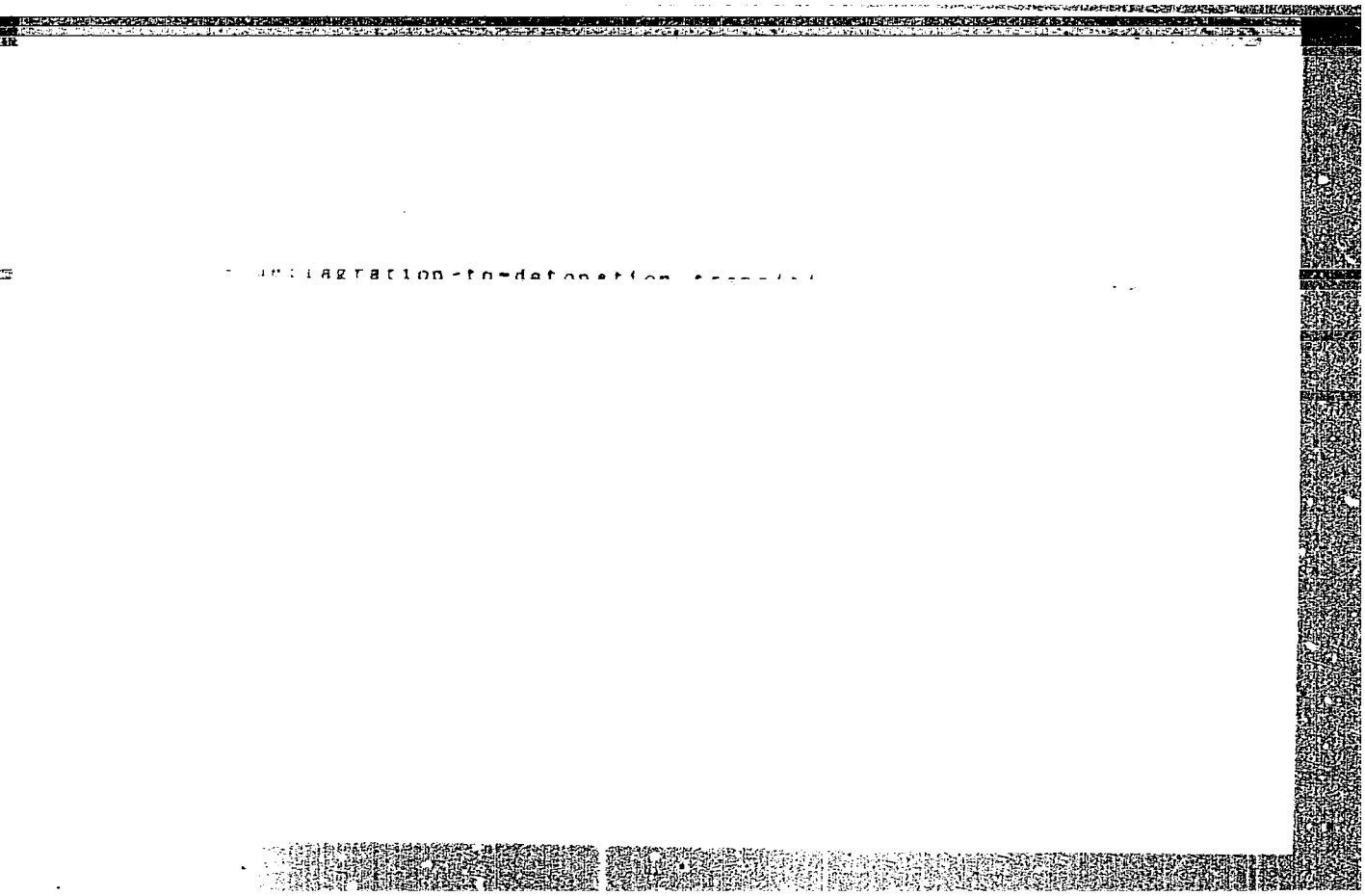

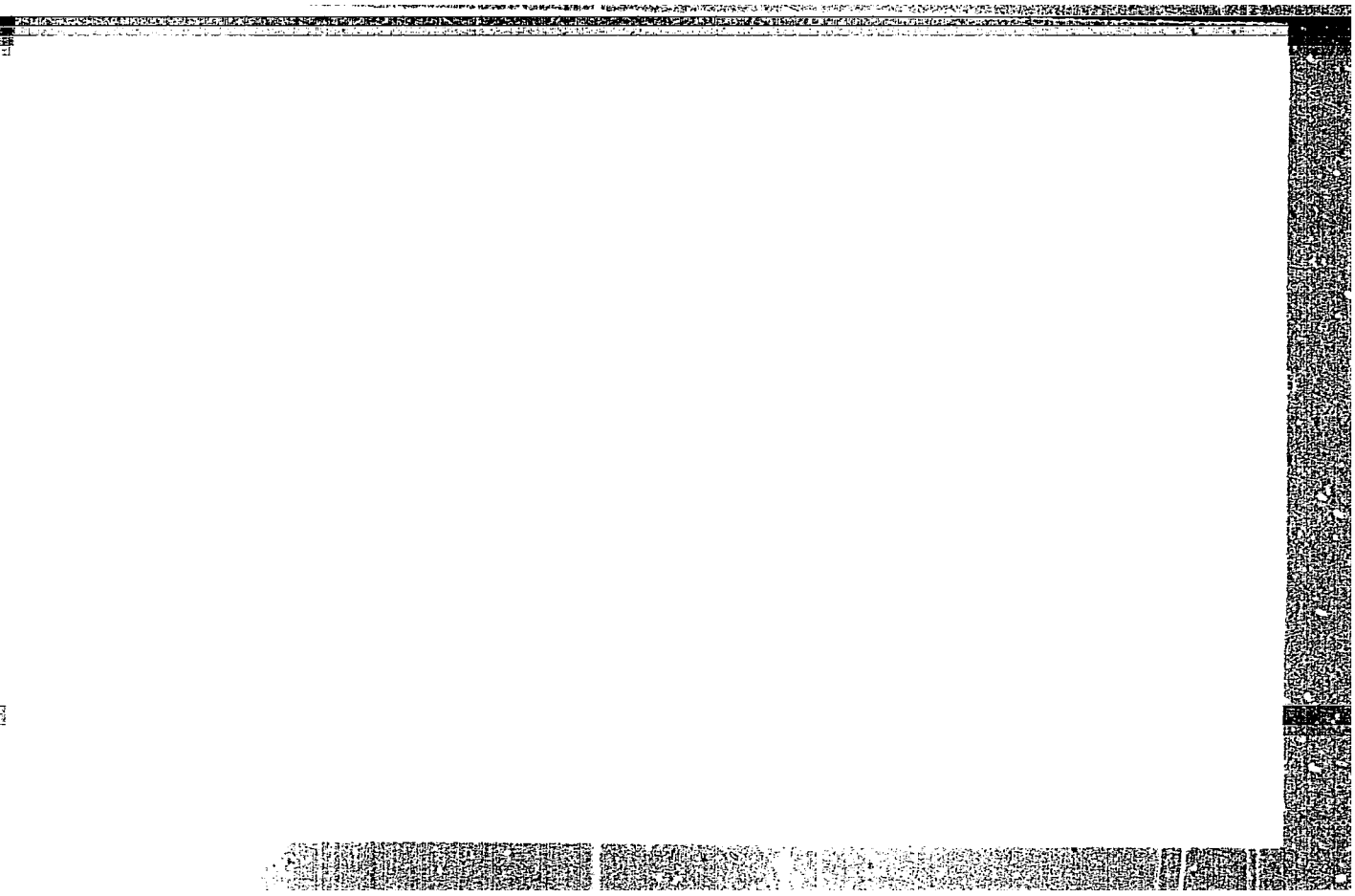

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L 2933-66 EWT(m)/EPF(c)/EWP(j)/T/EWA(c) WE/RM

ACCESSION NR: AP5023369 UR/0020/65/164/001/0125/0126

AUTHORS: Borisov, A. A.; Kogarko, S. M.; Lyubimov, A. V.

