5(4)

AUTHORS: ~~Miller, V. B.,~~ Neyman, M. B., Solobovnikov, S. P. SOV/76-33-2-35/45

TITLE: A Study of the Reaction of Isotopic Exchange Between $CH_2J_2^*$ and J_2 by the Intermittent Illumination Method (Issledovaniye reaktsii izotopnogo obmena mezhdu $CH_2J_2^*$ i J_2 metodom preryvistogo osveshcheniya)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 2, pp 457 - 462 (USSR)

ABSTRACT: The method mentioned in the title is based upon an impulse radiation (Ref 4) with a definite ratio between the illuminated and dark periods. This "pulsating" illumination is usually accomplished by means of a rotating disk with slits in it, which interrupts a light beam or allows it to penetrate the slits periodically. In the present work tagged methylene iodide was used which was obtained from CH_2J_2 and NaJ^{131}. The

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investigations were carried out using an apparatus (Fig 3) the reaction vessel of which was located in an air thermostat, and the reaction components could be separated after the experiment by adsorption of the iodine on silver. The irradiation was carried out using an SVDSh-250-3 Hg lamp and the light impulses could be varied from 1 to 10^{-4} seconds by means of a rotating disk. The exchange between $CH_2J_2^*$ and J_2 was tested in the dark in illuminations, under an iodine pressure of 0.2 mm and a methylene-iodide pressure of 1 mm and at 30°C. The experimental results obtained (Table) were represented in form of w_0/w_{st} as a function of $\lg\lambda$ (w_0 = reaction rate (RR) at intermittent illumination; w_{st} = (RR) with constant illumination) (Fig 6). The constant of the (RR) for the reaction $CH_2J^* + J$ amounted to $3 \cdot 10^{-12}$ cm³/second, and the value of the average life of the radicals was found to be: $2 \cdot 10^{-2}$ seconds. According to the mechanism $CH_2J_2^* + h\nu \longrightarrow$

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A Study of the Reaction of Isotopic Exchange Between SOV/76-33-2-35/45
CH_2J and J_2 by the Intermittent Illumination Method

$CH_2J^* + J^*$ (9) (and other reactions I - VI) the stationary concentration of the radicals was calculated to be $2 \cdot 10^{13}$ cm^{-3} There are 6 figures, 1 table, and 4 references, 1 of which is Soviet.

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

SUBMITTED: July 31, 1957

Card 3/3

S/190/60/002/009/015/019
B004/B060

AUTHORS: Shlyapnikov, Yu. A., Miller, V. B., Neyman, M. B., Torsuyeva, Ye. S., Gromov, B. A.

TITLE: Thermally Oxidative Destruction of Polypropylene. III. 15
Study of the Relative Efficacy of Some Antioxidants 15

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 9, pp. 1409-1412

TEXT: With the aim of preventing the oxidation of polypropylene films the authors analyzed the stabilizing effect of the following substances: cyclohexyl benzene, thiourea, 2,4-dinitro-phenyl hydrazine, 2,5-di-t-butyl hydroquinone, diphenyl amine, benzidine, "Poligard", 2,4,6-tri-t-butyl phenol, monobenzyl ester of hydroquinone, 2,6-di-t-butyl-4-methyl phenol (Ionol), propyl gallate, phenyl-β-naphthyl amine (Neozon D), and diphenyl-p-phenylene diamine. The authors determined the induction period before the start of the polypropylene oxidation after adding these substances under the following conditions: 140°C, 300 torr P_{O_2}, concentration

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Thermally Oxidative Destruction of Polypropylene. S/190/60/002/009/015/019
III. Study of the Relative Efficacy of Some B004/B060
Antioxidants

of the stabilizer 0.01 mole/kg (0.003 mole/kg in some cases). Fig. 1 shows the experimental apparatus which permitted the simultaneous analysis of seven samples. The polypropylene film was prepared by rubbing down pulverized polypropylene with the stabilizer, addition of solvent causing the stabilizer, but not the polypropylene, to dissolve, drying and pressing in inert gas at 120 - 130°C and 120 kg/cm^2 pressure. Fig. 2 shows the kinetic curves of oxidation a) of films with the same surface and different weight, b) of films having the same weight but differing in thickness. It follows that oxidation takes place within the film and not only on the surface. Fig. 3 shows the stabilizing effect of 0.003 mole/kg of benzidine, diphenyl amine, and Neozon D. Table 1 gives the induction periods for the examined stabilizers on addition of 0.01 mole/kg, Table 2 the same for several stabilizers on addition of 0.003 mole/kg. Diphenyl-p-phenylene diamine proved to be the best stabilizer, followed by Neozon D, propyl gallate, and Ionol. These results contradict the statement made by S. Ye. Bresler et al. (Ref. 6) that such substances should be applied to polymer stabilization as poorly stabilize at room temperature. Also ✓

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Thermally Oxidative Destruction of Polypropylene. III. Study of the Relative Efficacy of Some Antioxidants

S/190/60/002/009/015/019
B004/B060

easily oxidizing phenols or amines did not bring about a quicker oxidation. There are 3 figures, 2 tables, and 6 Soviet references.

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

SUBMITTED: April 18, 1960

Card 3/3

YERSHOV, Yu.A.; MILLER, V.B.; NEYMAN, M.B.; GONIKBERG, M.G.

Kinetics of the reaction $n-C_3H_7I$ + KI^* in nonaqueous solvents at pressures up to 3000 kg./cm.2. Izv. AN SSSR.Otd. khim. nauk no.12:2103-2106 D '60.
(MIRA 13:12)

1. Institut khimicheskoy fiziki AN SSSR i Institut organicheskoy khimii im.N.D.Zelinskogo AN SSSR.
(Propane) (Iodine—Isotopes)
(Potassium iodide)

84249

S/076/60/034/009/010/022
B015/B056

11.1210

AUTHORS: Miller, V. B., Levin, P. I., Konareva, G. P., Neyman, M. B., and Yenikolopyan, N. S.

19

TITLE: Application of the Kinetic Method of Isotopes for Investigating the Oxidation of Methane in the Presence of Nitromethane

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 9, pp. 1980-1986

TEXT: Two of the authors (Ref. 7) observed that in the oxidation of methane with small additions of NO_2, a slight temperature rise occurs. The latter is due to the formation of nitromethane, which acts as a catalyst and, at first, decays quickly into formaldehyde and carbon monoxides, and in the further course of the reaction it maintains a constant concentration for 1-1.5 minutes. For the time of concentration constancy of the nitromethane it may be assumed that nitromethane either does not take part in the reaction, or (which is more probable) is used up, but is re-formed in the same quantity. In the present case, it was found by the kinetic method that the latter assumption is correct. The

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Application of the Kinetic Method of Isotopes for Investigating the Oxidation of Methane in the Presence of Nitromethane

S/076/60/034/009/010/022
B015/B056

$C^{14}H_4$ used was produced from $BaC^{14}O_3$, and the $C^{14}H_3NO_2$ from marked acetic acid was obtained by a method developed by P. I. Levin (Ref. 11), and formaldehyde was separated by distillation from nitromethane (Table, results of separation). Three series of experiments were carried out; in the first, a mixture of 74.0 torr CH_4 + 146 torr O_2 + 4.7 torr $C^{14}H_3NO_2$ was used at a temperature of 473°C. The activity curves (Fig.3) show that nitromethane is formed from methane, and that nitromethane is not isolated. In the second series of experiments, $C^{14}H_4$ was oxidized besides nitromethane, and it was found that formaldehyde is formed partly direct from nitromethane and partly from methane (Fig. 4). To explain the part played by O_2, a third series was carried out with 220.3 torr CH_4 + 4.7 torr $C^{14}H_3NO_2$ at 473°C, and it was found that in the presence of O_2 the maximum concentration of formaldehyde is four times lower, and is attained three times more rapidly. The fraction of formaldehyde not formed from nitromethane, is formed by a reaction of methane

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Application of the Kinetic Method of Isotopes for Investigating the Oxidation of Methane in the Presence of Nitromethane

S/076/60/034/009/010/022
B015/B056

with nitrogen oxides. The isotopic exchange follows the scheme $C^{14}H_3NO_2 + CH_4 \rightleftarrows C^{14}H_4 + CH_3NO_2$. The formation and consumption rates of nitromethane in the presence and in the absence of oxygen were calculated. 2-3 methane molecules are oxidized for every nitromethane molecule. There are 8 figures, 1 table, and 11 references: 10 Soviet and 1 US.

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

SUBMITTED: December 18, 1958

Card 3/3

26298
15-8200 2209 S/190/61/003/008/011/019
B110/B218

AUTHORS: Gromov, B. A., Miller, V. B., Neyman, M. B., Shlyapnikov, Yu. A.

TITLE: Study of the mobility of ionol in polypropylene and polyformaldehyde

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 8, 1961, 1231-1233

TEXT: It was the aim of the present work to determine the diffusion coefficient D of the antioxidant ionol (2,6-di-tert-butyl-4-methylphenol) in solid isotactic polypropylene (PP) and polyformaldehyde (PF). Ionol tagged with C_{14} was examined. In this, the authors followed the method by A. A. Zhukhovitskiy et al. (Primeneniye radioaktivnykh izotopov v metallurgii (Application of radioisotopes in metallurgy), Metallurgizdat, Sb. 34, 1955, p. 102). Tagged ionol (app. 1.2 mg for PP, and app. 0.5 mg for PF) was applied to the polymer plate (1-2 mm thick). The plates were heated to experimental temperature (60-110°C for PP, 80-110°C for PF).

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S/190/61/003/008/011/019
B110/B218

Study of the mobility of ionol in ...

and the activity was measured, which decreased due to diffusion of ionol into the plates. According to Zhukhovitskiy, the curve $I/I_0=f(t^{-1/2})$ has an asymptote which passes through the origin of coordinates. Between D and the tangent of the asymptote, the relation $D = \left(I_\infty^2 d^2\right)/\left(I_0^2 \cdot \pi \cdot m^2\right)$ holds, where d = thickness of the sample, m = tangent of the slope, and I_∞ = activity after an infinite time of diffusion. With D being sufficiently large, the β rays of C_{14} cannot practically penetrate the plate so that one may write down for I_∞: $I_\infty \approx I_0/\mu d$. Here, μ is the absorption coefficient of β-radiation (as is the case with most organic substances it is 0.28 cm^2/mg). To exclude losses of ionol, the authors also chose an experimental arrangement in which the ionol was applied between two polymer plates. In this case, they measured the sum I_1+I_2 of the activity of both plates, and found: (1) for PP, $D = 5 \cdot 10^6 \cdot \exp(-23000/RT)$; (2) for PF, $D = 2.5 \cdot 10^1 \exp(-16300/RT)$. Due to the high diffusion rate of ionol

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S/190/61/003/008/011/019

Study of the mobility of ionol in ... B110/B218

in PP, even an incomplete mixing of the antioxidant with the polymer is sufficient. There are 2 figures and 3 Soviet references.

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

SUBMITTED: November 30, 1960

Card 3/3

GROMOV, B.A.; MILLER, V.B.; SHLYAPNIKOV, Yu.A.

Compression molding of films from polypropylene. Plast.massy no.10:
66 '61. (MIRA 15:1)
(Films (Chemistry)) (Propene)

29517
S/062/61/000/011/004/012
B119/B138

15.8061

AUTHORS: Shlyapnikov, Yu. A., Miller, V. B., and Torsuyeva, Ye. S.

