MERY, J.

MERY, J.   Normative calculation in the Szombathely Leather and Shoe Factory.   p. 34.

Vol. 10, No. 10, Oct. 1956.
TOB TERMELES
TECHNOLOGY
Budapest, Hungary

So: East European Accession, Vol. 6, No. 2, Feb. 1957

MER'YANOVA, V.L., mladshiy nauchnyy sotrudnik

Physical development of children in nurseries in Rostov-on-Don.
Vop.okh.mat.i det. 7 no.8:66-69 Ag '62.   (MIRA 15:9)

1. Iz Rostovskogo-na-Donu nauchno-issledovatel'skogo instituta
akusherstva i pediatrii (dir. - kand.med.nauk F.S.Baranovskaya,
zav. organizatsionno-metodicheskim sektorom - kand.med.nauk.
A.A.Perelygina).
               (ROSTOV-ON-DON—CHILDREN—GROWTH)

MERYTINA, V. A.

1469. Purification of glass sands by flotation-attrition.—G. B. SHLAIN, V. A. MERYTINA, YA. V. TIMOSHKOV and R. YA. MONESS (Stek. Keram., 7, No. 10, 5, 1950). Some more details are given on the Russian flotation-attrition method (see Abstr. 1167, 1950). The process includes 3 simultaneous operations: flotation, removal of the Fe hydroxide film and washing. The most suitable reagents are: raw sulphate soap (alkalis recalculated as Na_2O, 8·4%; acids, 79·7%, including 32-62% fatty acids, 33-53% resin acids, 6·1% oxyacids, and 6-10% unsaponifiable acids), 1·02% substances insoluble in ether and 1·6% of mechanical admixtures. 1 kg. of this soap is needed for 1 t. of sand, and calcined soda in the quantity of 3 kg/t. The proportion of the solid and liquid in the slurry is 1 : 1·5, the temp. of the water ≥18-20° C. and pH 7·0-7·2. The duration of the process varies from 15 to 60 min., depending on the flow-sheet. The reduction of Fe oxides was: for an initial content of 0·03-0·05%, 39% (varying from 28 to 50%), for 0·05-0·2%, 62% (33-78%), for 0·2-0·57%, 61% (40-90%). The bulk of the sand purified contains 0·03-0·05% of Fe oxides. It was found that the effectiveness of the method was different with different glass sands, the lowest limit of Fe oxide reduction being reached with the sands that had a considerable content of felspars (only 20-60% on the initial content). The impurities in sands containing Fe oxides are classified as clay admixtures, heavy minerals, Fe hydroxide films, light minerals (felspar, biotite, glauconite, etc.), and inclusions in the quartz grains. The method described removes only the first 3 (clay, films and heavy minerals). In the clay impurities there is 0-65% of the total content of Fe oxides (an average of 29%, for 20 Russian deposits investigated), in the heavy minerals 0-50%, (average 14%.), in the films 0-53% (average 22%.), in light silicates and inclusions inside the quartz grain 9-54% (average 35%.). The highest content of irremovable light silicate admixtures is found in those sands with a high Al_2O_3 content. Glass sands are further classified

MERZ, Marian

Illumination and its relation to visual fatigue. Wiadomosci lek.
7 no.4:261-264 Apr. 54.
  (VISION,
   fatigue, eff. of illumination)
  (ILLUMINATION,
   in visual fatigue)

MERC, M.

EXCERPTA MEDICA Sec.14 Vol.11/11 Radiology Nov 57.

1918. MERZ M. Warszawa. *Izotopy w okulistyce. Isotopes in ophthalmo-
logy KLIN.OCZNA 1957, 27/1 (63-72) Graphs 1 Illus. 3

A general review of the problem based on the literature. Their use for diagnostic
purposes is discussed and also the possibility of their use in treatment. Exact de-
scription of the methods is presented with special reference to their efficacy in
neoplasms on the surface of the eye and the lids, in conjunctivitis vernalis, and
the anterior part of the eye, in vascularization of the cornea, and keratitis. The
possibility of complications, even serious ones, is stressed. The author suggests
a greater development of this matter in the future.

Szmyt - Łódź (XII, 14)

MERZ, Marian

    The eye & the hypothalamus-hypophysial system. Klin. oczna 27 no.4:
629-636 1957.
        (EYE, physiol.
            relation to hypothalamo-hypophysial system (Pol))
        (HYPOTHALAMUS, physiol.
            relation of hypothalamo-hypophysial system to eye (Pol))
        (PITUITARY GLAND, physiol.
            same (Pol))

JEDRZEJOWSKA, Hanna; SOBKOWICZ, Hanna; MERZ, Marian

An atypic case of Hallervorden-Spatz disease. Neurol neurochir
psych 12 no.6:829-837 N-D '62.

1. Klinika Neurologiczna, Akademia Medyczna, Warszawa. Kierownik:
prof. dr med. I. Hausmanowa-Petrusewicz i Klinika Okulistyczna,
Akademia Medyczna, Warszawa. Kierownik: prof. dr med. S.
Altenberger.

3

MERZ, Marian; PIOTROWSKI, Aleksander

Dicumarin compounds in retinal pigmentary degeneration treatment. Klin.
oczna 32 no.3:239-244 '62.

1. Z Kliniki Okulistycznej AM w Warszawie Kierownik: prof. dr med.
S. Altenberger.
            (BISHYDROXYCOUMARIN)   (RETINITIS PIGMENTOSA)

POLAND

MERZ, Marian and LANCUCKI, Jan, Second Central Clinical Hos-
pital (2 Contralny Szpital Kliniczny), WAM [Wojskowa Akade-
mia Medyczna, Military Medical Academy] (Director: Dr. med.
M. MERZ) and the Clinic of Dermatology (Klinika Dermatolo-
giczna), AM [Akademia Medyczna, Medical Academy] in Warsaw
(Director: Prof. Dr. med. S. JABLONSKA)

"Cataract in the Course of Prurigo. Report of Six Cases."

Warsaw, Polski Tygodnik Lekarski, Vol 18, No 24, 10 Jun 63,
pp 857-861

Abstract: [Authors' English summary modified] Authors de-
scribe six cases of prurigo with cataract appearing in five
of them. They discuss and review the literature of the mor-
phology, pathogenesis, and treatment of this disease. They
suggest that the disease is probably more frequent than re-
ported, and that the first lenticular changes are probably
related to puberty. As prurigo improves, the cataract be-
comes stationary, or may even regress. There are 29 refer-
ences, of which one (1) is Polish, two (2) French, six (6)
German, and the others in English.
1/1

MERZ, Marian

Eyelashes in the anterior chamber of the eye. Klin. oczna 33
no.1:69-72 '63.

1. Z Kliniki Okulistycznej AM w Warszawie Kierownik: prof. dr
med. S. Altenberger.
(EYELASHES)   (EYE FOREIGN BODIES)
(AQUEOUS HUMOR)

HINTZ, Regina; MERZ, Marian

    Conjunctival vessels in diabetes. Pol. arch. med. wewnet. 34
    no.10:1323-1327 '64

    1. Z III Kliniki Chorob Wewnetrznych Akademii Medycznej w
    Warszawie (Kierownik: prof. dr. med. E. Kodejszko) i z
    Przychodni Okulistycznej II Centralnego Szpitala Wojskowej
    Akademii Medycznej w Lodzi (Kierownik: dr. med. M. Merz).

CONFIDENTIAL, Beschreib: Unio. Barth.

Examination of the subjective ...
purine in comparing. ...

1. Examination ... ...
... Hofer and Assistant Doctor ... (... ...
S. Bogunichenko) ... ...
Klinischen Wojenschaften ... ...
... med. R. No. 4).

MERZ, Marian

Studies on the behavior of gases in the anterior chamber of
the eye in the rabbit. Klin. oczna 34 no. 3:321-326 '64.

1. Z Zakladu Patologii Doswiadczalnej PAN w Warszawie (peln.
obowiazki Kierownika: prof. dr med. L.Ruszczewski).

MERL, E.: MARINCEK, E.

MERL, E.; MARINCEK, E. Producing oxide coatings on the surface of
melten iron. p. 245.

Vol. 5, No. 7/8, July/Aug. 1955
PRZEGLAD ODLEWNICTWA
TECHNOLOGY
Krakow, Poland

So: East European Accession, vol. 5, o. 5, May 1956

5502:
  Merza, J. L'introduction de la différentiation absolue
dans l'espace affin.   Publ. Math. Debrecen 5 (1958), 330–
337.
  It is shown how the covariant derivative of a vector on
a surface in a flat unimodular affine three space can be
obtained by projecting the derivative of the three di-
mensional vector on the tangent plane parallel to the
affine normal. In the case of homogeneous affinities the
projection is not parallel to the affine normal but to the
position vector.   D. J. Struik (Cambridge, Mass.)