TITLE: On the instability of a liquid surface during sliding of detonation and impact waves upon it

SOURCE: AN SSSR. Doklady, v. 164, no. 1, 1965, 125-126 and top half of insert facing page 126

TOPIC TAGS: liquid surface, impact wave, detonation wave, glycerin, flash point, cetane

ABSTRACT: The effect of sliding detonation and impact waves on a liquid surface and the flash points of the vapors resulting from the passage of the waves ov the liquid surface were determined. The rate of gas flow over the liquid surface in all experiments performed exceeded the critical velocity U_0

$$U_0^2 < \frac{4\alpha g \rho}{\rho_1},$$

where α is the surface tension coefficient, g - acceleration due to gravity, ρ - the density of the liquid, and ρ_1 the gas density behind the wave front. Photographs of the disturbance produced on the surface of glycerin by the passage of detonation waves over it are presented. The waves were produced by the explosion of

Card 1/2

Card 2/2

L 22986-66 EWT(1)/EWT(m)/EWP(j)/ETC(c) IJP(c) JD/JW/WW

ACC NR: AP6012922 SOURCE CODE: UR/0020/66/167/005/1079/1082

AUTHOR: Basevich, V. Ya.; Kogarko, S. M.

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

TITLE: The thermal limit of an atomic oxygen-methane flame

SOURCE: AN SSSR. Doklady, v. 167, no. 5, 1966, 1079-1082

TOPIC TAGS: atomic oxygen flame, methane, atomic flame, methane conversion

ABSTRACT: The present work establishes the limiting conditions for the conversion of methane in an atomic oxygen flame at elevated temperatures and verifies quantitatively the existence of a thermal limit by means of rate constants of the atomic oxygen-methane reaction obtained at the limiting conditions. It was established that as the current increases, the concentration of atomic oxygen increases and the temperature of the oxygen flow rises somewhat. A limiting value of current was observed above which the reaction takes place with a high conversion (> 42 ma). It was found that the rate constants obtained from the limits of the atomic flame are in agreement with calculations

UDC: 541.126

Card 1/2

L 06182-67 EWT(m)/EWP(1) WW/JW/WE/RM

ACC NR: AP6030700 (A,N) SOURCE CODE: UR/0195/66/007/004/0589/0596

60
X3

AUTHOR: Borisov, A. A.; Kogarko, S. M.; Skachkov, G. I.

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

TITLE: Thermal decomposition of nitromethane

SOURCE: Kinetika i kataliz, v. 7, no. 4, 1966, 589-596

TOPIC TAGS: nitromethane, thermal decomposition, combustion, chemical kinetics

ABSTRACT: An experimental investigation of the autoignition of argon-diluted nitromethane vapors has been carried out in the temperature range 700—1300K. The purpose of the investigation was to determine the constant of nitromethane decomposition in as wide a temperature range as possible without resorting to far-out extrapolation, on the assumption that the dissociation of the initial nitromethane molecule along the C-N bond plays the governing role in the ignition process. It was found that the thermal decomposition of nitromethane is a first-order reaction. An analytical expression was derived, which relates the autoignition delay with kinetic and thermal parameters of the system, and from this expression the constant of the monomolecular decomposition was calculated. This constant,

$$k = 10^{11.8}\left(\frac{57000}{RT}\right)^{1.7}\exp\left(-\frac{57000}{RT}\right)\frac{1}{\text{sec}}$$