TITLE: Principles of action of inhibitors in oxidation of polypropylene

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 11, 1961, 1966-1970

TEXT: Linear, isotactic propylene was oxidized at temperatures above its melting point (up to 200°C with an oxygen pressure of up to 300 mm Hg) in the presence of inhibitors. The following compounds were used as inhibitors: 2,6-di (1,1-dimethylhexyl)-4-methyl phenol (1), 2,2'-methylene-bis-(4-methyl-6-tert-butyl phenol)-a (2), NN'-di-phenyl-p-phenylene diamine (3), N-phenyl-N'-cyclohexyl-p-phenylene diamine (4), and NN'-dicyclohexyl-p-phenylene diamine (5). Investigation was made into the dependence of the length of the induction peric' on the concentration of the inhibiting substance and on temperature, respectively, and the variation in the quantity of inhibitor during the induction period.

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29517
Principles of action of inhibitors ... S/062/61/000/011/004/012
B119/B138

In the latter study, the unconsumed residues of the inhibitors were quantitatively distilled off from the reaction mixture and spectrophotometrically determined. The authors found that the consumption of inhibitor (1) was too high at 200°C and the length of the induction period was only weakly affected (with concentrations increasing up to 0.2 mole/kg there was a linear rise in induction period from 3 to 60 min at 200°C and from 3 to 170 min at 180°C). Concentrations of (2) up to 0.05 mole/kg show a steep rise in the induction period, from 5 to 300 min. Further increase in the concentration of (2), causes only a slight increase in induction period. The simultaneous presence of (1) and (2) shortens the induction period. The inhibiting action of both (1) and (2) is considerably reduced with rising oxygen pressure. Consumption of (2) during the induction period proceeds according to a first order reaction (effective velocity constant: $1.9\cdot10^{-4}sec^{-1}$). The consumption of (1) also depends on its concentration. (3) In concentrations of 0.01 mole/kg to 0.015 mole/kg will prolong the induction period from a few minutes to 5 hr, whereas higher concentrations have only a slight additional effect. (4) has a

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S/062/61/000/011/004/012
Principles of action of inhibitors ... B119/B138

critical concentration minimum. Of all substances investigated, (4) has the strongest oxidation-inhibiting effect. Consumption of (4) and (5) also corresponds to a first order reaction (velocity constant $9 \cdot 10^{-5} \sec^{-1}$ for (4) and $1 \cdot 10^{-3} \sec^{-1}$ for (5)). Consumption of (2), (4), and (5) mainly proceeds by direct oxidation, while a smaller part of these substances is converted by side reactions, such as formation of free radicals and cooperation in branching of propylene chains (especially in (1) and (3)). The dependence of induction period on initial concentration of the inhibitor can be written approximately as follows: $\tau = \tau_{cr} + \frac{1}{k_i} \ln \frac{[I]}{[I]_{cr}}$, $[I]_{cr}$ = critical concentration of inhibitor, $[I]$ = initial concentration of inhibitor, τ_{cr} = induction period of polymer without inhibitor, τ = induction period. [Abstracter's note: Meaning of k_i could not be determined]. Oxidation of the inhibitor initiates the destruction of the polymer. The present paper was read at the general meeting of the

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Principles of action of inhibitors ... S/062/61/000/011/004/012
B119/B138

Otdeleniye khimicheskikh nauk Akademii nauk SSSR (Department of Chemical Sciences of the Academy of Sciences USSR). There are 5 figures, 1 table, and 12 references: 8 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: E. L. Waters, C. J. Busso, Industr. and Engng. Chem. 41, 907 (1949), R. H. Rosenwald, J. R. Hoaston, Industr. and Engng. Chem. 41, 914 (1949). R. H. Rosenwald, J. R. Hoaston, J. A. Chenicek, Industr. and Engng. Chem. 42, 162 (1950). G. W. Kennerly, W. L. Patterson, Industr. and Engng. Chem. 48, 1919 (1956).

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

SUBMITTED: July 27, 1961

Card 4/4

S/020/61/136/003/022/027
B004/B056

AUTHORS: Neyman, M. B., Miller, V. B., Shlyapnikov, Yu. A., and Torsuyeva, Ye. S.

TITLE: The Dependence of the Induction Period of the Oxidation on the Concentration of the Antioxidant

PERIODICAL: Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 3, pp. 647-650

TEXT: The authors proceed from the fact that the problem of the mechanism of the effect produced by inhibitors of the oxidation, especially the connection between induction period and concentration of an inhibitor is as yet not clear. The present paper therefore studies the effect produced by very low concentrations of oxidation inhibitors upon the induction of the oxidation. According to the chain theory by N. N. Semenov $dn/dt = w_i + \varphi n$ (2) is written down for the oxidation. w_i is the rate of initiation, n is the concentration of the active centers, φ the factor of self-acceleration. With addition of an inhibitor, which breaks

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off the reaction chain, the reaction follows the system of equations: $dn/dt = w_i + \varphi n - kxn$ (3); $-dx/dt = kxn$ (4). x is the concentration of the inhibitor, k the rate constant of its reaction with the active centers. The following dimensionless variables are introduced: $\nu = n/w_i\tau_o$ (concentration of the active centers); $\varkappa = x/w_i\tau_o$ (concentration of the inhibitor); $\theta = t/\tau_o$ (time). Equations (3), (4) thus assume the form: $d\nu/d\theta = 1 + a\nu - b\varkappa\nu$ (5); $-d\varkappa/d\theta = b\varkappa\nu$ (6). $a = \varphi\tau_o$; $b = kw_i\tau_o^2$. The discussion of these equations leads to the following result: 1) with $\varkappa_o < a/b$ exponential growth of the active centers; with $\varkappa_o > a/b$ low steady rate of the reaction. Here, $\nu = 1/(b\varkappa_o - a)$ (7) holds for the concentration of the active centers. The induction period is finished as soon as $b\varkappa_o = a$. For the purpose of checking these theoretical assumption, experiments were carried out. The induction period of the thermal oxidation of polypropylene was determined in the presence of various inhibitors of the oxidation (phenolderivatives and aromatic amines). As an example, Fig. 3 shows the course taken by this reaction at

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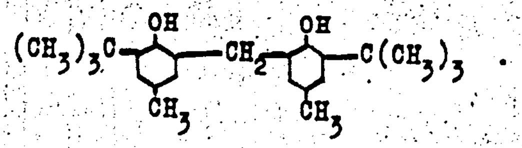
The Dependence of the Induction Period of the Oxidation on the Concentration of the Antioxidant

S/020/61/136/003/022/027
B004/B056

p_{O_2} = 300 mm Hg; 190, 200, and 210°C in the presence of the antioxidant A:



The induction period τ is represented as a function of the concentration x of the inhibitor. From the inclination of the initial sections of the curves $x_0 = k\tau_0/\varphi$ is found. The rate constant k equals 21, 14, and 15 kg/mole.sec. for the temperatures given. For high values of x (steep sections in Fig. 3), an activation energy of about 40,000 kcal/mole is calculated, which corresponds to the activation energies for the oxidation of hydrocarbons. The effectiveness of various oxidation inhibitors may be compared on the basis of k. In this way, the authors proved that at low concentrations N,N'-phenylcyclohexyl-p-phenylendiamine as inhibitor, with polypropylene-oxidation is more effective than the

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The Dependence of the Induction Period of the Oxidation on the Concentration of the Antioxidant

S/020/61/136/003/022/027
B004/B056

inhibitor A. There are 3 figures and 7 references: 6 Soviet and 1 British.

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

PRESENTED: July 29, 1960, by V. N. Kondrat'yev, Academician

SUBMITTED: July 29, 1960

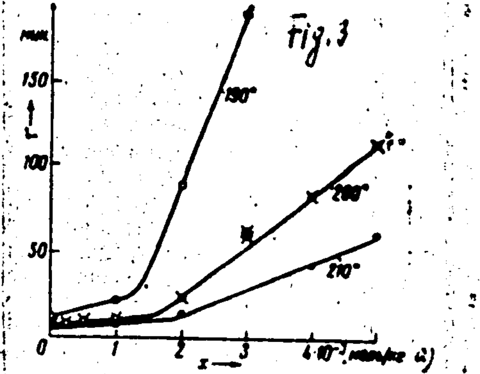

Fig. 3

Legend to Fig. 3: a) mole/kg

5,3400

39850
S/190/62/004/008/011/016
B101/B138

AUTHORS: Shlyapnikov, Yu. A., Miller, V. B., Neyman, M. B., Torsuyeva, Ye. S.

TITLE: Correlations in the effects of inhibitors in oxidation reactions. I. Alkyl phenols

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 8, 1962, 1228-1234

TEXT: The authors studied the effect of 2,6-di-tert.-octyl-4-methyl phenol (I) and 2,2'-p-methylene-bis-(4-methyl-6-tert.-butyl phenol) (II) on the induction period of the oxidation of isotactic polypropylene. The inhibitor consumption was measured for the induction period at 170 - 200°C in the presence of I, and at 190 - 210°C in the presence of II, according to Vysokomolek. soyed., 2, 1409, 1960. The amount unconsumed was determined by weighing the inhibitor sublimed from the reaction mixture at 200°C. Results: (1) The induction period increases with inhibitor concentration but without linear relation. With I, the

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induction period τ depends on pressure; at 170°C and 0.01 moles I/kg polypropylene, τ was 56 and 32 min at 300 and 600 mm Hg, respectively. (2) The absorption spectra of the oxidation products show that their composition remains unchanged during τ, while their amount is proportional to the decreasing inhibitor concentration. The change in concentration of II during oxidation follows a first-order rule. (3) During τ the decrease in the molecular weight of polypropylene is accelerated as the inhibitor concentration rises. At every polymer chain rupture approximately 5 mols. inhibitor are consumed. (4) τ is considerably shortened by adding I to polypropylene already containing II. (5) The low intensity of the epr signals of I and II suggests that only a small portion of inhibitor is present in the form of free radicals. Conclusions: A large amount of inhibitor is consumed by direct oxidation and chain termination initiated by it, but only a small portion by those not initiated by it. The different behaviors of I and II are due to their different effects on initiation and branching during hydroperoxide decomposition. Rapid and direct oxidation by molecular oxygen is assumed for II. There are 4 figures and 1 table. The most important English-language references are: E. L. Waters, C. J. Busso, Industr. and Engng. Chem., 41, 907, 1949;

X

Correlation in the effects of ... S/190/62/004/008/011/016
B101/B138

R. H. Rosenwald, J. R. Hoatson, Industr. and Engng. Chem., 41, 914, 1949;
R. H. Rosenwald, J. R. Hoatson, J. A. Chenicek, ibid., 42, 162, 1950.

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

SUBMITTED: May 18, 1961

X

Card 3/3

SHLYAPNIKOV, Yu.A.; MILLER, V.B.; NEYMAN, M.B.; TORSUYEVA, Ye.S.

Regularities of the effect of inhibitors in oxidation reactions. Part 2: Mixtures of alkyl phenols with didecyl sulfide. Vysokom. soed. 5 no.10:1507-1512 O '63.

(MIRA 17:1)

1. Institut khimicheskoy fiziki AN SSSR.

L 13700-63 EWP(j)/EPF(c)/EWT(m)/BDS Pc-4/Pr-4 RM/WW

ACCESSION NR: AP3003521 S/0020/63/151/001/0148/0150

AUTHORS: Shlyapnikov, Yu. A.; Miller, V. B.; Neyman, M. B.; Torsuyeva, Ye. S.