MERZA, J. (Debrecen)

Affine trihedrals associated to curves. Annales Pol math
15 no.3:217-231 '64.

MERZA, J.   (Debrecen)

Some invariants of the centr-affine geometry of plane curves.
Annales : Math. in m .1:17-2   'h..

MERZA, Jozsef

New characterization of the affine geodetic curvature of
surface curves. Mat kozl MTA 13 no.2:119-124 '63.

(A)L 1801-66   JXT

ACCESSION NR: AP5019522   UR/0244/65/024/004/0076/0078
                                 613. 289. 6+612. 664. 1 :636. 293. 2

AUTHOR: Merzametov, M. M. (Leningrad)

TITLE: Buffalo milk, a valuable nutrient

SOURCE: Voprosy pitaniya, v. 24, no. 4, 1965, 76-78

TOPIC TAGS: processed animal product, animal product, food product, animal husbandry

ABSTRACT: The chemical composition of buffalo milk and milk lipids was studied on samples obtained from a kolkhoz farm in the Dagestan ASSR in the winter of 1963. The following findings are reported: fat content 8. 1%; total protein 4. 3%; casein 3. 6%; lactose 4. 9%; phosphorus 0. 12%, calcium 0. 18% and dry solids 18. 1%. Content of polyunsaturated fatty acids in 7 samples was as follows: 1. 5-1. 7% linoleic, 0. 53-0. 58 linolenic and 0. 19-0. 20% arachidonic acid. The milk was white, indicating the absence of carotene. The transcaucasian population uses this milk as is or in processed products. Considering that buffaloes are rather resistant to a number of diseases and in view of the above findings, the author

Card 1/2

L 1801-66

ACCESSION NR: AP5019522

recommends further studies by physicians and specialists of the dairy industry with a view towards broader utilization of this milk. Orig. art. has: 2 tables

ASSOCIATION : Kafedra tekhnologii moloka i molochnykh produktov Leningrads-kogo tekhnologicheskogo instituta kholodil'noy promyshlennosti (Department of Milk and Dairy Product Technology of the Leningrad Technological Institute of The Refrigerant Industry).

SUBMITTED: 06Aug64

ENCL: 00

SUB CODE: LS

NR REF SOV: 010

OTHER: 004

Card 2/2

Merzel, Marijan

Effect of promoters on copper catalysts in hydrogenation.
Ivan Brihta, Dalimil Vranjican, Marijan Merzel, and Drago Vlašić (Inst. Ind. Istraživanja, Zagreb, Yugoslavia). Kem. i Ind. (Zagreb) 6, 112-14(1957).—Cr_2O_3, MnO, FeO, MgO, and kieselguhr were found to be equally effective promotors for a CuO catalyst in the hydrogenation of acetone at 130 atm. and 160°, contrary to ZnO which was much less effective. Raney Cu proved to be far less active than CuO promoted appropriately. CuO was a better catalyst when pptd. with Na_2CO_3 than with NH_4OH.   N. Plavšić

SLAPNICAR, Ivan, inz.; MERZEL, Marijan, inz.

Natural gas and petroleum products as raw materials for the production of carbon black. Nafta Jug 13 no.11/12:312-316 N-D '62.

1. "Metan", Kutina.

MERZEL, Marijan, inz.; SLAPNICAR, Ivan, inz.

Production, properties, and application of carbon black in
rubber industry. Tehnika Jug 17 no.10: Suppl.: Hemindustrija
16 no.10:1971-1976 0 '62.

1. Kemijska industrija "Metan", Kutina.

SLAPINCAR, Ivan, inz.; MERZEL, Marijan, inz.

Gas and derivatives of petroleum as raw materials for
the production of carbon black. Nafta Jug 13 no. 11/12:
312-316 N-D '62.

1. "Metan", Kutina.

ACC NR: AP7001400   SOURCE CODE: UR/0413/66/000/021/0076/0076

INVENTOR: Smirnov, V. V.; Fomin, Yu. V.; Sud'in, A. P.; Marzenev, M. D.

ORG: none

TITLE: Arc welding attachment. Class 21, No. 187905

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 21, 1966, 76

TOPIC TAGS: arc welding, arc length, automatic arc length control, welding equipment

ABSTRACT: This Author Certificate introduces an attachment for arc welding which includes a welding head and a copying device. To ensure a stable arc length and to improve the welding quality, the welding head carries an additional argon nozzle and is connected to a membrane actuator. The argon jet from the additional nozzle
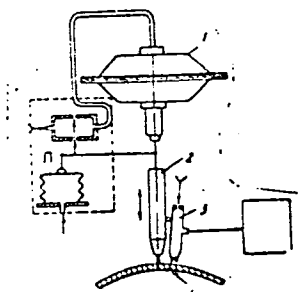

Fig. 1. Welding attachment

1 - Membrane actuator; 2 - welding torch;
3 - nozzle; 4 - argon jet.

Card 1/2   UDC: 621.791.753.39.03

ACC NR: AP7001400

serves as the copying device. The change of jet pressure caused by the change in the arc length activates the membrane actuator and controls the arc length (see Fig. 1). Orig. art. has: 1 figure.

SUB CODE: 13 / SUBM DATE: 02Apr65/ ATD PRESS: 5111

Card 2/2

MERZHAKOV, Miron Tarashovich.

The manufacture of railroad cars. Moskva, Mashgiz, 1948. 490 r.

The effect of temperature on pressure change in champagne. A. A. Merzhanin (Krasnodar Inst. Food Industry). Vinodelie i Vinogradarstvo S.S.S.R. 6, No. 11-12, 17-20(1946).—A formula is derived for the change of pressure with changing temp. in fermenting sparkling wines. The formula $P_2 = P_1 \sqrt{\beta_1/\beta_2} K.e + [1 + \alpha(t_2 - t_1)]e'$, where P_1 and P_2 are pressures at temps. t_1 and t_2, resp.; β_1 and β_2 are the absorption coeffs. of the wine for CO_2 at temps. t_1 and t_2, resp.; K is a correction factor to account for the deviation from the Henry-Dalton law, and v and e' are the vols. of wine and gas space (above the wine level), resp. Where no great accuracy is required, at P_2 not exceeding 5 atm., and since e' is ordinarily only 2-2.5% of the total vol. a simplified formula can be used:
$$P_2 = P_1 \sqrt{\beta_1/\beta_2}.$$
M. Hoch

Champagnization of high-sugar materials. E. M. Kozenko (Krasnodar Inst. Food Industry). Vinodelie i Vinogradarstvo S.S.S.R. 6, No. 9, 14-18(1946). The main object of champagnization is to accumulate during fermentation as much CO_2 as possible and preserve it during the subsequent operations. The effect of fermentation time, temp., pressure, and vat compn. (sugar and alc.) on the quality of the sparkling wine produced was studied and the results are discussed.
M. Hoch

MERZHANIAN, A. A.

20808. Merzhanian, A. A. Ob igristykh svoistvakh shampanskikh vin. (Sokr. tekst kand. dissertatsii). Trudy Krasnodarsk. in-ta pishch. prom-sti, vyp. 3, 1948, s.23-82. --Bibliogr. 15 nazv.

SO: LETOPIS ZHURNAL STATEY - Vol. 28, Moskva, 1949.

MERZHANIAN, A. A.

20810. Merzhanian, A. A. i Kozenko, Ye. M. Samopishuschiy pribov dlya sb''yektivnoy
atsenki igristykh svoystv shampanskikh vin. Trudy Krasnodarsk. in-ta pishch.
Prom-sti, vyp, 3, 1948, s. 117-23.

SO: LETOPIS ZHURNAL STATEY - Vol. 28, Moskva, 1949.

MERZHANIAN, A. A.

20809. Merzhanian, A. A. i Kozenko, Ye. M.   K metodike kolichestrennogo opredeleniya svyazannoy uglekisloty v igristykh vinakh. Trudy Krasnodarsk. in-ta pishch. prom-sti, vyp. 3, 1948, s. 149-54.

SO: LETOPIS ZHURNAL STATEY - Vol. 28, Moskva, 1949.

MERZHANIAN, A. A.

20807. Merzhanian, A. A. O zavisimosti davleniya shampanskogo ot temperatury.
Trudy Krasnodarsk. in-ta pishch. prom-sti, vyp. 3, 1948, s. 155-63.

SO: LETOPIS ZHURNAL STATEY - Vol. 28, Moskva, 1949.

MERZHANIAN, A. A.

21321   MERZHANIAN, A. A. K i schaniju t plo anosti i " plo rovo oti
vin. Trudy Krasnodarsk. In-ta pishch. pro-sti, 1, 1. , 1947,
. 113-19. - Bibliogr: 7 nazv.

SO: Letopis' "urnal'nykh Statey, o. ., Moskva, 1949

MERZHANIAN, A. A.

ER HANIAN, A. A.

MERZHANIAN, A.A.; KOZENKO, E.M.