UDC: 541.124+542.921.4

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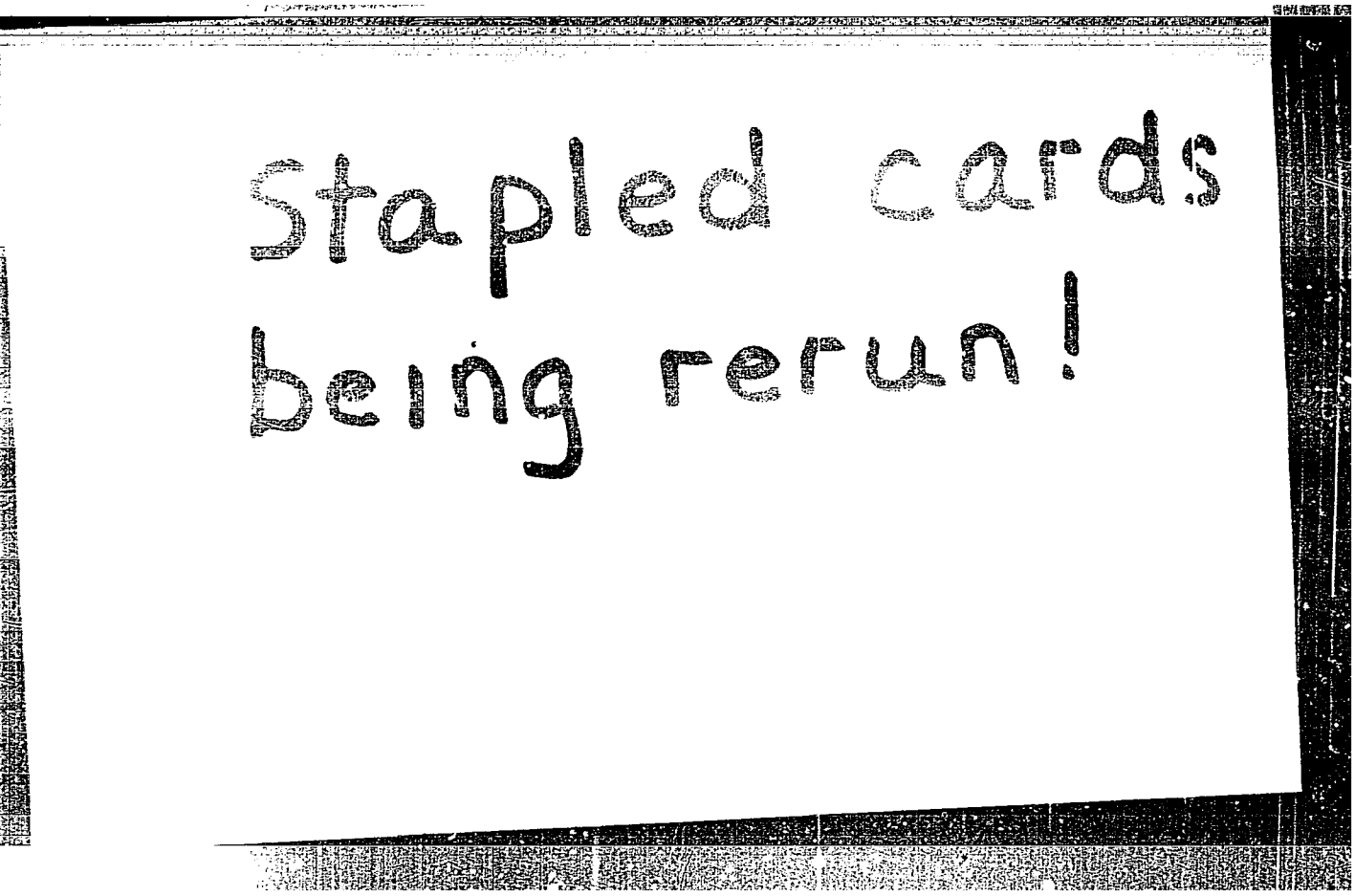

L 2933-66 EWT(m)/EPF(c)/EWP(j)/T/EWA(c) WE/RM

ACCESSION NR: AP5023369 UR/0020/65/164/001/0125/0126

AUTHORS: Borisov, A. A.; Kogarko, S. M.; Lyubimov, A. V. 44,55

TITLE: On the instability of a liquid surface during sliding of detonation and impact waves upon it