TITLE: Participation of inhibitor in degenerate branching of a chain 65 64

SOURCE: AN SSSR. Doklady, v. 151, no. 1, 1963, 148-150

TOPIC TAGS: inhibitor, oxygen pressure, oxidizing reaction, chain branching

ABSTRACT: The author investigated the influence of the inhibitor "monophenol" on the quantity of critical concentration of another inhibitor "biphenol". It is shown that the factor of self-accelerating oxidizing reaction of high-molecular carbohydrate depends on the oxygen pressure and on the concentration of the "monophenol" inhibitor. The growth of the self-accelerating oxidizing reaction factor in the presence of the inhibitor "monophenol" is explained by the participation of the inhibitor in the act of degenerate branching of chains. The paper was presented by Academician N. N. Semenov on 11 March 1963. Orig. art. has: 11 formulas and 2 figures.

ASSOCIATION: Inst. of Chemical Physics, Academy of Sciences

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L 59350-65

ACCESSION NR: AP5019335 UR/0020/64/157/003/0707/0709

AUTHOR: Konovalova, N. P.; Bogdanov, G. N.; Miller, V. B.; Neyman, M. V.; Rozantsev, E. G.

14
B

TITLE: Antitumor activity of stable free radicals

SOURCE: AN SSSR. Doklady, v. 157, no. 3, 1964, 707-709

TOPIC TAGS: biochemistry, neoplasm

ABSTRACT: The antitumor activity of free radicals was studied in the light of literature data indicating that a vital role in the mechanism of the antitumor action of inhibitors of radical processes is played by the action of comparatively stable free radicals formed from the inhibitors. Stable free radicals of a number of 4-substituted 2,2,6,6-tetramethylpiperidine oxides were investigated by a kinetic method of determining antitumor effectiveness. The kinetics of the changes in the weight of the spleen, number of leukocytes and hemocytoplasts per cubic millimeter of blood and percent content of hemocytoplasts in the bone marrow were studied in mice of the C57BL line with grafted leukemia from the La strain. Antileukemic activity was discovered in three free radicals; the

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L 59350-65

ACCESSION NR: AP5019335

antileukemic activity of one of the preparations was found to be due to the presence in its molecule of both an unpaired electron and of a urethan group.

Orig. art. has: 4 graphs, 1 table.

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

SUBMITTED: 19Mar63 ENCL: 00 SUB CODE: LS, GC

NR REF SOV: 005 OTHER: 003 JPRS

Card 2/2

L 34141-65 EWT(m)/EPF(c)/EWP(j) Pc-4/Pr-4 GS/RM
ACCESSION NR: AT4049847 S/0000/64/000/000/0106/0109 25 23 B

AUTHOR: Shlyapnikov, Yu. A.; Miller, V. B.; Neyman, M. B.; Torsuyeva, Ye. S.

TITLE: The kinetics of the effect of inhibitors in oxidation reactions. III. Inhibitor 2,2'-thio-bis-(4-methyl-6 tert.-butylphenol)

SOURCE: Khimicheskiye svoystva i modifikatsiya polimerov (Chemical properties and the modification of polymers); sbornik statey. Moscow, Izd-vo Nauka, 1964, 106-109

TOPIC TAGS: polypropylene, isotactic polymer, oxidation inhibitor, alkylphenol, thiobiphenol, polymer oxidation, biphenol

ABSTRACT: The oxidation of linear isotactic polypropylene was investigated at about 200C in the presence of the inhibitor 2,2'-thio-bis-(4-methyl-6-tert.-butylphenol), m.p. 83-34C, abbreviated as thiobiphenol. The dependence of the induction period on the thiobiphenol concentration was studied at 190, 200 and 210C, and an oxygen pressure of 300 mm Hg. At a concentration of 0.005-0.020 mole/kg, an approximately linear relationship was found between the induction period and the thiobiphenol concentration. Thiobiphenol consumption in the induction

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L 34141-65

ACCESSION NR: AT4049847

period was investigated only at 200C at initial inhibitor concentrations of 0.015 and 0.030 mole/kg. The rate constants of thiobiphenol consumption calculated from the slope of the plotted curves are 1.38×10^{-4} sec^{-1} for the initial 0.015 mole/kg and 1.07×10^{-4} sec^{-1} for the 0.030 mole/kg concentration, i.e. the deviation of the inhibitor consumption from the first-order law is insignificant. The relationship between the critical concentration of thiobiphenol at the end of the induction period and its initial concentration calculated by the given equation shows that the constant "k" depends linearly on the initial thiobiphenol concentration. The plotted critical concentration of thiobiphenol decreases approximately 30-fold when the initial concentration is increased from 0.005 to 0.030 mole/kg, while that for biphenol decreases by less than 50%. A thiobiphenol solution in heptane has a maximum absorption in ultraviolet light at 292-300 mμ, while the analogous biphenol solution absorbs at 28 - 285 mμ. The consumption of each inhibitor in the mixture is first order in nature, but the rate constants differ considerably from the rate constant of each of the inhibitors when used alone: for thiobiphenol in a mixture, $K = 1.07 \times 10^{4}$ sec^{-1} instead of 1.38×10^{-4} sec^{-1} for the same initial concentration, and for biphenol in a mixture, $k - 3 \times 10^{-4}$ sec^{-1} instead of 2×10^{-4} sec^{-1} in the absence of thiobiphenol. The

L 34141-65
ACCESSION NR: AT4049847

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equation describing the consumption of one inhibitor in the oxidizing mixture containing two inhibitors of the same type is given. In a mixture of these two inhibitors, 2,2'-thio-bis-(4-methyl-6-tert.-butylphenol) is consumed more slowly, and 2,2'-methylene - bis-(4-methyl-6-tert.-butylphenol) more rapidly than each of them are consumed separately at the same initial concentration. "The authors express their gratitude to F. Yu. Rachinskiy for supplying the 2,2'-thio-bis-(4-methyl-6-tert.-butylphenol)." Orig. art. has: 4 figures and 5 formulas.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Chemical physics institute, AN SSSR)

SUBMITTED: 07Jul62 ENCL: 00 SUB CODE: OC, GC

NO REF SOV: 005 OTHER: 000

Card 3/3

ACCESSION NR: AP4030363 S/0190/64/006/003/0470/0472

AUTHORS: Gromov, B. A.; Miller, V. B.; Shlyapnikov, Yu. A.

TITLE: Correlations in the performance of inhibitors in oxidation reactions. 5. Kinetics of α-naphthol consumption in the induction period

SOURCE: Vy#sokomolekulyarny#ye soyedineniya, v. 6, no. 3, 1964, 470-472

TOPIC TAGS: polypropylene, oxidation of polypropylene, oxidation inhibitor, alpha-naphthol, 2,2-methylene-bis-(4-methyl-6-tert.butylphenol), didecilsulfide, temperature effect, oxygen effect, oxidation induction period, activation energy

ABSTRACT: The consumption rate of α-naphthol in the induction period of polypropylene oxidation at various temperatures and oxygen pressures was studied. The technique is described in an earlier publication by the authors and M. B. Neyman (Sb. Khimicheskiye svoystva i modifikatsiya polymerov. Izd. "Nauka," 1964). It was found that by using 0.2 mole of alpha-naphthol per 1 kg of isotactic polypropylene, at a constant oxygen pressure of 300 mm mercury, the induction period of polypropylene oxidation decreased from 510 to 240 minutes with an increase in temperature from 180 to 200C. It was also revealed that at a constant

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ACCESSION NR: AP4030363

temperature of 200C the duration of the induction period dropped from 450 to 150 minutes when the oxygen pressure was raised from 150 to 650 mm Hg. Calculations showed that in the middle part of alpha-naphthol consumption the rate constant exhibited a linear relation to the oxygen pressure, and that the temperature dependence of the induction period was 16.8 kcal/mole. The addition of 0.01 mole of the oxidation inhibitor 2,2-methylene-bis-(4-methyl-6-tert.butylphenol) per 1 kg of polypropylene with an equal amount of alpha-naphthol (at 200C and an oxygen pressure of 300 mm Hg), shortened the induction period to 225 minutes, as against 285 minutes needed for alpha-naphthol alone. On the other hand, the simultaneous incorporation of 0.1 mole/kg of alpha-naphthol and 0.08 mole/ kg of the inhibitor didecilsulfide extended the induction period to 510 minutes, as compared with 160-170 minutes for alpha-naphthol alone. The authors theorize that the oxidation inhibiting performance of alpha-naphthol was caused by the pressure of its transformation products. Orig. art. has: 5 figures.

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

SUBMITTED: 11Mar63 DATE ACQ: 07May64 ENCL: 00

SUB CODE: OC NO REF SOV: 002 OTHER: 000

Card 2/2

L 29992-65 EWT(m)/EPF(c)/EWP(j) Pc-4/Pr-4 RM
ACCESSION NR: AP4047220 S/0190/64/006/010/1895/1900 27 26 8

AUTHOR: Gromov, B.A.; Miller, V.B.; Neyman, M.B.; Torsuyeva, Ye. S.; Shlyapnikov, Yu. A.

TITLE: Mechanism of action of weak antioxidants during the oxidation of polypropylene

SOURCE: Vy*sokomolekulyarny*ye soyedineniya, v. 6, no. 10, 1964, 1895-1900

TOPIC TAGS: polypropylene, polypropylene oxidation, antioxidant, monophenol, isotactic polypropylene, antioxidant consumption

ABSTRACT: In order to confirm the hypothesis that all monphenols are weak antioxidants, the author investigated the oxidation of isotactic polypropylene in the presence of 2, 4, 6-tri-tert.-butylphenol, 2, 6-ditert.-butyl-4-phenylphenol and 4,4'-methylene-bis-(2, 6-di-tert.-butylphenol). Samples of polypropylene were oxidized in sealed ampoules as described in earlier papers. In addition to determining the consumption of the monophenol, the authors measured the water content in the gas phase of the ampoule, and in some cases the characteristic viscosity (in tetralin at 130C). The results showed that the monophenol was consumed according to a zero order law, at a rate proportional to the oxygen pressure; the rate was decreased by the presence of didecylsulfide. In the presence of antioxidant, the molecular weight of the polymer decreased sharply, and oxidation was

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L 29992-65
ACCESSION NR: AP4047220

found to proceed in a non-stationary way at all antioxidant concentrations. Mathematical analysis of these results indicated that the reason for the low degree of effectiveness of the monophenols as antioxidants is that they stimulate branching of the kinetic oxidation chain. Orig. art. has: 1 table, 6 figures and 11 equations.

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

SUBMITTED: 26Dec63 ENCL: 00 SUB CODE: OC, GC

NO REF SOV: 005 OTHER: 000

Card 2/2

KONOVALOVA, N.P.; BOGDANOV, G.N.; MILLER, V.B.; NEYMAN, M.B.;
ROZANTSEV, E.G.; EMANUEL', N.M.

Antitumorigenic activity of stable free radicals. Dokl. AN SSSR 157 no.3:707-709 Jl '64. (MIRA 17:7)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Emanuel').