The determination of combined carbon dioxide in wine.   Vinodelie i
Vinogradarstvo S.S.S.R. 9, No.10, 30-3 '49.   (MLRA 2:9)
(CA 47 no.14:7155 '53)

1. Inst. Nahrungsmittelind., Krasnodar.

CA

16

Carbon dioxide absorption coefficient for wine. A. A. Mershanian. Vinodelie i Vinogradarstvo S.S.S.R. 10, No. 5, 34-7(1950).—CO₂ absorption coeff. and coeff. of CO₂ absorption capacity of wine depend only on its alc. and sugar content and do not change with ext. content. A simple equation for calcn. in champagne is: $\alpha = b\beta/\eta$, where α is the absorption coeff., indicating the amt. of CO₂ in kg. absorbed by a wine of given comp. at a given temp. in 1 hr. over a surface 1 sq. m. and at a differential in pressure of the gas over the wine and that dissolved in the wine equal to 1 atm.; b is an empirical constant depending on alc. and sugar content of the wine, detd. graphically from authors' exptl. data; β is the coeff. of absorption capacity of the wine for CO₂ (cf. tables of Kucherga and Kashirin ibid. 1940, No. 11-12) and η is the viscosity of the wine in centipoises at the exptl. temp.   H. Oatfield

16

c A

1951

The behavior of diethyl esters of pyrocarbonic acid in sparkling and gasified wines. A. A. Merzhanian (Krasnodar Inst. Beverage Inds.). *Vinodelie i Vinogradarstvo S.S.S.R.* 11, No. 3, 19-22(1951).—M. describes an investigation on the effect of the ethyl ester of carbonic acid on the CO_2 emission and the sparkling qualities of champagnes and gasified wines. Expts. were carried out in which the diethyl ester of pyrocarbonic acid (I) was introduced into dry white wine at a concn. of 76.6-102.4 mg. per 100 ml. Where no champagnization or gasification was present, the added I was converted in yield of 91% to CO_2 and EtOH. In expts. where the wine was gasified to 1.25 atm., addn. of I in these concns. raised the pressure to 2.26 atm in 3 days. In either wine gasified to 3.5 atm. or in champagnized wine, addn. of I did not increase the free CO_2 pressure, but increased the amt. of combined CO_2. It is concluded that the amt. of I remaining in the unhydrolyzed state after addn. to dry wines is a function of the CO_2 pressure. Addn. of I to gasified and champagnized wines affects its sparkling quality and its effervescence. S. Gottlieb

Merzhanian, A.A.

The champagne pressure system during bottling. A. A. Merzhanian (East. Food Ind., Krasnodar). *Vinodelie i Vinogradarstvo S.S.S.R.* 11, No. 7, 25-6(1951).—With the equation, $p = k + (p_0 - k) e^{ct}$, where p = pressure of CO_2 above the wine at t hrs. after beginning of the process; p_0 = original pressure; and k and c = coeffs. depending on the wine compn. and the parameter of the reservoir, it was shown that during the bottling of champagne, after the temp. was lowered to $-5°$, the pressure in the reservoir can be lowered to 2-2.5 atm. without affecting the concns. of free and bound CO_2 of the product; this simplifies the entire procedure.   E. Wierbicki

MERZHANYAN, A. A.

Champagne (Wine)

Theory of making champagne   Vin. SSSR 12 No. 2, 1952.

Monthly List of Russian Accessions, Library of Congress, June 1952 UNCLASSIFIED.

MERZHANYAN, A-A

USSR.

Calculation of primary constituents of [prepared] must [as commonly used] in the manufacture of fruit-berry wines. A. A. Merzhanian (Inst. Food Ind., Krasnodar). *Vinodelie i Vinogradarstvo S.S.S.R.* 12, No. 0, 49-52(1952).— Formulas are given for the calcn. of the necessary amts. of wine materials or juices, alc., water, sugar, and org. acids (malic, citric, tartaric, and (or) lactic acid) to obtain such a mixt. which on alc. fermentation will yield a product of desired alc. strength, acidity, sweetness, and flavor.

H. Wierbicki

MERZHANYAN, A A.

USSR

Adsorption of carbon dioxide by the yeast precipitate of wine. A. A. Merzhanian and E. M. Kozenko (Inst. Feed Ind., Krasnodar). Vinodelie i Vinogradarstva S.S.S.R. 12, No. 8, 20-3(1952).—Usually wine is satd. with CO_2 within 20-40 min. For the satn. of the yeasts suspended in a wine a time period of approx. 3 hrs. was required. The CO_2-satd. yeasts contained 0.10-0.11 g. CO_2/g. dry yeasts. However, this was only true for the yeast ppt. consisting of powder-size particles; in the case of large yeast particles the adsorption was found to be 0.0000 g. CO_2/g. dry yeast only. For the powder-size yeast particles the CO_2 adsorption at 15° followed apprcx. the Freundlich equation: $a = 0.0197 p^{0.49}$, where a = the amt. of CO_2 adsorbed (in millimole/g.), p = the pressure at equil. (in mm. Hg.). At normal atm. pressure, according to this equation, $a = 0.0197 \times 70p^{0.49} = 2.455$ millimoles/g. = 0.11 g./g., that corresponds to the exptl. data. The amt. of CO_2 which can be adsorbed by a wine was calcd. by the equation: $V = \beta + 0.05 q$, where V = the amt. of CO_2 in l. which is adsorbed under normal conditions by 1 l. of wine contg. powder-sized yeasts, β = adsorption coeff. according to the tables of Landberg and Kachirian (cf. Frolov-Bagreev, Sovetskoe Shampanskoe, 1948, p. 71), and q = the amt. of air-dried yeasts in g./l. wine, the sp. gr. of yeasts was 1.1. E. W.

MERZhaNYAN, A.A.

Absorption of carbon dioxide by wine. G. G. Agabal'yants, E. M. Korenko, and A. A. Merzhanian (Inst. Food Ind., Krasnodar). *Vinodelie i Vinogradarstvo S.S.-S.R.* 14, No. 6, 26–32(1954).—The absorption of CO_2 is a function of temp. and of the percentage of alc. and sugar in wine. If B_t is the index of the absorption at $t°$, B_0 is the coeff. of absorption at $0°$, and a and b express empirical factors, depending on the amt. of alc. and sugar in wine the equation is: $B_t = B_0 - at + bt^2$. B_0, a, and b are given in a table, where they are arranged according to the percentage of sugar (0–11) and alc. (10–14) in wine. This table enables one to use the given formula for the computation of B_t.

E. Markus

MERZHANYAN, A-A.

Preparation of cider by the reservoir method. A. S. Vecher and A. A. Merzhanian. (Inst. Food Ind., Krasnodar).—Vinodelie i Vinogradarstvo S.S.S.R. 15, No. 1, 8-11(1955).—A schematic drawing of the assembly and the description of the reservoir prepn. of cider are given. The cider prepd. by the technological method described does not show any phys. and chem. changes for 6 months. E. W.

(1)

MERZHANIAN,A.A.; BICHUK,N.Ye.

Calculation of ingredients for preparing tirage and sweetening
liqueurs. Vin.SSSR 15 no.3:55-57 '55.   (MLRA 8:8)

1. Krasnodarskiy institut pishchevoy promyshlennosti (for
Merzhanian). 2. Leningradskiy zavod shampanskikh vin (for Bichuk)
(Wine and wine making)

MERZHANIAN, A.A.

Kinetics of absorption of carbon dioxide by wine. A. A. Merzhanian (Food Inst., Krasnodar). *Vinodelie i. Vinogradarstvo S.S.S.R.* 15, No. 6, 41-2(1955).—If the pressure of CO_2 on the surface of wine and the concn. of CO_2 in wine are const., the absorption of CO_2 can be detd. by means of a simple formula: $Q = \alpha F\tau(P - P_c)$, where $Q =$ the weight (in kg.) of CO_2 absorbed by wine; $\alpha =$ the absorption index which shows how many kg. of CO_2 are absorbed by wine, if the contact surface of CO_2 and wine is 1 square meter and the difference of pressures (concn.) is equal to 1 atm.; $F =$ the size of the contact area of CO_2 and wine in sq. m.; $\tau =$ time in hrs.; $P =$ pressure of CO_2 in atm., on wine; $P_c =$ pressure in atm., corresponding to the concn. of CO_2 in wine. E. Marcus

USSR / Microbiology.   Technical Microbiology.   F-3

Abs Jour: Ref Zhur-Biol., No 16, 1958, 72020.

Author : Merzhanian, A. A.; Kozenko, Ye. M.
Inst   : Krasnodar Institute of Food Industry.
Title   : On the Absorption of Carbon Dioxide by Yeast
          Deposits in Wine.

Orig Pub: Tr. Krasnodarsk. in-ta pishch. prom-sti, 1957,
          vyp. 9, 51-54.