SOURCE: AN SSSR. Doklady, v. 164, no. 1, 1965, 125-126 and top half of insert facing page 126

TOPIC TAGS: liquid surface, impact wave, detonation wave, glycerin, flash point, cetane

ABSTRACT: The effect of sliding detonation and impact waves on a liquid surface and the flash points of the vapors resulting from the passage of the waves over the liquid surface were determined. The rate of gas flow over the liquid surface in all experiments performed exceeded the critical velocity U_0

$$U_0^4 < \frac{4\alpha g \rho}{\rho_1},$$

where α is the surface tension coefficient, g - acceleration due to gravity, ρ - the density of the liquid, and ρ_1 the gas density behind the wave front. Photographs of the disturbance produced on the surface of glycerin by the passage of detonation waves over it are presented. The waves were produced by the explosion of

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ACCESSION NR: AP5023369

an oxygen-hydrogen mixture. Flash points of kerosene and cetane vapors produced by oxygen impact waves were determined. It was found that the flash point of the vapor-oxygen mixture was dependent on the Mach number. A cetane-oxygen mixture ignites at Mach number 2.1 and a cetane-air mixture at Mach number 2.6. Orig. art. has: 1 equation. [Abstracter's note: no photographs are included in the present article.]

ASSOCIATION: Institut khimicheskoy fiziki, Akademii nauk SSSR (Institute for Chemical Physics, Academy of Sciences, SSSR); Moskovskiy inzhenerno-fizicheskiy institut (Moscow Engineering-Physics Institute) 44,55

SUBMITTED: 06Feb65 ENCL: 00 SUB CODE: GC, ME

NO REF SOV: 004 OTHER: 001

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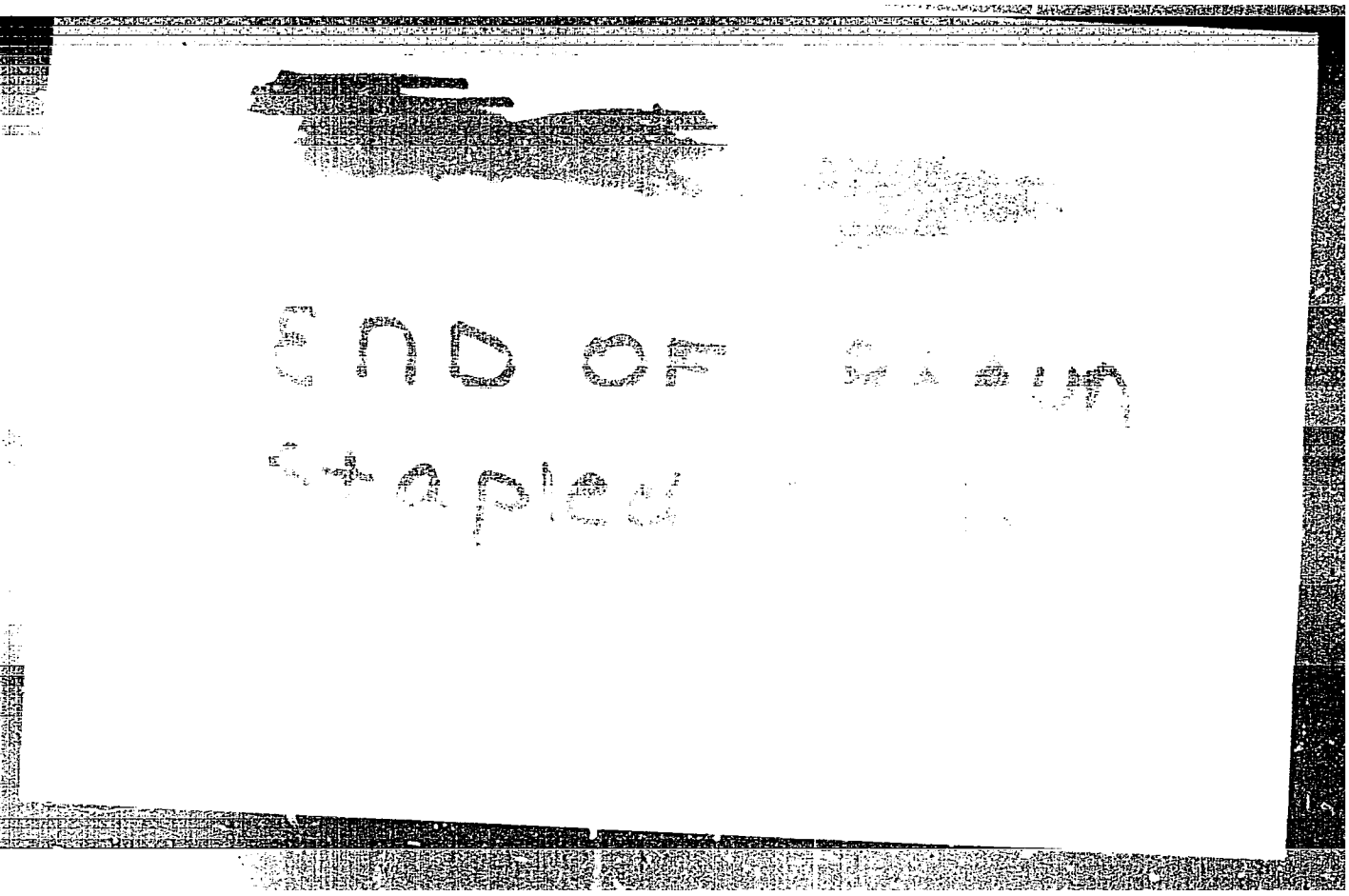