L 1126-66 EWT(m)/EPF(c)/EWP(j) RM

ACCESSION NR: AP5022936

UR/0062/65/000/008/1481/1483
541.6+542.943

AUTHOR: Yasina, L. L.; 44,55 Miller, V. B.; 44,55 Shlyapnikov, Yu. A.; 44,55 Skripko, L. A. 44,55

TITLE: Mechanism for the inhibition of the polypropylene 15 oxidation 7 process by tetramethoxydiphenylnitroxide 7

36
32
B

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 8, 1965, 1481-1483

TOPIC TAGS: polypropylene plastic, 44,55 oxidation, inhibitor

ABSTRACT: The mechanism of inhibition of polypropylene oxidation by 2,2',4,4'-tetramethoxydiphenylnitroxide, $(CH_3O)_2C_6H_3$-NO-$C_6H_3(OCH_3)_2$, was studied at 200°C and 300 mm Hg of oxygen pressure. The object of the study was to define the active oxidation inhibiting species. The polypropylene used had a characteristic viscosity $\eta = 3.8$ and a molecular weight equal to 150,000. The dependence of the induction period of polypropylene oxidation upon inhibitor concentration is shown in fig. 1 of the Enclosure. The UV absorption spectra are shown in fig. 2 of the Enclosure. The changes in induction period and UV absorption spectra indicate that

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ACCESSION NR: AP5022936

15 4

2,2',4,4'-tetramethoxydiphenylamine is the actual oxidation inhibitor for propylene stabilized with 2,2',4,4'-tetramethoxydiphenylnitroxide. One molecule of amine is formed from two molecules of nitroxide. Formation of amine is completed within 1-2 minutes from the beginning of the oxidation process and it is reflected in a rapid decline of the polypropylene molecular weight. Orig. art. has: 3 figures.

ASSOCIATION: Institut khimicheskiy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR) 44,55

SUBMITTED: 23Nov64 ENCL: 02 SUB CODE: GC, OC

NO REF SOV: 005 OTHER: 003

Card 2/4

L 1126-66

ACCESSION NR: AP5022936

ENCLOSURE: 01

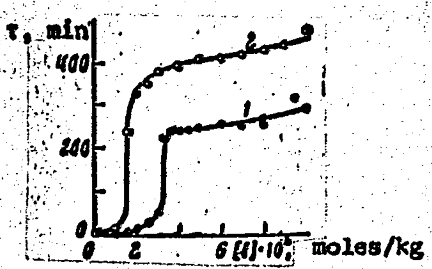

Fig. 1. 1--2,2',4,4'-tetramethoxydiphenylnitroxide; 2--2,2',4,4'-tetramethoxydiphenylamine.

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ACCESSION NR: AP5022936

ENCLOSURE: 02

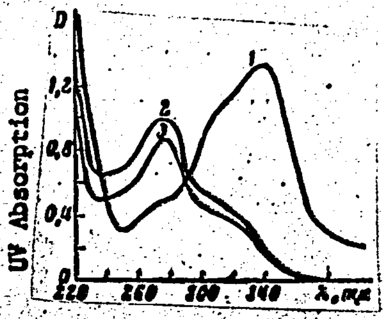

Fig. 2. 1--2,2'4,4'-tetramethoxydiphenylnitroxide; 2--product distilled out of polypropylene stabilized with tetramethoxydiphenylnitroxide after 15 min oxidation; 3--2,2',4,4'-tetramethoxydiphenylamine.

L 10525-66 EWT(m)/EWP(j) RM

ACC NR: AP5027173 SOURCE CODE: UR/0076/65/039/010/2418/2424

AUTHOR: Shlyapnikov, Yu. A.; 44,55 Miller, V. B. 44,55 51 B

ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut khimicheskoy fiziki, Akademiya nauk SSSR) 44,55

TITLE: Mechanism of action of antioxidants 7,44,55

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 10, 1965, 2418-2424

TOPIC TAGS: antioxidant additive, oxidation inhibition, oxidation kinetics, hydrocarbon

ABSTRACT: A scheme of inhibited oxidation of hydrocarbons 7 is proposed which takes into account the participation of the antioxidant in the chain initiation and propagation:

$$IH + O_2 \xrightarrow{k_0} I^\cdot + HO_2^\cdot \xrightarrow{RH} \alpha R^\cdot + \text{inactive products},$$

$$R^\cdot + O_2 \xrightarrow{k_1} RO_2^\cdot,$$

$$RO_2^\cdot + RH \xrightarrow{k_2} ROOH + R^\cdot,$$

$$RO_2^\cdot + IH \xrightarrow{k_3} ROOH + I^\cdot,$$

Card 1/2 UDC 541.124/.128

2

$$\mathrm{ROOH} + \mathrm{RH} \xrightarrow[k_4]{O_2} \delta \mathrm{RO}_2 + \text{inactive products}$$

$$\mathrm{ROOH} + \mathrm{R_2S} \xrightarrow{k_5} \text{inactive products}$$

where IH is the antioxidant and δ the number of kinetic chains formed in the breakdown of one hydroperoxide molecule (i.e., the probability of degenerate chain branching). The following equations result from this scheme:

$$\frac{d([\mathrm{R}^{\cdot}] + [\mathrm{RO_2^{\cdot}}])}{dt} = \alpha k_0 [\mathrm{IH}][\mathrm{O_2}] - k_7 [\mathrm{RO_2^{\cdot}}][\mathrm{IH}] + \delta k_4 [\mathrm{ROOH}][\mathrm{RH}],$$

$$\frac{d[\mathrm{ROOH}]}{dt} = k_2 [\mathrm{RO_2^{\cdot}}][\mathrm{RH}] + k_7 [\mathrm{RO_2^{\cdot}}][\mathrm{IH}] - k_4 [\mathrm{ROOH}][\mathrm{RH}] - k_5 [\mathrm{ROOH}][\mathrm{R_2S}].$$

Some special cases of solution of this system of equations are considered, and certain aspects of the mechanism of inhibited oxidation are analyzed. It is shown that the concept of participation of the antioxidant in the act of degenerate branching is the missing link which makes it possible to advance a consistent mechanism of inhibited oxidation that adequately accounts for various experimental facts. Orig. art. has: 25 formulas.

SUB CODE: 07 / SUBM DATE: 15Jul64/ ORIG REF: 008 / OTH REF: 002

L 33427-66 EWT(m)/EWP(j) JW/RM

ACC NR: AP6012724 (A) SOURCE CODE: UR/0190/66/008/004/0769/0770

AUTHOR: Shlyapnikova, I. A.; Miller, V. B.; Neyman, M. B.; Shlyapnikov, Yu. A.

ORG: None

TITLE: Upper critical concentration of an antioxidant 15

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 8, no. 4, 1966, 769-770

TOPIC TAGS: antioxidant additive, ~~polypropylene,~~ solution concentration, oxidation, ~~antioxidant, critical concentration~~

ABSTRACT: The upper critical concentration of an antioxidant has been investigated. It was shown that antioxidant additives increase the probability that the degenerated chain branching under certain conditions, does possess lower and upper critical concentrations. The upper critical concentration during polypropylene oxidation is shown in the presence of antioxidant-phenyl-β-naphtylamine. Orig. art. has: 1 figure and 3 formulas. [NT]

SUB CODE: 11/ SUBM DATE: 15Oct65/ ORIG REF: 003/

Card 1/1 ULR UDC: 678.01:54

L 00832-67 EWT(m)/EWP(j) RM

ACC NR: AP6027773 (A) SOURCE CODE: UR/0190/66/008/008/1405/1410

AUTHOR: Shlyapnikova, I. A.; Miller, V. B.; Molvina, M. I.; Torsuyeva, Ye. S.; Shlyapnikov, Yu. A.

14
B

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

TITLE: Monoamines as antioxidants and regularities and mechanisms of their effect

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 8, no. 8, 1966, 1405-1410

TOPIC TAGS: monoamine, polypropylene, antioxidant

ABSTRACT: The oxidation of isotactic polypropylene in the presence of phenyl-α-naphtylamine and phenyl-β-naphtylamine occupying intermediate positions between strong and weak antioxidants was studied. The mechanism of the effect of antioxidiants was analyzed. Orig. art. has: 5 figures and 11 formulas. [Based on authors' abstract] [NT]

SUB CODE: 07/ SUBM DATE: 05Jul65/ ORIG REF: 007/

Card 1/1 hs UDC: 678.01:54

L 00833-67 EWT(m)/EWP(j) RM

ACC NR: AP6027774 (A) SOURCE CODE: UR/0190/66/008/008/1411/1413

AUTHOR: Yasina, L. L.; Gromov, B. A.; Miller, V. B.; Shlyapnikov, Yu. A.

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

TITLE: Investigation of polypropylene oxidation stabilized with 4-methyl substituted alkylphenols

29

B

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 8, no. 8, 1966, 1411-1413

TOPIC TAGS: alkylphenol, phenol, polypropylene, oxidation

ABSTRACT: The oxidation of polypropylene in the presence of 2,6-ditertbutyl-4-methylphenol and 2,6-diisobornyl-4-methylphenol has been investigated. At a certain moment of the induction period, the rate of phenol consumption is sharply decreased. The moment occurs with the maximum concentration of nonvolatile products of antioxidant conversion. It is shown that the self-accelerating oxidation process becomes

Card 1/2 UDC: 678.01:54+678.742

L 00833-67

ACC NR: AP6027774

stationary for some time due to the effect of products of antioxidant conversion. Orig. art. has: 1 figure and 2 formulas. [Based on authors' abstract] [NT]

SUB CODE: 07/ SUBM DATE: 05Jul65/ ORIG REF: 004/ OTH REF: 004

hs

Card 2/2

SHATSKIY, M.M.; MILLER, V.N. [deceased]; ZHURAVLEV, B.A., inzhener, nauchnyy redaktor; SMIRNOVA, A.P., redaktor; SMOL'YAKOVA, M.V., tekhnicheskiy redaktor.

[Technical and economic comparison of hot-water heating systems] Tekhnicheskoe i ekonomicheskoe sravnenie sistem vodianogo otopleniia. Moskva, Gos. izd-vo lit-ry po stroitel'stvu i arkhitekture, 1954. 190 p.
(Hot-water heating) (MLRA 7:12)

S/262/62/000/008/003/022
I007/I207

AUTHOR: Miller, V. S.

TITLE: Some results of experimental investigation on contact-type heat exchangers

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk. 42. Silovyye ustanovki, no. 8, 1962, 20, abstract 42.8.107. "Zb. prats. In-t teploenerg. AN URSR" no. 18, 1960, 37–45

TEXT: Description of design and basic components of a test unit for determining the thermal resistance under varying operating conditions. As shown by the test results, the extent of thermal resistance is a factor that should be taken into account when determining the temperature field of turbine components. There are 5 figures and 6 references

[Abstracter's note: Complete translation.]

Card 1/1

MILLER, V.S.

Results of investigations of conductive heat exchange between plane metallic surfaces. Zbir. prats' Inst. tepl. AN URSR no. 20:44-53 '60. (MIRA 14:4)

(Heat—Transmission)

MILLER, V.S.

Determining thermal resistances of conductive heat exchange between metal ceramic surfaces. Zbir. prats' Inst. tepl. AN URSR no. 20:54-59 '60. (MIRA 14:4)

(Heat--Transmission)

27886
S/021/61/000/001/007/008
D251/D305

17.4400

AUTHOR: Miller, V.S.