Abstract: Wines which contain yeast cells absorb more CO_2
          by means of adsorption of gas on the surface
          of the yeast cells than wines which have been
          filtered from yeast.   Powdered yeasts possess
          more adsorption capacity than whole yeasts.
          The amount of CO_2 adsorption in yeasts with de-
          termined content of deposits is permanent: for
          powdered yeasts it equals 0.1 g/g, and for whole
          yeasts - 0.0006 g/g.

Card 1/1

22

MERZHANIAN, A.A.

Mass transfer coefficient for CO_2 during the "sparkling" of champagne. Izv. vys. ucheb. zav.; pishch. tekh. no.3:59-63 '58.   (MIRA 11:9)

1. Krasnodarskiy institut pishchevoy promyshlennosti, Kafedra tekhnologii vinodeliya.
                  (Champagne (Wine))

MERZHANIAN, A.A.; CHAMPALOVA, N.F.

Stability of monodisperse wine foam. Izv.vys.uchob.zav.;
pishch.tekh. no.6:80-87 '59.   (MIRA 13:5)

1. Krasnodarskiy institut pishchevoy promyshlennosti. Kafedra
tekhnologii vinodeliya.
        (Wine and wine making) (Foam)

MERZHANIAN, A.A.

Investigation into the phenomena occuring on the surface of sparkling wines after the discontinuance of airtightness in the system wine - CO_2. Trudy KIPP no.22:61-87 '61.   (MIRA 16:4)
(Champagne (Wine))   (Foam)

MERZHANIAN, A.A.

Absorption of gases through the wine surface coated with an
oily film. Trudy KIPP no.22:88-94 '61.   (MIRA 16:4)
(Wine and winemaking)

MERZHANIAN, A.A.

Changes occurring in the physicochemical characteristics of the
wine during bulk champagnizing. Trudy KIPP no.22:95-104 '61.
(MIRA 16:4)

(Champagne (Wine))

MERZHANIAN, A.A.; KIBKO, L.A.; KLIONER, M.I.

Studying the process of yeast reproduction as applicable to the conditions of continuous champagnization. Trudy KIPP no.22:105-110 '61.   (MIRA 16:4)

(Champagne (Wine))   (Yeast)

MERZHANIAN, A.A.

Surface tension of wine. Izv. vys. ucheb. zav.; pishch. tekh.
no.2:99-102 '63.   (MIRA 16:5)

1. Krasnodarskiy institut pishchevoy promyshlennosti, kafedra
tekhnologii vinodeliya.
            (Wine and wine making—Analysis)

MERZHANIAN, A.A.

Factors of accumulation of combined carbon dioxide in champagne wine.
Biokhim. vin. no.7:148-163 '63.   (MIRA 16:4)

1. Krasnodarskiy institut pishchevoy promyshlennosti.
        (Champagne (Wine))   (Carbon dioxide)

AUTHORS: Merzhanov, A. G., Dubovitskiy, F. I.   SCV/20-120-5-33/47

TITLE: The Quasi-Steady Course Taken by Explosion Reactions
             (Kvazistatsionarnyy teplovoy rezhim protekaniya vzryvnykh
             reaktsiy)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 5, pp.1068-1071
             (USSR)

ABSTRACT: First the unsteady system of equations describing a thermal
             explosion and the pertinent initial conditions are given.
             The authors study, without loosing the general character
             of the final conclusions, the most simple type of a self-
             accelerating reaction, that is to say the auto-catalytic re-
             action of first order: $\varphi(\eta) = (\eta + \eta_o)(1 - \eta)$, where η_o
             denotes the criterion of autocatalicity, this quantity being
             basically small. $(10^{-1} - 10^{-3})$. The quasi-steady system of
             equations is written down. Only in a certain interval above
             the boundary of the explosion the reaction proceeds still in
             a quasi-steady manner. The expressions resulting from the
             solution of the system of equations for the critical condi-
             tions of the depth of the preliminary reaction, for the

Card 1/3

The Quasi-Steady Course Taken by Explosion Reactions   SOV/20-120-5-39/67

period of induction, for the period of induction above the boundary of explosion, and for the course of the reaction with time are written down. The quasi-steady behavior can be considered as a limit case of the non-isothermal course of the reaction. In self-accelerating reactions it occurs even above the boundary of explosion. The width of the domain of the preliminary reaction of the explosion is dependent upon the degree of self acceleration. In reactions with normal kinetics the reaction is quasi-steady only below the boundary of the explosion after the maximum of heating. A formula is given for estimating the period of induction. The authors thank for valuable suggestions made by N. N. Semenov, Member, Academy of Sciences, USSR, and by Ya. B. Zel'dovich, Corresponding Member, Academy of Sciences, USSR. There are 3 figures and 4 references, 4 of which are Soviet.

PRESENTED: February 3, 1958, by V. N. Kondrat'yev, Member, Academy of Sciences, USSR

Card 2/3

SOV/20-120-6-29/59

AUTHORS: Barzykin, V. V., Merzhanov, A. G.

TITLE: A Boundary Problem in Thermal Explosion Theory (Krayevaya zadacha v teorii teplovogo vzryva)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 120, Nr 6, pp 1271 - 1273 (USSR)

ABSTRACT: In this paper thermal explosions of substances in the condensed phase are considered. In such processes the temperature on the boundary between the substance and the surrounding medium can remain constant only under definite experimental conditions Ordinarily the heat exchange across the boundary is more com- plicated. The heat liberated in the reaction causes a combustion of the nearest layers of the surrounding medium. Thus the temperature of the medium deviates from the temperature at infinity. This paper is a study of the critical conditions of the thermal explosion with a heat exchange as mentioned above The respective boundary conditions are given first. The equation of steady heat conduction and the boundary conditions read as follows:

Card 1/3

A Boundary Problem in Thermal Explosion Theory

SOV/2o-12o-6-29/59

$$\frac{d^2\theta}{d\xi^2} + \frac{m}{\xi}\frac{d\theta}{d\xi} = -\delta e^{\theta} \quad \text{at} \quad \xi = 1, \quad \left(\frac{d\theta}{d\xi}\right)_S = -Bi\theta_S,$$

$m=0$ for an infinite plane parallel slab. $m=1$ for an infinite cylinder, and $m=2$ for a spherical domain. The Frank Kamenetskiy criterion δ is a function of the criterion $Bi = ar/\lambda$ on the boundary of the explosion. If $Bi \rightarrow \infty$ and $\theta_S \rightarrow 0$ the problem is reduced to that of Frank-Kamenetskiy. By varying Bi from ∞ to 0 all possible cases of heat exchange are taken account of, from an ideal heat exchange to the case of no heat exchange (adiabatic case). The authors determine the steady temperature distribution and the critical conditions for the domains mentioned above. The case of an infinite cylindrical domain can be solved analytically all the way through. Expressions for the critical condition and for their distribution on the boundary of the explosion are given. No general integral has hitherto been found for the spherical problem. It possibly does not exist at all. The critical dependence $\delta(Bi)$ can also be determined by an approximation method within the frame work of unsteady theory. A corresponding formula is given.

Card 2/3

A Boundary Problem in Thermal Explosion Theory   SOV/2o-12o-6-29/59

There are 3 references, 2 of which are Soviet.

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

PRESENTED: February 26, 1958, by V. N. Kondrat'yev, Member, Academy of Sciences, USSR

SUBMITTED: February 24, 1958

1. Explosions--Analysis   2. Explosions--Heat transfer   3. Mathematics--Applications

Card 3/3

SOV/2o-121-4-26,'54

2(1), 5(4)
AUTHORS: Dubovitskiy, F. I.,   Manelis, G. B.,   Merzhanov, A. G.