ACC NR: AP6029763 (N) SOURCE CODE: UR/0414/66/000/002/0107/0109

AUTHOR: Vavilov, A. N.; Kogarko, S.M.; Basevich, V. Ya.

ORG: none

TITLE: The effect of active particles on flame stabilization at low pressures

SOURCE: Fizika goreniya i vzryva, no. 2, 1966, 107-109

TOPIC TAGS: combustion, air breathing engine, combustion stability, flame stabilization

ABSTRACT: Experiments were made to determine the effect of active flame species, such as radicals and atoms (OH, H, O), on the stability of turbulent combustion of natural gas-air mixtures with respect to pressure and flow velocity. At a constant air flow, the gas flow rate was gradually decreased until the flame separated from the flame holder. This procedure was repeated at various pressures ranging from 20 to 300 mm Hg and flow velocities of 5--35 m/sec. Plots of the gas flow rate vs pressure and velocity were obtained delineating the regions of stable combustion with and without active flame species. The latter were introduced in the form of combustion products. It was shown that active flame species widen the stability region of lean mixtures by 40—60% and of rich mixtures by 5—15%. It is concluded that acceleration of the combustion rate by introduction of active flame species substantially lowers the pressure limit for stable combustion. Orig. art. has: 3 figures. [PV]

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Card 1/1 hs 5077 UDC: 536.468

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TSAPKIN, N.V., red.; TIKHONOVA, I.M., tekhn. red.

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(Money) (Banks and banking)

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(Russia—Economic policy) (Russia—Culture)

PLOTNIKOV, K.N.; KOGAY, A.V., kand.ekonom.nauk; LARIONOV, K.A., prof.; TSAPKIN, N.V., dotsent; VORONINA, N., red.; NAUMOV, K.M., tekhn.red.

[Finances and credit of the U.S.S.R.; textbook] Finansy i kredit SSSR; uchebnoe posobie. Moskva, Izd-vo VPSh i AON pri TsK KPSS, 1962. 253 p. (MIRA 15:2)

1. Kommunisticheskaya partiya Sovetskogo Soyuza. Vysshaya partiynaya shkola. 2. Chlen-korrespondent AN SSSR (for Plotnikov). (Finance)

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