TITLE: Contact heat exchange between metal powder surfaces

PERIODICAL: Akademiya nauk Ukrayins'koyi RSR. Dopovidi, no. 1, 1961, 40 - 43

TEXT: The author investigated contact heat exchange for two groups of surfaces. In the first group, the contact surfaces, prepared by anode-mechanical methods, had 5 - 4th class purity of the worked surface and the second group was not specially prepared and had 2nd class purity of surface. The pressure between the contact surfaces was varied from 5 to 400 kg/cm^2 by means of a special hydraulic press. The heat flow was in the region of 220-250 thousand kcal/m^2 hour for a mean temperature in the zone of contact of 290 -300°C. The following results were obtained: a) The thermal resistance in the zone of contact of metallic powders varies with the pressure and composition of the alloy; b) The magnitude of the

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27886
S/021/61/000/001/007/008
D251/D305

Contact heat exchange between ...

contact thermal resistance of alloy metal powders is 2-3 times greater than for the similar pairs -- steel 45, steel ЭIX13-steel ЭIX-13 (YeIKh-13) for the same pressure and purity; c) As the coefficient of heat exchange increases, in the case of alloy metal powders, the thermal resistance decreases. This relationship breaks down at pressures above 250 kg/cm^2; d) The purity of the surface has a comparatively small effect on the magnitude of the thermal resistance. The author concludes that it is necessary to take into consideration the contact thermal resistances when investigating the temperature fields of details prepared from alloy metal powders. The experimental method used was that of I.T. Shvets, Ye.P. Dyban and N.M. Kondak (Ref. 1: Sb. Trudov In-ta teploenergetiki AN URSR, 12, 21, 1955). [Abstractor's note: No experimental details given]. There are 4 figures, 1 table and 3 Soviet-bloc references.

ASSOCIATION: Instytut teploenerhetyky AN URSR (Institute of Thermal Energy AS UkrSSR)
PRESENTED: by I.T. Shvets', Academician AS UkrSSR
SUBMITTED: March 11, 1960

Card 2/2

34944
S/143/62/000/003/007/007
D238/D302

26.2223
21.2110

AUTHOR: Miller, V. S., Engineer

TITLE: Features of contact heat-exchange in reactor fuel elements

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Energetika, no. 3, 1962, 67-70

TEXT: The temperature drop between core and can of a fuel element cannot be calculated in advance due to the inadequacy of basic data regarding the nature of contact thermal resistance and its dependence on a variety of factors. Experimental investigations on thermal heat-exchange between metal and metal-ceramic surfaces have yielded some basic principles governing contact thermal-resistance as a function of various factors, as set out in the author's two previous works. The experiments employed fairly high heat-fluxes (450 to 500 thousand kcal/m^2.h) and high contact surface temperatures (350 - 400°C) and different gaseous media as occurring

Card 1/2

X

S/143/62/000/003/007/007
D238/D302

Features of contact ...

in fuel-element practice. The results demonstrate the importance of purity-treatment of the surfaces, being less for soft metals at high temperature. The actual contact area comprises only a small part of the geometric area (1 to 2%), increasing with pressure. The thermophysical characteristics of the gas layer occupying the micro-nonuniformities of the contact surfaces have a substantial influence on the contact thermal resistance. An analysis of the experimental data shows that the main thermal flux from the hotter to the colder surface passes via the thermal conductivity of the gaseous medium. This is demonstrated on air, cabon dioxide, hydrogen and vacuum. There are 6 figures and 5 Soviet-bloc references.

ASSOCIATION: Institut teploenergetiki AN USSR (Thermal-Power Institute, AS UkrSSR)

SUBMITTED: May 21, 1961

Card 2/2

X

S/526/62/000/024/013/013
D234/D308

AUTHOR: Miller, V.S.

TITLE: Thermal contact resistances in heat evolving elements

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut teploenerhetyky. Zbirnyk prats'. no. 24, 1962. Teploobmin ta hidrodynamika, 133-139

TEXT: Contact heat exchange was investigated with heat flows 450-500 x 30^3 kcal/m^2.h, in different gas media. Thermal resistance decreases with cleaner surface finish, with an increase of the compression force, of the mean contact temperature, of heat conductivity of contact materials, and of that of the gas medium. Contact pairs investigated were Cu, Al, bronze, 45 and Э1Х13 (E1Kh13) steel, gas media were air, CO_2 and H_2. An oxide film on the contact surface leads to a considerable increase of temperature gradient. Changes of heat conductivity and other factors under operating conditions decrease the resistance. There are 6 figures.

Card 1/1

L 13154-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG/WB

S/170/63/000/004/008/017

64

63

AUTHOR: Miller, V. S.

TITLE: An effective method for reducing contact thermal resistance

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 6, no. 4, 1963, 71-74

TEXT: The author clarifies the derived experimental dependence of variation in contact thermal resistances upon type of coatings, compression forces and surface smoothness. He demonstrates that the use of metal coatings on surfaces is an effective means for reducing the contact thermal resistances. The technique consists of plating the surfaces with metals having lower hardness and higher heat conductivity than the base metal. Physical properties for Ag, Cu, Al, Zn, Cd, Cr, Ni, Sn and Pb are tabulated, including a listing of the Brinel hardnesses and the melting temperatures. The dependence of the thermal resistance upon compression force is graphically shown. Besides the metal coatings, one can also insert metal shims between the contact surfaces. To reduce the thermal resistance of the contact zone, the shims' hardness should be less, while the heat conductivity should be more, than that of the base metal. The shim should be so selected that its maximum thickness should not be more than twice the

Card 1/2

L 13154-63

S/170/63/000/004/008/017

average height of the micro-irregularity of the surface. There are 2 graphs and 2 tables.

ASSOCIATION: Institut teploenergetiki AN UkrSSR (Kiev), (Institute of Thermal Power, Academy Sciences Ukrainian SSR)

SUBMITTED: Sep 19 62

Card 2/2

MILLER, V.S.

Determining the area of actual contact of surfaces by the radioisotope method. Zbir. prats' Inst. tepl. AN URSR no.22: 63-67 '61. (MIRA 16:6)

(Surfaces(Technology))
(Radioisotopes--(Industrial applications)

ACCESSION NR: AT4039458 S/2526/64/000/026/0101/0106

AUTHOR: Miller, V. S.

TITLE: The contact heat exchange of surfaces with metal coatings

SOURCE: AN UkrRSR. Insty*tut teploenergety*ky*. Zbirny*k prats', no. 26, 1964. Teploobmin ta gidrody*namika (Heat exchange and hydrodynamics), 101-106

TOPIC TAGS: heat exchange, heat transmission, thermal conductivity, metal coating, electroplating, surface smoothness, copper plating

ABSTRACT: One of the most common ways of increasing the heat exchange between contiguous machine parts is to plate the parts with highly conductive metals such as copper, gold, cadmium, nickel, etc. In the present paper, the author reviews the laws of electrochemistry which determine which metals can and cannot be plated directly onto iron, cadmium, copper, tin, silver and zinc, and tabulates data as to the hardness, melting point and thermal conductivity of deposits of silver, copper, aluminum, zinc, cadmium, chromium, nickel, tin and lead. Plating was found to have no significant effect on the surface smoothness of machine parts. However, as shown in Figs. 1 and 2 of the Enclosure, the thermal resistance was highly dependent on the type of coating, the compressive force between the two parts, and the surface smoothness. The results demon-

Card 1/2

ACCESSION NR: AT4039458

strate that application of metallic coatings is an effective way of lowering the thermal contact resistance. Orig. art. has: 3 tables and 4 figures.

ASSOCIATION: Insty*tut teploenergety*ky*, AN UkrRSR (Institute of Thermal Energetics, AN UkrRSR)

SUBMITTED: 18Apr62	DATE ACQ: 12Jun64	ENCL: 02
SUB CODE: MM, GP	NO REF SOV: 003	OTHER: 000

Card 2/4 2

34

CA MILLER, V.V.

Width of Auger showers. G. T. Zatsepin and V. V. Miller. *Zhur. Eksptl. Teoret. Fiz.* 17, 939-40(1947).—Broad Auger showers of cosmic rays were observed at 3860 m. above sea level with app. designed to minimize accidental coincidences between counter impulses. Amplifiers S_{12}, S_{34} select and amplify coincidences between counter groups (1,2) and (3,4), resp.; a distance D separates S_{12} and S_{34}, whose outputs are fed into a central amplifier S which registers double coincidences. The no. of coincidences as a function of D is nearly that predicted by the cascade theory for $D < 100$ m. but is considerably larger for $100 < D < 1000$ m. From 2 to 30 m., $C_d(D) \sim D^{-0.1}$, and $C_d(D) \sim D^{-2.0}$ for $100 < D < 1000$ m. F. H. Murray

Physics Inst. im. P.N. Lebedev, AN SSSR.

CA MILLER, V.V.

3A

Density of the particle flux in Auger showers. G. T. Zatsepin, V. V. Miller, I. L. Rozental, and L. Kh. Eidus. *Zhur. Eksptl. Teoret. Fiz.* 17, 1125-7(1947).—The particle flux d. at 3860 m. above sea level in the Pamirs was measured with 6 counter groups in the form of a hexagon 1.6 m. on a side. The effective counter area σ was varied; if C_n is the no. of coincidences of multiplicity n, the results can be expressed by $C_n = B_n\sigma^{\alpha}$, where $B_2 = 0.054$, $B_3 = 0.017$, $B_4 = 0.0072$ (sq. cm.)$^{-\alpha}$, $\alpha = 1.42$. F. H. Murray

Phys. Inst. im. Lebedev, AS USSR

YESIPKO, A.; MILLER, V.

Stamping rollers and bushes of sheet metal. Nov.neft.tekh.: Nefteprom.delo no.6:48-52 '54. (MIRA 14:10)
(Sheet-metal work) (Chains)

KUDAYENKO, M.Ya., inzhener; KOVYNEV, M.V., inzhener; MILLER, V.V., inzhener.

The use of textolite bearings with forced lubrication at the Voroshilov Metallurgical Plant. Metallurg no.4:32-34 Ap '56. (MLRA 9:9)
(Bearings (Machinery)) (Textolite)

-MILLER, V.V.

		CARD 1 / 2 PA - 1472
SUBJECT	USSR / PHYSICS	
AUTHOR	LEJPUNSKIJ,O.I., MILLER,V.V., MOROZOV,A.M.,JAMPOL'SKIJ,P.A.	
TITLE	The Isomers with Short Period obtained by Proton Bombardment.	
PERIODICAL	Dokl.Akad.Nauk, 109, fasc.5, 935-937 (1956) Issued: 10 / 1956 reviewed: 11 / 1956	

The present work forms part of the general program of research concerning the discovery of short-lived isomers created on the occasion of nuclear reactions. Here the nuclei were excited by an impulselike bundle of 20 MeV protons. The targets of substances to be examined were located in a vacuum at an angle of 45° with respect to the bundle. Short-period γ -radiation occurring as a result of proton bombardment was recorded by means of a scintillation counter and β-radiation was recorded by means of a counter with a stilb-crystal. The impulses of the counters were amplified and discriminated by means of an integral amplitude analyzer, after which they impinged upon the screen of a special cathode oscillograph with "standing" development, and were then photographed.
On the occasion of the irradiation of Be a noticeable β-activity was noticed wit $T_{1/2}=0,85 \pm 0,15$ sec. This activity may be ascribed to the Li^8($T_{1/2}=0,87\pm0,02$ sec) created on the occasion of the reaction Be^9(p,2p)Li^8. The threshold of this reaction computed from the masses is 18,7 MeV. In the course of further tests new γ -activities, which had formerly not been noticed, were found, which belong to hitherto unknown isotopes. The characteristics of these γ -activities are shown in a table. Apart from half lives, the estimated yields of these γ -activities are given. The elements concerned are Ti, Cd, Ta, Tl, Pb, Bi. Also on the occasion

Dokl.Akad.Nauk, 109, fasc.5, 935-937 (1956) CARD 2 / 2 PA - 1472

of the bombardment of Cu, Mo, CaO a marked short-period activity ($T_{1/2}$ - some milliseconds) was found. On the occasion of the irradiation of Co, Rh and Au no short-period activities were found to exist. Longwave activities are only weakly expressed.