TITLE: The Formal-Kinetic Laws of the Thermal Decomposition of Ex-
plosive Substances in the Liquid Phase (Formal'no-kineti-
cheskiye zakonomernosti termicheskogo razlozheniya vzryvchat-
ykh veshchestv v zhidkoy faze)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 4, pp 668-670
(USSR)

ABSTRACT: The investigation discussed in this paper takes into account
also the variation of volume. In the overwhelming majority
of cases the volume practically does not vary if two or more
components are interchanged. In the first approximation it
may therefore be assumed that the volume of the condensed
phase is an additive function of the volumes of the non-re-
acted substance and of the condensed remainder. The volume
of the liquid phase may be considered to be a linear func-
tion of the "degree of conversion" (glubina prevrashcheniya).
If the volume is variable, the reaction of the nth order
satisfies the equation

Card 1/3

SOV/20-121-4-26/54

The Formal-Kinetic Laws of the Thermal Decomposition of Explosive Substances in the Liquid Phase

$d\eta/dt = k - (1 - \eta)^n/(1 - \mu\eta)^{n-1}$. μ denotes the depth of the variation for a total decomposition. This reaction is reduced to the equation of a simple monomolecular reaction if the variation of the volume by the decomposition is sufficiently high. This implies that the reactions of the first order may proceed according to the monomolecular law and also according to the bimolecular law. Also the taking into account of the volume by the autocatalysis (which is caused by the final condensed products of decomposition) modifies the character of the kinetic curves. This case corresponds to the kinetic equation $d\eta/dt = k_1(1 - \eta)+(k_2\alpha(1-\mu)\,\eta(1-\eta))/(1-\mu\eta)$ where α denotes the share of the catalyzer in the condensed remainder. For $\mu = 0$, the last equation is reduced to the classical equation of autocatalysis. A diagram shows the calculated dependence of the reaction velocity on the depth of conversion for various values of μ. The maximal velocity and the corresponding depth of conversion $\eta_{maximum}$ depend in a high degree on the value of μ. A formula for η_{max} is given. The experimental data found by the decomposition of

Card 2/3

SOV/20-121-4-26/54

The Formal-Kinetic Laws of the Thermal Decomposition of Explosive Substances
in the Liquid Phase

various substances in the liquid phase may be described sui-
ficiently well by the equations deduced in this paper. There
are 3 figures and 3 references, 2 of which are Soviet.

PRESENTED: April 4, 1958, by V. N. Kondrat'yev, Academician

SUBMITTED: March 8, 1958

Card 3/3

SOV/20-124-2-34/71

2(5)
AUTHORS: Merzhanov, A. G., Dubovitskiy, F. I.

TITLE: On the Theory of the Thermal Explosion of Condensed Explosives
                  (O teorii teplovogo vzryva kondensirovannykh vv)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 2, pp 362-365
                  (USSR)

ABSTRACT: The authors first give a report on several previous papers
                  dealing with this subject. The present paper deals with a more
                  general theory which takes into account the removal of a part
                  of the reaction products from the reaction volume. According
                  to this theory for liquid explosives, all the main characteris-
                  tics of the thermal explosion can be calculated: the critical
                  condition, the depth of pre-explosion decomposition, and the
                  period of induction. The removal of the gaseous products from
                  the reaction volume is assumed to be a quasi-equilibrium pro-
                  cess; this assumption is justified in the case of low rates of
                  gas liberation. An expression is given for the rate of con-
                  ductive heat transfer. The authors then give the system of
                  equations for the thermal explosion. The removal of the gaseous
                  product exercises a considerable influence upon the thermal ex-

Card 1/2

SOV/20-124-2-34/71

On the Theory of the Thermal Explosion of Condensed Explosives

plosion if the depth of the explosion reaction is comparatively great. The authors then investigate the simplest case among such reactions, viz. the autocatalytic reactions of the first order. Some characteristics of the thermal explosion can be calculated according to the steady theory of Frank-Kamenetskiy. Finally, the equation of thermal balance is given for the convective heat transfer. The expressions for the characteristics of thermal explosion can be deduced from the solution of a quasi-steady system. A diagram shows the results of some calculations. There are 1 figure and 5 Soviet references.

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

PRESENTED: September 9, 1958, by N. N. Semenov, Academician

SUBMITTED: June 4, 1958

Card 2/2

5 (4)   5. 1300 (A), 5. 4700   66435

AUTHORS: Merzhanov, A. G., Abramov, V. G.,   SOV/20-128-6-40/63
             Dubovitskiy, F. I.

TITLE: Critical Conditions for the Thermal Explosion of Tetryl

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 6, pp 1238 - 1241
             (USSR)

ABSTRACT: The processes taking place in the explosion caused by heating
             molten tetryl were investigated experimentally. Figure 1 shows
             the experiment apparatus. Hot glycerol served as heat carrier.
             The temperature was measured by means of a thermocouple and re-
             corded by a potentiometer of the type EPP-09. The critical con-
             ditions of the explosion caused by heating the material, i.e.
             the relationship between temperature and the dimensions and con-
             stants of the explosive characteristic of the transition from
             the non-explosive desintegration to the explosive one, were de-
             termined. It proved possible to stop the reaction at any time
             by quickly replacing hot by cold glycerol. Table 1 lists the ex-
             perimental data, which permit the following conclusions: The ex-
             perimental value of the critical temperature T_{cr} lies between
             the values found when assuming purely conductive and purely

Card 1/2

Critical Conditions for the Thermal Explosion of Tetryl   SOV/20-128-6-40/63

66435

convective heat transfers. Thus under experimental conditions a combined heat transfer took place. Observations by means of the television apparatus PTU-OM proved that the convection is due to the gas bubbles formed during the decomposition. This also results in a considerable increase in the initial heating over the value calculated according to N. N. Semenov's theory (Ref 5). The dependence of the induction period under critical conditions on the temperature may be represented by the equation $t_{cr} = 10^{-21} \cdot 5_e 49000/RT$ sec. The degree of decomposition found experimentally before the explosion set in lies in the vicinity of the calculated theoretical value of 0.49. The explosions exhibited a "soft" character in all experiments, and no impact wave formed. The influence found of the gaseous decomposition products upon the heat transfer is believed to hold for all liquid or molten explosives. There are 4 figures, 1 table, and 5 Soviet references.

PRESENTED: June 1, 1959, by V. N. Kondrat'yev, Academician

SUBMITTED: May 28, 1959
Card 2/2

SOV/20-129-1-42/64

5(4)
AUTHORS: Merzhanov, A. G., Dubovitskiy, F. I.

TITLE: On the Theory of Steady Burning of Powder

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 1, pp 153-156
             (USSR)

ABSTRACT: Ya. B. Zel'dovich (Ref 1) set up equations for the calculation
             of the burning of the solid phase of powder from the character-
             istics of the gas phase. The present paper investigates the burn-
             ing of powder as regards to the processes in the solid phase.
             The dependences between the temperature distribution in the
             powder, rate of burning, thermokinetic characteristics, proces-
             ses going on in the solid phase, and of the heat flow entering
             from the gas phase are derived. In formulating the set of equa-
             tions the experimental results by P. F. Pokhil (Ref 2) were
             taken into consideration, according to which the sum of the pro-
             cesses proceeding in the solid phase of the powder is exothermic.
             The set of equations is transformed to the nondimensional form
             by applying D. A. Frank-Kamenetskiy's rules (Ref 3). The authors
             give an approximate solution, arriving at the formula by O. I.
             Leypunskiy (Ref 5) for the heat reserve and the thickness of
Card 1/2

On the Theory of Steady Burning of Powder

SOV/20-129-1-42/64

the heated layer. Calculations based on the equations given and on data by Samsonov on pyroxilin powder are carried out (Fig 2, Table 2). There are 2 figures, 2 tables, and 6 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

PRESENTED: June 13, 1959, by N. N. Semenov, Academician

SUBMITTED: June 10, 1959

Card 2/2

Merzhanov, A. G.

II 5000

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S/062/60/000/06/08/011
B020/B061

AUTHORS: Dubovitskiy, F. I. Barzykin, V. V., Merzhanov, A. G.

TITLE: Thermal Explosion of Dinitroxydiethylnitramine Under Conditions of Purely Convective Heat Transfer

TEXT: A method of studying the thermal explosion of liquid and molten explosives in purely convective heat transfer has been developed. In the tests, the method previously described by the authors (Ref. 1) for determining the critical conditions of thermal explosion was used, a device for mixing the substances (Fig. 1) being used in addition. This mixer was used for examining the critical conditions of the thermal explosion of dinitroxydiethylnitramine. The experimental results were compared with data calculated from N. N. Semenov's formula (Refs. 8,9), and good agreement was noted. There are 1 figure, 1 table, and 9 references: 5 Soviet, 3 Canadian, and 1 German.

Card 1/2

Inst. Chem Physics AS USSR

84628

II 8200

S/076/60/034/010/008/022
B015/B064

AUTHORS: Merzhanov A G , and Dubovitskiy F I

TITLE: The Quasi-steady Theory of Thermal Explosion of Self accelerating Reactions

TEXT: The papers by N N Semenov (Ref 1) D A Frank-Kamenetskiy (Ref 2) and O M Todes (Ref 3) are to be regarded as the fundamental publications on thermal explosion. Subject of the present work is the theory of thermal explosion of self-accelerating reactions under isothermal conditions, the authors' concept (Ref 4) of the existence of quasi-steady thermal conditions in the course of reaction prior to explosion being the basis of their study N N Semenov's diagram for self accelerating reactions, which shows the quasi-steady course of reaction is studied, and then the authors discuss and apply the quasi-steady theory of autocatalytic reactions of first order proceeding with constant parameters of the system It is shown

Card 1/3

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S/020/60/133/02/42/068
BOO4/BO64

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AUTHORS: Manelis, G. B., Merzhanov, A. G., Dubovitskiy, F. I.