The short-period γ-irradiation observed is probably connected with the excitation of isomeric states of the isotopes obtained on the occasion of reactions with protons. The work by S.D.SOFTKY, UCRL-2754, Nucl.Sci.Abstr., 9, No 2, 95 (1955), which appeared after publication of the present work, is mentioned.

The value of $T_{1/2}$ obtained here on the occasion of the proton bombardment of Pb and Bi indicates that on the occasion of this reaction Bi^{208} after the reaction $Pb^{209}(p,n)$ or $Bi^{209}(p,pn)$ is obtained. In tantalum isomeric activity may be connected either with the isotopes Tl^{202} and Tl^{204} (reaction p,pn) or with Pb^{203} and Pb^{205} (reaction p,n). The study of the excitation curve will probably contribute towards finding the correct type of reaction.

INSTITUTION: Institute for Chemical Physics of the Academy of Science in the USSR.

MILLER, V.V.

PHASE I BOOK EXPLOITATION SOV/3600

Yadernaya geofizika; sbornik statey po ispol'zovaniyu radioaktivnykh izlucheniy i izotopov v geologii nefti (Nuclear Geophysics; Collection of Articles on the Use of Radioactive Radiation and Isotopes in Petroleum Geology) Moscow, Gostoptekhizdat, 1959. 370 p. Errata slip inserted. 4,000 copies printed.

Ed.: F.A. Alekseyev, Professor, Doctor of Geological and Mineralogical Sciences; Assoc. Ed.: A.P. Kalantarov; Tech. Ed.: A.S. Polosina.

PURPOSE: This book is intended for petroleum geologists, geophysicists and scientists engaged in geological research who are interested in radiometric techniques of petroleum prospecting.

COVERAGE: The collection contains 28 articles compiled by staff members and aspirants of the Laboratory for Nuclear Geology and Geophysics of the Petroleum Institute (now the Institute for Geology and Mineral Fuel Processing) of the Academy of Sciences USSR, the Laboratory for Radioactive Logging of the All-Union Scientific Research Institute of Geophysics, and the heads of councils for planning research projects for petroleum enterprises. The articles treat new material on radiometric surveying in petroleum geology, describe radiometric instruments (counters, etc.) for registering neutrons and gamma rays, give the results of research with models of rock strata, introduce fundamentals of a new method for effectively utilizing radioactivity in the analysis of rock samples from petroleum-survey bore holes, etc. Problems of method in the study and interpretation of radiometric measurements in bore holes are reviewed, as well as the results of studies in the nonabsorption of tritium in tracing the movement of petroleum and water in a stratum. Finally, a new method of surveying based on measuring the radioactivity of the surface of a prospective petroleum deposit is described. No personalities are mentioned. References accompany each article.

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A166/A029

24.4400

AUTHOR: Miller, V.V. (Dubna)

TITLE: With an Accuracy of up to One Millionth of a Billionth. A Laboratory Check of the General Theory of Relativity 21

PERIODICAL: Priroda, 1960, No. 7, pp. 7 - 12

TEXT: Einstein's theory of relativity could be tested experimentally by measuring the red shift in the spectral line of a light quantum (photon) moving against the earth's gravity, since the gravity would reduce its speed and, thereby, its frequency. Recent experiments have shown that the red shift can be measured from the resonance scattering of gamma-quanta 19 In 1946, I.Ya. Barit and M. I. Podgoretskiy discovered that the resonance absorption and resonace scattering of gamma rays could be detected, if the energy loss due to the recoil of the nucleus upon the departure of the gamma-quantum were counteracted. Moon and Storrast found that this could be achieved by using the Doppler Effect, mounting the radiation source on a rapidly rotating wheel before the absorber and measuring the scattered radiation with the radiation counter (Fig. 3). Thanks to the rotation, the speed and frequency of radiation increased, leading to a shift into

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With an Accuracy of up to One Millionth of a Billionth. A Laboratory Check of the General Theory of Relativity

the violet band of the spectrum. The German scientist Mossbauer devised a simpler method of doing this by cooling the radiation source and absorber to the temperature of liquid air (later experiments used the temperature of liquid helium), which revealed the resonance scattering of gamma-rays emitted by irridium Ir^{191} during transition from the first to the basic stage of excitation (Fig. 4). The method was sensitive enough to permit the measurement of resonance lines at a rotatory speed of only a few centimeters a second. Figure 5 shows the relationship between the degree of resonance absorption and the rate of rotation. Thanks to its own magnetic momentum, a nucleus placed in a magnetic field will become orientated either with or against the field, leading to a change in the energy level and its division into two near sub-levels. A similar change will appear in the frequency of the gamma-quanta emitted and the spectral line will be divided into two lines, provided the extent of this division is greater than the natural width of the line. Given the value of the overall magnetic field, the magnetic momentum of the nucleus can be measured from the degree of shift of the resonance line. Experiments such as these have been conducted in 1960 by the Soviet phys-

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S/026/60/000/007/002/008
A166/A029

With an Accuracy of up to One Millionth of a Billionth. A Laboratory Check of the General Theory of Relativity

icists A.I. Alikhanov and V.A. Lyubimov, using tin Sn^{119} as a radiation source at a temperature of 90°K to measure resonance lines only 10^{-7} ev wide. The experiments proved successful and will lead to a series of experiments to determine the magnetic momenta of nuclei. The change in wavelength effected by the earth's gravity is in the order of 10^{-15}, which can be detected provided that the resonance scattering line of the gamma-quantum is smaller than this value. Suitable nuclei for the tests would be Fe^{57} or Zn^{67}, whose gamma-quanta with an energy of 93 Kev would have a relative resonance line of $5 \cdot 10^{-16}$. With the gamma-quanta moving horizontally there would be resonance scattering, whereas vertical movement would disrupt the resonance scattering (Fig. 6). The preliminary results of such tests in the USSR, USA and England fit in with the general theory of relativity. There are 4 diagrams and 2 graphs.

ASSOCIATION: Ob'yedinennyy institut yadernykh issledovaniy (Joint Institute for Nuclear Research), Dubna

Card 3/3

RYTOV, Sergey Mikhaylovich, prof., doktor fiziko-matem.nauk; MILLER,
Vladimir Viktorovich, kand.fiziko-matem.nauk; BASOV,
Nikolay Gennadiyevich, prof., doktor fiziko-matem.nauk;
PROKHOROV, Aleksandr Mikhaylovich, prof., doktor fiziko-matem.
nauk, laureat Leninskoy premii; FAYNBOYM, I.B., red.;
ATROSHCHENKO, L.Ye., tekhn.red.

[New problems in physics] Novye problemy fiziki; sbornik statei. Moskva, Izd-vo "Znanie," 1961. 44 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.9, Fizika i khimiia, no.7) (MIRA 14:6)
(Astronautics) (Relativity)

ROSPASIYENKO, V.I.; MILLER, V.V.

Adjusting rolls and fixed rulers behind the disk shears.
Sbor.rats.predl.vnedr.v proizv. no.1:17-18 '61. (MIRA 14:7)

1. Alchevskiy metallurgicheskiy zavod.
(Shears (Machine tools))

KUGAYENKO, Mikhail Yevdokimovich; KOVYNEV, Mikhail Vasil'yevich; MILLER, Viktor Viktorovich; GOROBINCHENKO, V.M., red. izd-va; DOBUZHINSKAYA, L.V., tekhn. red.

[Sheet-rolling mill practice; manual for increasing the qualifications of workers in the industry]Listoprokatnoe proizvodstvo; posobie dlia povysheniia kvalifikatsii rabochikh na proizvodstve. Moskva, Metallurgizdat, 1962. 429 p. (MIRA 15:10)

(Rolling (Metalwork))

MILLER, V. V.

Laboratory test of the general theory of relativity. Dos. such. fiz. no.6:165-173 '62. (MIRA 16:1)

(Relativity(Physics))

MILLER, V.V., kand.fiz.-matem.nauk

Mossbauer effect; new tool for research in physics. Priroda 51 no.3:99-101 Mr '62. (MIRA 15:3)

1. Ob"yedinennyy institut yadernykh issledovaniy, Dubna.
(Mössbauer, Rudolf, 1929-) (Gamma rays)

L 12940-65 EWT(1)/EPA(w)-2/EEC(t)/EEC(b)-2/EWA(m)-2 Pab-10

ACCESSION NR: AP4048493 S/0120/64/000/004/0023/0025

AUTHOR: Miller, V. V.

B

TITLE: Computation of the focusing of particles by a doublet of quadrupole lenses

SOURCE: Pribory* i tekhnika eksperimenta, no. 4, 1964, 23-25

TOPIC TAGS: magnetic quadrupole lens, quadratic equation

Abstract: In analytical computation of focusing by a doublet of magnetic quadrupole lenses a very precise expression is utilized for the sum of the focal lengths of the lens ($f_+ + f_- = \mathcal{L}/3$, where $\mathcal{L}$ is the effective length of the lens). Assuming that the principal surfaces of the

the focal lengths of the lens ($f_1 + f_2 = \ell/3$, where ℓ is the effective length of the lens). Assuming that the principal surfaces of the lens coincide with its center, it is easy to derive a quadratic equation for the determination of f_1 and f_2. This method of computation gives a precision of better than 1%, even with $\ell/f \gtrsim 0.5$. A method of introducing a correction into a misalignment of the principal surfaces with the center of the lens is explained.

ASSOCIATION: Ob"yedinenny*y institut yaderny*kh issledovaniy (Joint Institute of Nuclear Research)

Card 1/2

L 12940-65
ACCESSION NR: AP4048493

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SUBMITTED: 25Jul63 ENCL: 00 SUB CODE: EM, MA

NO REF SOV: 000 OTHER: 001 JPRS

Card 2/2

L 24387-65 EWT(m) DIAAP

ACCESSION NR: AP5002138 S/0120/64/000/006/0003/0023

AUTHOR: Miller, V. V.

B

TITLE: Calculation of magnetic focusing systems for high-energy particle beams

SOURCE: Pribory i tekhnika eksperimenta, no. 6, 1964, 3-23 9

TOPIC TAGS: magnetic focusing system, particle beam, high energy particle 19

ABSTRACT: A review of the magnetic focusing systems used in nuclear studies is presented; it is partly based on material reported at various conferences, etc., not known to the Russian reader. The elements of magnetic systems are described, including a discussion of the motion of particles in an arbitrary magnetic field, quadrupole magnetic lenses, and magnets; the latter can combine the functions of a lens and the magnet proper. The simplest magnet systems include a quadrupole-lens doublet, lens triplets and quartets. The motion of a particle beam can be described by phase space and matrix methods; their

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ACCESSION NR: AP5002138

applicability and comparison are discussed. Multilens and multimagnet systems are described, including a discussion of these points: (a) impulse analysis in magnetic systems and compensation of dispersion; (b) neutralization of the chromatic aberration of lenses; (c) beams with a large impulse spread; (d) obtaining well-localized beams; (e) practice of adjusting magnetic systems. Basic formulas and data on various magnetic systems are supplied. Orig. art. has: 16 figures and 29 formulas.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Nuclear Research Institute)

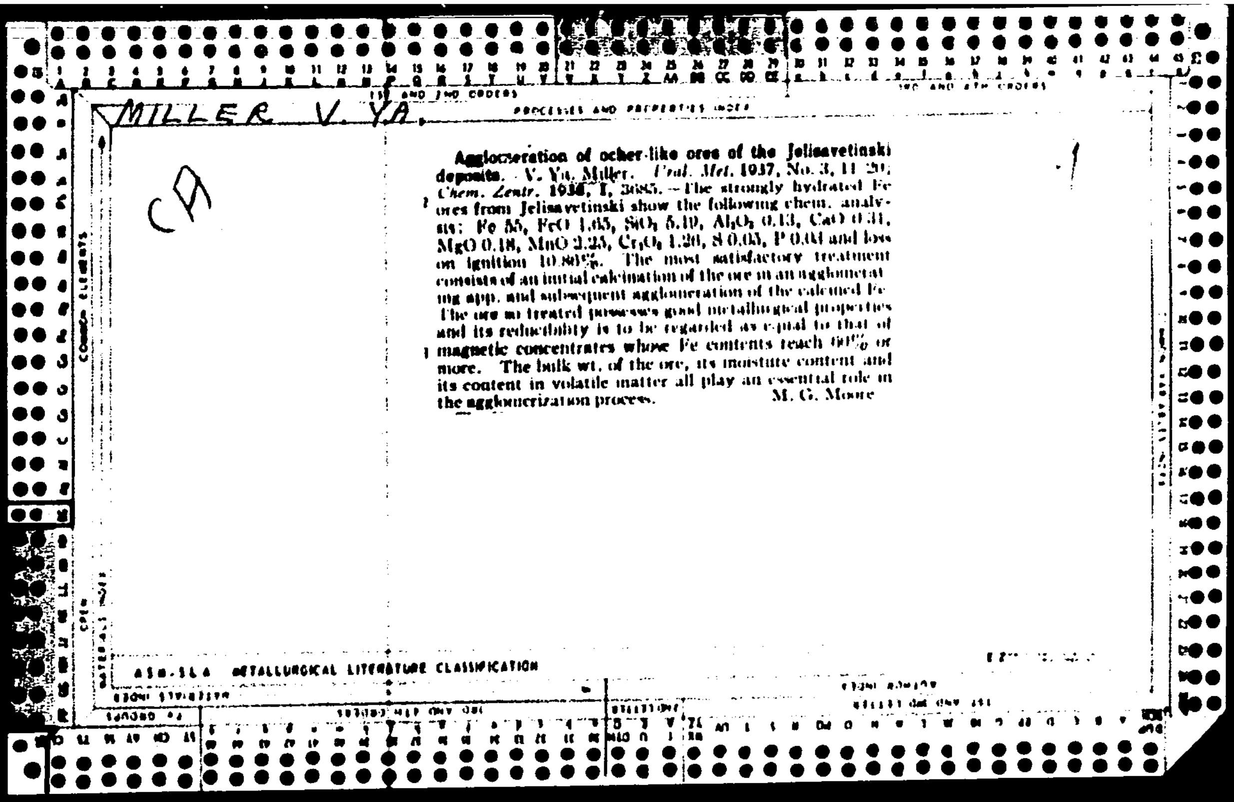
SUBMITTED: 04Feb64 ENCL: 00 SUB CODE: NP

NO REF SOV: 014 OTHER: 031

Card 2/2

KRIVONOSOV, Yu.I.; MILLER, V.V.; ROSPASIYENKO, V.I.

Decreasing the variation in thickness of heavy-gauge steel during rolling on a 2800 reversing mill. Met. i gornorud. prom. no.5:64-65 S-O '64. (MIRA 18:7)



1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

MILLER, V. YA.

PROCESSES AND PROPERTIES INDEX

CA

1

Agglomeration of ocher-like ores of the Jelisavetinski deposits. V. Ya. Miller. *Ural. Met.* 1937, No. 3, 11-20; *Chem. Zentr.* 1938, I, 3085.—The strongly hydrated Fe ores from Jelisavetinski show the following chem. analysis: Fe 55, FeO 1.65, SiO_2 5.10, Al_2O_3 0.13, CaO 0.31, MgO 0.18, MnO 2.25, Cr_2O_3 1.20, S 0.05, P 0.03 and loss on ignition 10.80%. The most satisfactory treatment consists of an initial calcination of the ore in an agglomerating app. and subsequent agglomeration of the calcined Fe. The ore so treated possesses good metallurgical properties and its reducibility is to be regarded as equal to that of magnetic concentrates whose Fe contents reach 60% or more. The bulk wt. of the ore, its moisture content and its content in volatile matter all play an essential role in the agglomerization process. M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

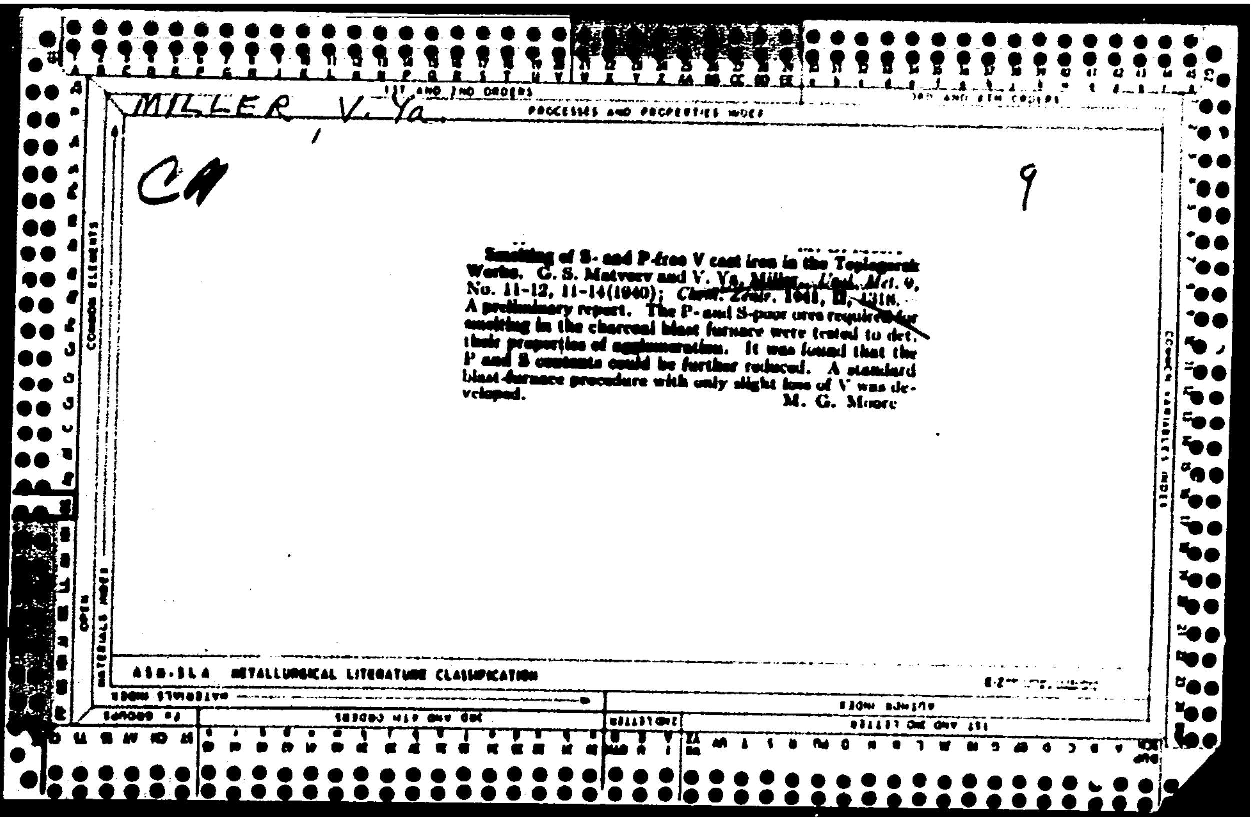
MILLER V. Ya

9

ca

The production of an agglomerate which can be melted without a flux from the ores of Magnitogorsk. V. Ya. Miller. *Ural Met.* 8, No. 4-5, 6-14(1939); *Chem. Zentr.* 1940, I, 2375.—The ore used contained Fe 54.12 (Fe_3O_4 2. 70.78 + FeO 5.88%), SiO_2 11.14, Al_2O_3 4.63, CaO MgO 0.58, MnO 0.22 and S 0.047%. The loss on ignition was 4.76%. This ore was agglomerated with limestone contg. Fe 0.66 (Fe_2O_3 0.95), SiO_2 3.24, Al_2O_3 1.24, CaO 49.05 and MgO 2.72% (ignition loss 4.23%) to produce a mixt. which would fuse in the blast furnace without the addn. of a flux or a basic agglomerate. This result was obtained by using ore of grain size less than 6 mm., accurately dosing the fuel (80-85 kg. coke per metric ton of agglomerate or 83-88 kg. for a basic agglomerate), and by uniformly moistening the charge (9-10% water content). The porosity of the final product (36.2%) was somewhat greater than that of a normal agglomerate, while the basic agglomerate was characterised by low porosity. The latter showed high reducibility (90.9%). The amt. of FeO combined with difficultly reducible constituents was practically the same as in the case of the normal agglomerate, so that no shift in the CO_2:CO ratio in the flue gas is to be expected although a 10% reduction in coke consumption is to be expected. M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



MILLER V. Ya.

CA

9

Smelting of S- and P-free V cast iron in the Teplogorsk Works. G. S. Matveev and V. Ya. Miller. *Ural. Met.* 9, No. 11-12, 11-14(1940); *Chem. Zentr.* 1941, II, 1318. A preliminary report. The P- and S-poor ores required for smelting in the charcoal blast furnace were tested to det. their properties of agglomeration. It was found that the P and S contents could be further reduced. A standard blast-furnace procedure with only slight loss of V was developed.

M. G. Moore

MILLER, Viktor Yakovlevich; KHOKHLOV, Dmitriy Gavrilovich; YABLONSKAYA,
L.V., redaktor; VAYNSHTEYN, Ye.B., tekhnicheskiy redaktor

[Work practice of sintering plants] Opyt raboty aglomeratsionnykh fabrik. Moskva, Gos.nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1955. 50 p. (MIRA 9:3)
(Metallurgical plants)

MILLER, V. YA.

4
18 .4E2c

Theory and Practice of the Production of Self-fluxing Sinter for Blast Furnace Use. D. G. Kuokhlov and V. Ya. Miller. (*Stal'*, 1955, 15, (6), 488–497). The mechanism of the lime-iron oxide reaction and conditions for production of sinter from various ores is investigated. At moderate temperatures lime reacts with Fe_2O_3 to form relatively low-melting ferrites. Gas evolution increases porosity so that relatively large amounts of melt need to be formed and the product is somewhat brittle. Finally reducibility falls with fusibility and increased carbon content is to be avoided as it produces strong increased carbon content is to be avoided as it produces strong bonding and coarse structure.

RG MT

URAL Sci Res Inst Ferrous Metallurgy

MILLER, V. Ya.

Steel parts of a standard 53,000-cubic foot blast furnace, A. F. Lileev, V. Ya. Miller, and A. G. Sokolov, *Stroit. Prom.* 33, No. [illegible] (1955).—A detailed description is given of the steel parts of a blast furnace, hot stoves, and auxiliary equipment of a blast furnace to be operated at 3.2 atm top pressure. It is intended as a standard for all furnaces to be built. The charging equipment does not rest on the shell but is supported by independent framework, while the skip hoist is designed as a cantilever truss not resting on the furnace. Their total weight is 3830 tons, excluding hopper trestles, or 2.63 tons for each cu m of furnace vol.