TITLE: On the Problem of the Mechanism of Powder Burning /

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 2,
             pp. 399 - 400

TEXT: Proceeding from experiments conducted by P. F. Pokhil (Ref. 1)
the authors investigated whether the burning of dispersed powder par-
ticles occurs in the hot flame zone near the maximum temperature, or
whether its decomposition occurs already on the surface of the powder.
For this purpose an isothermal estimation of the lifetime t_{life} of a
particle is carried out. It was assumed that the decomposition of the
particles starts at T_{surf} of the surface. Equations are written down
for the burning rate u, for t_{life}, and for x_{disp}, the path of the dis-
persed particles. T_{surf}, t_{life}, x_{disp} were calculated on the basis of
the experimentally found values for u, and x_{disp} compared with the

Card 1/2

On the Problem of the Mechanism of Powder   81867
Burning   S/020/60/133/02/42/068
                                              B004/B064

experimental value x_{gas} of the breadth of the dark zone in front of the flame. The data for pyroxiline powder is given in Table 1. The following conclusions are drawn: An exothermal decomposition occurs in the condensed phase, causing the dispersion of a considerable part of the powder. The decomposition of the dispersed particles occurs close to the surface of the burning powder with 300 cal/g and more being released. The final reaction occurs with the formation of the final products, and release of the rest of the heat in the zone of maximum temperature. There are 1 table and 6 references: 4 Soviet and 2 American.

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

PRESENTED: March 2, 1960, by V. N. Dondrat'yev, Academician

SUBMITTED: February 27, 1960

Card 2/2

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S/020/60/135/006/029/037
B004/B056

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AUTHOR: Merzhanov A. G.

TITLE: The Role Played by Dispersion in the Combustion of Powders

PERIODICAL: Doklady Akademii nauk SSSR, 1960. Vol 135, No 6,
               pp. 1439 - 1441

TEXT: When investigating the combustion of mercury fulminate, A. F. Belyayev
(Ref. 1) discovered the dispersion of the concentrated substance in the
process of combustion. It was the purpose of the present investigation to
analyze the relationship between combustion rate, surface temperature, and
depth of dispersion, and to evaluate the role of dispersion in the com-
bustion of powders. The author proceeds from the approximative equations
adopted in the theory of combustion: $\lambda d^2T/dx^2 + c\rho u \, dT/dx + Q_0 k_0 \exp(-E/RT) = 0$;

$u = u_{dec} + u_{disp}$; $u_{dec} = \int_0^\infty k_0 \exp\left[-E/RT(x,u)\right] dx$ The boundary conditions are

$x = 0$, $T = T_s$. $x = \infty$, $T = T_0$ T denotes the temperature in $^\circ$K, T_s is the

Card 1/3

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The Role Played by Dispersion in the Com   S/020/60/135/006/029/037
bustion of Powders   B004/B056

temperature on the surface of the burning powder. T_o the temperature of the

powder outside the zone of combustion. x is the linear constant (cm), u is
the combustion rate (cm/sec), u_{disp} is the linear dispersion rate, u_{dec} is

the linear rate of decomposition. λ is the coefficient of thermal con-
ductivity of the powder (cal/cm sec deg) c is the specific heat

(cal/g deg). ϱ is the density (g/cm^3). a is the coefficient of thermal

diffusivity (cm^2/sec). Q is the heat of decomposition (cal/g). k_o is the

coefficient of the exponential function (sec^{-1}) and e is the activation
energy (cal/mole). The depth η_d of dispersion is defined as $\eta_d = u_{disp}/u$,

and, using the results of Ref 4, the following relation is given:

$$u^2 = \left[1/(1 - \eta_d)\right]ak_o \exp\left[-E/RT_s\right]\left\{(RT_s^2/E)/\left[T_s - T_o - Q(1 - \eta_d)/2c\right]\right\} \quad (1)$$ This

equation represents the relationship between combustion rate. surface
temperature, and depth of dispersion For flameless combustion the
following relations are given: $T_s = T_o - Q(1 - \eta_d)/c$ (2);

Card 2/3

The Role Played by Dispersion in the Combustion of Powders

87412
S/020/60/135/006/029/037
B004/B056

$$u^2 = \left[2/(1-\eta_d)^2\right] ak_o \exp\left\{-E/R\left[T_o+Q(1-\eta_d)/c\right]\right\}(cR/QE)\left[T_o+Q(1-\eta_d)/c\right]^2 \quad (3)$$

Application of equation (3) to experimental data by P. F. Pokhil (Ref 2) concerning the combustion of pyroxyline shows good agreement ($\eta_d \sim 0.7$, $T_s = 280 - 300°C$). From equation (3) it follows that the function $\eta_d(T_s)$ slows down the increase of T_s. η_d thus plays the part of a regulator. There are 1 table and 6 Soviet references

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

PRESENTED: June 30, 1960, by N. N. Semenov, Academician

SUBMITTED: June 20, 1960

Card 3/3

89572

S/076/61/035/002/006/015
B124/B201

AUTHORS: Dubovitskiy, F. I., Strunin, V. A., Manelis, G. B., and Merzhanov, A. G.

TITLE: Thermal decomposition of tetryl at varying m/V values

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 2, 1961, 306-313

TEXT: A. Lukin and S. Z. Roginskiy (Ref. 5: Acta chem.-phys. USSR, 2,8, 1935) found a critical ratio to exist between the weight m and the volume V of the reaction vessel in tetryl (2,4,6-trinitro phenyl methyl nitramine), in which the slow decomposition passes over into an explosion under the promoting action of various additions (NO_2 et al.). An extensive study has been made of the kinetic rules governing the isothermal decomposition of molten tetryl as a function of the m/V ratio. The reaction concerned was examined in a device made from stainless steel, as diagrammatically shown in Fig. 1. The pressure rise was measured with the aid of a thin membrane made of stainless steel to which tensometer 5 was fastened. The change of resistance of 5 was determined by a ГПЗ-2 (GPZ-2)

Card 1/12

Thermal decomposition of tetryl...

89572

S/076/61/035/002/006/015
B124/B201

galvanometer inserted into the diagonal of the bridge. The measurement
was made by the compensation principle. The membrane was brought back
to zero position by introducing nitrogen from bomb 6 into the compensator.
The pressure rise was measured at given time intervals with the pressure
gauges 7 and 8 connected to the compensator. Also a strain gauge was
fastened onto the membrane, to serve as second arm of the bridge and for
a compensation of temperature fluctuations. The clamp 4 (Fig. 2) was
pressed onto sealings made of fluorine-containing synthetic material
3 between flanges 1 and 5, the tubes from the strain gauge were via tube
6 connected to the outer arms of the bridge. The minimum measurable
pressure is 0.1 mm Hg, the reading accuracy on the mercury manometer
$\pm$ 0.2 mm Hg. The gaseous products were analyzed for NO_2, NO, N_2O, CO, and
CO_2. Samples were taken by means of traps 9 and 10 (Fig. 1) and cuvette
11. The kinetic curves of gas evolution at $150^\circ C$ (Fig. 3) and $160^\circ C$ (Fig.
4) in the coordinates: conversion degree η - time at various m/V values
are given. The m/V maximum was about 44 times as large as the correspond-
ing minimum; the maximum end pressure of the decomposition products was
about 6000 mm Hg. The curves show that the reaction kinetics is practical-
ly independent of the mass of the substance, and that the decomposition
Card 2/12

89572

Thermal decomposition of tetryl...

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B124/B201

rate increases at all temperatures with rising m/V. The percent content of NO_2, NO, and condensation products drops with increasing decomposition, while the percentage of CO_2 and N_2 increases somewhat toward the end of the reaction, and the CO content remains practically unchanged (Table 1). The change in the number of NO_2 and NO moles per mole of tetryl as a function of the conversion degree for various m/V at $150^\circ C$ is given; k_1 is the constant of the monomolecular reaction, k_2' that of the autocatalytic reaction, and k_3 is a constant depending on m/V, in which connection $d\eta/dt = k_1(1 - \eta) + k_2'\eta(1 - \eta) + k_3\eta(1 - \eta) = k_1(1 - \eta) + k_2(1 - \eta)$, where $k_2 = k_2' + k_3$. The dependence of k_1 on m/V is shown in Fig. 7. The initial acceleration of the reaction is correlated with the course of the macroscopic stage of the reaction, which leads to the formation of a highly volatile product with a catalytic action. This process is inhibited after some time by the tetryl decomposition. The further acceleration does not depend on the volume of the reaction vessel, which is indicative of an autocatalysis by the final condensation products

Card 3/12

89572
S/076/61/035/C02/006/015
B124/B201

Thermal decomposition of tetryl...

(picric acid according to Hinshelwood). The effective values of the activation energy and of the factor of the exponential function in the Arrhenius equation were calculated from the rate constants (Table 3). the values obtained for k_1 being characteristic of the monomolecular decomposition,

whereas an activation energy of 37 kcal/mole was found for k_2 with all m/V.

The explanation offered by the authors fits the respective hypothesis by N. M. Emanuel' (Ref. 10: Makroskopicheskiye stadii, osobaya rol' nachal'nogo perioda i mekhanizm deystviya ingibitorov i polozhitel'nykh katalizatorov v tsepnykh reaktsiyakh (Macroscopic stages, special role of the initial period and mechanism of the action of inhibitors and positive catalysts in chain reactions); Collection: "Voprosy khimicheskoy kinetiki, kataliza i reaktsionnoy sposobnosti" ("Problems of chemical kinetics. catalysis and reactivity"), Moscow, 1955, p. 117) on the significant role of the initial initiating stage. There are 9 figures, 3 tables, and 10 references: 4 Soviet-bloc and 6 non-Soviet-bloc. The references to the English language publications read as follows: M. A. Cook, M. J. Abegg, Industr.a.Engng. Chem. 48, 1090, 1956.

Card 4/12

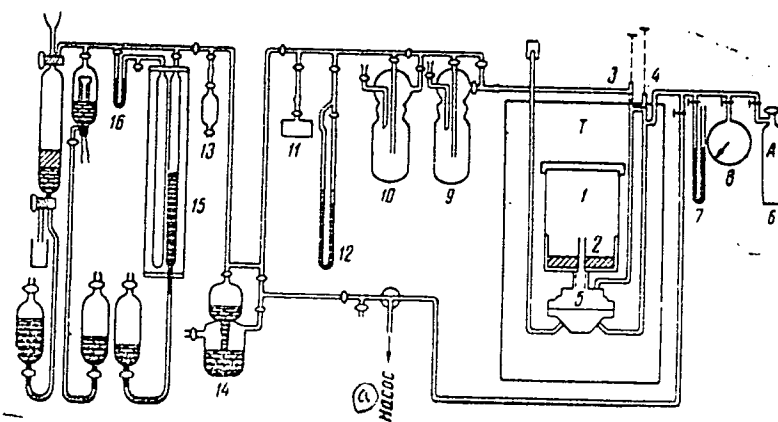Thermal decomposition of tetryl...   89572
                                          S/076/61/035/002/006/015
                                          B124/B201

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

SUBMITTED: May 21, 1959

Legend to Fig. 1:
Overall diagram of the
device. a) pump.
Card 5/ 12'

11. 6300
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s/076/ɔ1/035/009/ᴄ08/ᴄ15
B106/B110

AUTHORS: Merzhanov, A. G., Barzykin, V. V., Abramov, V. G., and
Dubovitskiy, F. I.

TITLE: Thermal explosion in the liquid phase under conditions of a
purely convective heat transfer

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 9, 1961, 2083 - 2089

TEXT: The authors tried to realize the thermal explosion of explosives in
the liquid phase for the limiting case of purely convective heat transfer.
The heat exchange is of such intensity that no temperature distribution
takes place in the reaction zone, and the total temperature gradient falls
to the wall of the reaction vessel. Such a heat exchange may be achieved
by intensive artificial intermixing of the substance. Under these con-
ditions, the heat-transfer coefficient from the reaction zone ᴄo the
ambient medium may easily be measured since it is derived from the heat-
transfer coefficient through the wall of the vessel. Moreover, these
conditions may serve as starting point for a detailed study of the compli-
cated convective heat transfer. Two explosives with strongly different

Card 1/5

27685
S/076/61/035/009/008/015
B106/B110

Thermal explosion in the liquid phase ...

properties were chosen for the experiments: Dina (dinitrooxydiethyl-
nitramine; melting point 52.5°C) and Tetryl (melting point $\simeq$ 130°C).
The decomposition of Dina is a reaction of first order and only leaves a
small condensated residue. The rate of heat development per unit volume
is independent of the extent of transformation, and is only determined by
the temperature. Under the conditions of a purely convective heat trans-
fer, Dina represents, therefore, the simplest example for the theory of
thermal explosion according to N. S. Semenov (Ref. 7: Zh, Uspekhi fiz.
nauk, RFKhO, 60, 241, 1928; 23, 251 1940). On the other hand, the
decomposition of Tetryl has an autocatalytic course and leaves a very
large condensated residue. Tetryl is a good example for the quasisteady
theory of thermal explosion developed by the authors (Ref. 6: A. G.
Merzhanov, F. I. Dubovitskiy, Dokl. AN SSSR, 124, 362, 1959; Ref. 9:
same authors, Dokl. AN SSSR, 120, 1068, 1958; Zh. fiz. khimii, 34, 2235,
1960). The investigation method had been elaborated previously (Ref. 2:
A. G. Merzhanov, V. G. Abramov, F. I. Dubovitskiy, Dokl. AN SSSR, 128,
1238, 1959) and was only completed by a device for the intermixing of the
substance. This method permits a determination of all fundamental
characteristics of thermal explosion. In Table 1, the experimental results

Card 2/ 5

27685

Thermal explosion in the liquid phase ...

S/076/61/035/009/008/015
B106/B110

on the thermal explosion of Dina are compared with the values calculated according to Semenov's theory; they agree well. The data for the calculations were obtained independently of the experiments. Table 2 gives a comparison of results of experimental investigation of the thermal explosion of Tetryl with the critical temperature and heating calculated by means of the equations derived in Ref. 6 and Ref. 9. Also in this case, the agreement is good. D. A. Frank-Kamenetskiy (Ref. 1: Diffuziya i teploperedacha v khimicheskoy kinetike (Diffusion and heat transfer in chemical kinetics), M.-L., 1947) is mentioned. There are 2 figures, 2 tables, and 9 references: 7 Soviet and 2 non-Soviet-bloc. The two references to English-language publications read as follows: A. J. B. Robertson, Third Symposium on Combustion, 1949, 545; W. G. Chute, K. G. Herring, L. E. Toombs, G. F. Wright, Canad. J. Res., B26, 89, 1948.

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

SUBMITTED: February 5, 1960

Card 3/5

| 1210

//. 8200

AUTHOR: Merzhanov, A. G.

TITLE: Quasi-stationary theory of thermal explosion

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 3, 1961, 637 - 640

TEXT: Within the scope of the quasi-stationary theory, the character of thermal explosion is studied at the dynamic conditions of linear temperature increase of the surrounding medium with increasing time. In the initial system of the equations: $c\varrho(dT/dt) = Qk_o\exp(-E/RT)\varphi(\eta)$ $- \alpha(S/V)\cdot(T-T_o)$; $d\eta/dt = k_o\exp(-E/RT)\varphi(\eta)$, $T_o = wt$ (1) (initial conditions: $t = 0$; $T = T_o$; $\eta = 0$), where T = temperature in the reaction zone, °K; T_o = temperature of the surrounding medium, °K; η = transformation degree; t = time, sec; α = heat transfer coefficient, $cal/cm^2\cdot sec\cdot degree$; V = reaction volume, cm^3; E = activation energy, cal/mole; k_o = factor of the exponential function; c = specific heat, cal/g·degree; ϱ = density,

Card 1/6

Quasi-stationary theory...

28735
S/020/61/140/003/017/020
B110/B101

g/cm^3; w = rate of change of T_0, degree·sec; $\varphi(\eta)$ = function expressing the rule of the reaction course at isothermal conditions. The quasi-stationary course of the process before the explosion is specific for con-strained systems. If T_0 is variable, the heat input is expressed in the Semenov diagram (Fig. 1) by a family of straight lines. During the reac-tion, the equilibrium position (intersection of heat input and heat loss) is shifted along the heat input curve. If heat input and heat loss are considered to belong to different coordinate systems moving toward each-other with a velocity w along the abscissa, explosion occurs at the moment of contact. With a linear increase of T_0, a zero-order reaction will always end up in an explosion, at any w. If w is smaller than the rate of establishment of thermal equilibrium, the process before the explosion becomes quasi-stationary. Explosion occurs when the heating rate w which is due to the burning out exceeds the critical rate w_{crit}, $(w > w_{crit})$.
In the constrained quasi-stationary system the rate of temperature change in the reaction zone almost equals the heating rate: $dT/dT_0 \approx 1$. By using the method of D. A. Frank-Kamenetskiy (Ref. 3: Diffuziya i teploperedacha

Card 2/6

28735

Quasi-stationary theory...