J. D. G[illegible]

②

SOV/137-57-10-18598

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 10, p 18 (USSR)

AUTHOR: Miller, V.Ya.

TITLE: Theoretical Fundamentals of the Sintering of Iron Ores (Teoreticheskiye osnovy aglomeratsii zheleznykh rud)

PERIODICAL: Tr. Nauchn.-tekhn. o-va chernoy metallurgii, 1956, Vol 8, pp 152-178

ABSTRACT: The conditions essential to successful sintering are high contact area of the particles of the mix (M) prior to the formation of a liquid phase, low temperature at the onset of softening of the M materials, and intimate intermixture of adequately fine ores with well ground fuel. A fundamental condition for intensive sintering is that the M be highly permeable to gas during the sintering process. Production of sinter with the most favorable combination of strength and reducibility for blast-furnace purposes is determined by the degree of development of the liquid phase, which in turn determines the temperature in the sintering zone and the depth of the mineralogical transformations occurring. An examination is made of the special characteristics of the process of the sintering of various types

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SOV/137-57-10-18598

Theoretical Fundamentals of the Sintering of Iron Ores

of Fe ores. Ores of high unit weight in the free-flowing condition have the greatest surface of contact at the moment prior to fusion. Therefore, the criterion that most accurately reflects the conditions of sinter formation is the yield of sinter per unit volume of M. The yield of sinter in the sintering of magnetite concentrates (1.71-1.62 t/m^3) and of hematites (1.57-1.59 t/m^3) is the highest of all, and this is the reason for the favorable conditions for the sintering of these ores. In the case of limonite, the respective value is ~ 1.06 t/m^3 (the loss of weight in the M attains 26%). In order to raise the gas permeability of the M it is recommended that the M be heated by hot returns, that 1-2% lime be added to the M, and that limestone ground to 3-0 mm be added. Addition of open-hearth slag and Mn ore has a favorable effect on the permeability to gas. The sintering of limonites may be improved by increasing the free-flowing weight of the M (by pre-roasting or heavy additions), by sintering the ore with a larger amount of limestone (to reduce the softening temperature), and by raising the power of the fan.

F.K.

Card 2/2

SOV/137-57-11-20828

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 11, p 26 (USSR)

AUTHOR: Miller, V.Ya.

TITLE: General Account of the Experiences of Sintering Plants (Obobshcheniye opyta raboty aglomeratsionnykh fabrik)

PERIODICAL: Tr. Nauch.-tekhn. o-va chernoy metallurgii, 1956, Vol 8, pp 179-205

ABSTRACT: A general account is given of the work of the following sintering plants (S): Magnitogorsk, Vysokogorsk, Kursk Magnetic Anomaly, Dneprodzerzhinsk, Krivoy Rog, and Kamysh-Burun. An important condition for high-yield work on the part of S and for the production of quality sinter is continuous supply of uniform ore, toward which end it is necessary to grade all ore delivered to the S, and to make maximum use of hoppers and storage bins to attain uniformity. One of the prime conditions for normal sintering of the charge is fine crushing of the ore components of the charge, the limestone, and the coke breeze. At the Magnitogorsk S, the > 5-mm fraction of the ore is reduced to 13%, and a grinding of the limestone to 3-0 mm is achieved. Excessively coarse crushing of the ore (~ 27% >6 mm)

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SOV/137-57-11-20828

General Account of the Experiences of Sintering Plants

at the Vysokogorsk S leads to diminished strength and reducibility of the sinter. Properly organized proportioning should assure adequate uniformity of the charge not only in terms of Fe, C, and moisture, but of gangue, grain size, and mineralogical constitution as well. The experience of the Dneprodzerzhinsk and Magnitogorsk S indicates the desirability of 2-stage mixing of the charge. A major shortcoming in the work of the S is incomplete sintering of the charge before reaching the grates, resulting in a reduction in output rate due to an increased yield of returns. The most reliable criterion for complete sintering is a positive temperature differential in vacuum chambers 12 and 13 ($t_{12}-t_{13}$) and in vacuum chambers 12 and 11 ($t_{12}-t_{11}$). The most important properties of sinter, viz., its strength and reducibility, depend upon the C content of the mix. An attempt (at the Nizhniy-Tagil Plant) to increase the strength of a specimen by increasing the FeO content, i.e., be reducing reducibility, resulted in impairing the functioning of the blast furnaces. The successes of the blast-furnacemen of Magnitogorsk are to be explained largely by the fact that the reducibility of the sinter has risen from 27 to 40% in the past 4 years. Further improvement in S functioning may be attained as follows: By intensifying the sintering process via heating of the mix by hot returns; addition of 1-2% lime to the charge; cutting the down time, which in some S attains 2.5 to 12%, and elimination of harmful

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SOV/137-57-11-20828

General Account of the Experiences of Sintering Plants

air leakage in the sintering machines. The monitoring of the process procedure currently practiced at S is inadequate. Measuring and control equipment is used to poor advantage. It is necessary to work out a standard method of sampling raw materials and sinter.

F.K.

Card 3/3

137-58-6-11354

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 14 (USSR)

AUTHORS: Babushkin, N.M., Miller, V.Ya., Durnov, V.K.

TITLE: Clinkering Fine Concentrates by Pelletizing and Subsequent Roasting (Okuskovaniye tonkoizmel'chennykh kontsentratov metodom okomkovaniya s posleduyushchim obzhigom)

PERIODICAL: Byul. nauchno-tekhn. inform. Ural'skiy n.-i. in-t chernykh metallov, 1957, Nr 3, pp 14-25

ABSTRACT: A fine-ground magnetite concentrate from the KMA ore dressing and concentrating plant is used to study the process of clinkering and roasting pellets (P). The chemical composition, in %, is as follows: Fe 56.16, FeO 23.92, Fe_2O_3 56.70, SiO_2 16.85, Al_2O_3 0.48, CaO 0.55, MgO 0.88, and S 0.037. The design of an experimental plant for roasting P is presented as is that of an experimental pilot plant for clinkering Fe ores and concentrates. It is shown that the roasting of fluxed P on belt-type machines is entirely possible. Production of solid fluxed P differs from that of unfluxed P in the need for generating a certain amount of liquid phase which affords a complete utilization of the lime and solidification of the P on roasting. The narrow

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137-58-6-11354

Clinkering Fine Concentrates by Pelletizing and Subsequent Roasting

temperature interval of incipient fusion and positive fusion of the mixture of concentrate and limestone makes it necessary to maintain strict adherence to roasting temperature schedules, since even an insignificant overheating of the P > 1200°C results in a strong fusion with one another and an impairment of reducibility. The maximum size of the limestone to be used as flux for P is ≤ 0.5 mm. Roasting of P on belt-type machines with application of solid fuel on the surface thereof presents significant shortcomings. Combustion of the fuel on the surface of the P is certain to cause overheating, which will result in fusion of portions of the surface. Nonuniform development of temperatures through the thickness of the bed has the same results.

A.Sh.

1. Ores--Processing 2. Pellets--Production

Card 2/2

137-58-6-11618

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 55 (USSR)

AUTHORS: Yel'kin, S.A., Miller, V.Ya.

TITLE: Influence of the Nature of Gas Flow, Gas Consumption, and Hydrogen Concentration on the Rate of Reduction of Iron Oxides (Vliyaniye kharaktera gazovogo potoka, raskhoda gaza i kontsentratsii vodoroda na skorost' vosstanovleniya okislov zheleza)

PERIODICAL: Byul. nauchno-tekhn. inform. Ural'skiy n.-i. in-t chernykh metallov, 1957, Nr 3, pp 37-49

ABSTRACT: This work makes use of a new method for studying reduction processes - one that makes it possible to arrive at separate determinations of the influence of the velocity of the gas flow, the composition of the reducing gas, and of its unit flow rate (per unit reaction surface of the specimen) upon the rate of reduction of Fe oxides. The reductant employed is a gas similar in composition to the gas in the hearth of a blast furnace. The experiments were run with cylindrical specimens of 28 mm diam, pressed from rich Goroblagodat magnetite concentrate of 140 mesh size. The samples thus obtained were subjected to a complete oxidizing roast in a stream of air at 1000°C. The degree

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137-58-6-11618

Influence of the Nature (cont.)

of reduction was monitored by the quantity of reduction products detected. As a result of the investigation it was established that at temperatures of >800°, a change in the velocity of the gas stream in the 6-29 m/sec interval (Re 500-2400) does not have any significant influence upon the rate of reduction, if the unit consumption of reductant is held constant. An increase in unit gas flow rate significantly accelerates the process; this is attributable to a diminution in the average concentration of CO_2 or H_2O in the reaction zone. In this connection, an elimination of the nonuniform distribution of materials and gas in blast furnaces by reducing their height somewhat and arriving at rational lines will permit a better employment of the reducing properties of the gases under pressure operation. An increase of 1% in the H_2 contents of hearth gas (increasing the moisture content by 10 g/m^3) increases the rate of reduction by 4.7% on the average. The minimum compensation required for the consumption of heat for the decomposition of the moisture to sustain unchanged coke consumption and an increase in the reducing power of the gas with an increase in the moisture content of the blast, is 4.7° per g moisture per m^3 blast. However, use of steam-and-air blast is profitable when an unutilized blast heating capacity is available. Otherwise it is more advisable to introduce the H_2 to the blast directly, by employing H_2-containing gases, with simultaneous enrichment of the blast by O_2. G.Ch.

1. Iron oxides--Reduction 2. Gas flow--Velocity 3. Hydrogen--Effectiveness 4. Oxygen--Applications

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TITLE: Sintering of Pyrite Cinders and Metallurgical Assessment of the Clinker Derived From Them (Spekaniye piritnykh ogarkov i metallurgicheskaya otsenka poluchennogo iz nikh aglomerata)

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ABSTRACT: Experiments in the sintering of pyrite cinders (PC) by pulverized-pyrite roasting furnaces, as an instance of the possible utilizations of PC, are described. The fuel was Kemerovo coke breeze of the 0-3 mm class, having 15.30 percent ash and 0.26 percent S. The layout of an experimental sintering plant is presented. In "heat value"--coke consumption per ton of iron--and also in consumption of flux in a blast-furnace heat, the clinker (C) from PC is equivalent to sand-clay refuse C having the same Fe content. PC C requires more flux and coke per blast furnace heat than does magnetic ironstone C, since the gangue of PC is exceptionally acid. But where ores have a low $SiO_2:Al_2O_3$ ratio, this peculiarity of PC C is a positive factor. When 8-10 percent

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Sintering of Pyrite Cinders (cont.)

C is added to the charge, the Cu they add does not interfere with the smelting of common conversion pig irons. The Zn content of the C is appx. 0.5 percent. When the charge contains 60-65 percent PC, this will add appx. 0.032 percent Zn to blast furnace charge, and this cannot but introduce difficulties in smelting. Thus, C from flotation tailings of furnaces and dust-catchers may be employed with adequate effectiveness by addition to the charges of sintering plants employing magnetic ironstones. Up to 10 percent of the weight of the charge may thus be added. Simultaneous addition of sand-clay refuse or ochre-brown ore fines, which speed the sintering process, is highly desirable.

A. Sh.

1. Minerals--Sintering--Test methods 2. Minerals--Sintering--Test results

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