S/020/61/140/003/017/020
B110/B101

v khimicheskoy kinetike (Diffusion and heat transfer in chemical kinetics), Izd. AN SSSR, 1947), the exponent neighboring the temperature of the most intensive reaction T_{oi} is factorized according to:

$\exp(-E/RT) \simeq \exp(-E/RT_{oi}^2) \exp\left[(E/RT_{oi}^2)(T-T_{oi})\right]$. Introduction of the dimensionless quantities: $\theta = (E/RT_{oi}^2)(T-T_{oi})$;

$\varkappa = \left[QEk_o \exp(-E/RT_{oi})\right]/(RT_{oi}^2 \alpha S/V)$; $\theta_o = (E/RT_{oi}^2)(T_o-T_{oi})$;

$\gamma = (c\varrho/Q)(RT_{oi}^2/E)$; $\omega = \left\{w/\left[k_o \exp(-E/RT_{oi})\right]\right\} \cdot \left[E/(RT_{oi}^2)\right]$; $\beta = E/RT_{oi}$

into (1) results in ($\theta_o = -\beta$; $\theta = -\beta$; $\eta = 0$): $e^\theta \varphi(\eta) - (1/\varkappa)(\theta - \theta_o) - \omega\gamma = 0$;

$\omega(d\eta/d\theta) = e^\theta \varphi(\eta)$ as quasi-stationary reaction course at linear heating. For a monomolecular reaction, it has been found that $w_{crit} = e$; degree of reaction before the explosion: $\eta_{expl} = 1 - \exp(-e/\omega)$. Fig. 3 shows the results for the parameters: $k_o = 10^{18} sec^{-1}$; $E = 45,000$ cal/mole; $Q = 1000$ cal/cm^3; $\alpha = 10^{-3}$ cal/cm^2·sec·deg; $S/V = 4/d$; $d = 0.44$ cm; $c = 0.3$ cal/g·deg; $\varrho = 1.5$ g/cm^3. It has been established that: 1) w_{crit}

Card 3/6

28735

Quasi-stationary theory...

S/020/61/140/003/017/020
B110/B101

is inversely proportional to the diameter of the reaction vessel; 2) the heat increase before the explosion is a function of the critical temperature as in the case of T_0 = const ($\Delta T_{crit} = RT^2_{0,crit}/E$); 3) the high reaction degree before the explosion ($\eta_{crit} \approx 63\%$), which is typical for the quasi-stationary reaction course, decreases with increasing w/w_{crit}; 4) the dynamic temperature $T_{0,crit})_d$ is greater by the quantity ΔT_{crit} than the static temperature $(T_{0,crit})_{st}$. The temperature of the nascent explosion decreases with increasing w/w_{crit}; $T_{0,expl} \rightarrow (T_{0,crit})_{st}$; 5) the criterion of the quasi-stationary properties in dimensionless quantities is: $K_0 \approx \omega \varkappa \gamma$. Since γ is $10^{-2} - 10^{-3}$ in reactions capable of thermal explosion, the system is always quasi-stationary with $K_0 = e\gamma \ll 1$. The interval of the rates within which quasi-stationary development of the explosion occurs, is: $1 < w/w_{crit} < 2-20$. Bimolecular, autocatalytic, and other reactions can be calculated in a similar way. There are 3 figures

Card 4/6

28735

Quasi-stationary theory...

$S/020/61/140/003/017/020$
$B110/B101$

and 3 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)
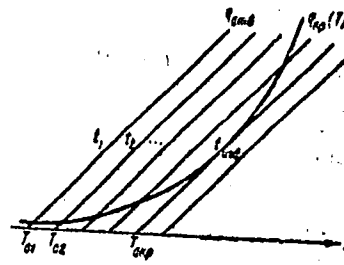
PRESENTED: March 16, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: March 10, 1961

Fig. 1. Diagram of Semenov.

Legend: q_{om6} = heat loss;
q_{np} = heat input; t_{uno} = temperature of induction; T_{0Kp} = $T_{0,crit}$.

Fig. 1

Card 5/6.

S/062/63/000/003/014/018
B101/B186

AUTHORS: Merzhanov, A. G., and Filonenko, A. K.

TITLE: The part of the flame in the combustion mechanism of explosive
               powders

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh
               nauk, no. 3, 1963, 560 - 562

TEXT: The influence of the flame on the combustion rate of explosives was
investigated experimentally by retarding the process in the flame either
by removing the heat by means of a metal plate kept over the flame or by
blowing nitrogen over it. The retardation effect, i.e. the decrease of
combustion rate, was determined according to the equation $(u - u_r)/u$, %,
where u is the non-retarded combustion rate, u_r the retarded combustion
rate. Results with pyroxylene showed that between a pressure of 12 and
41 kg/cm^2 the retardation effect is very small, dropping from 9 to 1.5 %.
With nitroglycerin the retardation effect was also only 10 % with 31 kg/cm^2.
There is 1 table.

Card 1/2   Inst. Chem. Physics, AS USSR

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AUTHORS: Merzhanov, A. G., Abramov, V. G., Gontkovskaya, V. T.

TITLE: Rules for the transition from self-ignition to ignition

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 1, 1963, 156-159

TEXT: A theoretical investigation of an unsteady temperature field within a cylindrical system, made to determine the boundaries of self-ignition and the transition to ignition, is reported. It is assumed that the initial temperature of the system is lower than that of the ambient medium, that the temperature at the system surface is constant, and that the reaction is of zeroth order. The starting point is the equation:

$$\partial\theta/\partial\tau = \exp\left[\theta/(1 + \beta\theta)\right] + (1/\delta)(\partial^2\theta/\partial\zeta^2 + \partial\theta/\zeta\,\partial\zeta);\ 0 \leqslant \zeta \leqslant 1;\ 0 \leqslant \tau < \infty.$$

The initial and the boundary conditions are: $\theta(\zeta, 0) = -\theta_0$; $\theta(1, \tau) = 0$;

$\partial\theta/\partial\zeta\big|_{0,\tau} = 0$, where $\theta = (E/RT_o^2)(T - T_o)$; $\zeta = x/r$; $\tau =$

$(Q/c\varrho)(E/RT_o^2)k_o\exp(-E/RT_o)\cdot t$; $\delta = (QE/\lambda RT_o^2)r^2k_o\exp(-E/RT_o)$; $\beta = RT_o/E$;

Card 1/4

Rules for the transition from ...

$\theta_0 = (E/RT_0^2)(T_0 - T_{in})$; x = radial coordinate (cm); t = time (sec); $T(x,t)$ = temperature $(^\circ K)$; T_0 = temperature of the medium $(^\circ K)$; T_{in} = initial temperature of the system $(^\circ K)$; r = radius of the cylinder (cm); E = energy of activation (cal/mole); Q = heat effect of the reaction (cal/cm^3), λ = coefficient of thermal conductivity (cal/cm·sec·deg); c = specific heat (cal/g·deg); ϱ = density (g/cm^3); the dimension of the factor k_0 is sec^{-1}. δ is the criterion by Frank-Kamenetskiy (ZhFKh, 13, 738 (1939)) which is the most important of the dimensionless parameters (δ, θ_0, and β) used for determining the position of the self-ignition limits; θ_0 characterizes the thermal head; the parameter β only slightly effects the system. The differential equation was split up into a system of finite-difference equations. The temperature distribution as a function of the time and the parameters was calculated by computer. In all calculations, β = 0.03 was assumed, the other parameters were varied: $0 < \delta < 1000$; $0 < \theta_0 < 16$. Results: (1) For $\delta \sim \delta_{crit}$, all points of the

Card 2/4

Rules for the transition from ...

system are simultaneously heated to the temperature of the medium, the temperature maximum during the entire process of heating is in the center (on the cylinder axis), hence inflammation is initiated. (2) Noncontemporary heating sets in with rising δ, a temperature maximum develops near the surface and migrates to the center. If δ is not very large, the thermal wave reaches the center and inflammation sets in as in the case of (1). If δ is large, inflammation occurs before the thermal wave has reached the center. If δ is very large, inflammation occurs near the surface and the temperature of the center remains un- changed. (3) With increasing heating, the abscissa of the maximum approaches a value ζ_{expl}. Self-ignition sets in at $\zeta_{expl} = 0$, but only in the narrow range $\delta_{crit} < \delta < \delta'_{crit}$, where $\delta_{crit} = 2.07$ and δ'_{crit} = 12.0 - 12.5 according to J.R. Parks (J.Chem.Phys., 34,46 (1961)). For $\delta > \delta'_{crit}$, ζ_{expl}, with increasing δ, asymptotically approaches the curve $\zeta_{expl} = 1 - const/\sqrt{\delta}$, which describes ignition. (4) In the range $0 < \theta_0 < 16$, $0 < \delta < 12$, the equations $\tau_h = 0.48\theta_0^{0.22}\delta^{0.85} - 0.6/\theta_0$;

Card 3/4

Rules for the transition from ...   S/020/63/148/001/031/032
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$\tau_{ind} = 1 + 1/(\delta - 2)^{0.92}$, (at $\theta_o = 0$), hold for the heating time τ_h and the induction time τ_{ind}. Presently this scheme is used to calculate autocatalytic reactions and to elucidate the effect of external heat exchange on the transition from self-ignition to ignition. There are 4 figures and 1 table. The most important English-language reference is: J. Zinn, C.L. Mader, J.Appl.Phys., 31,323 (1960).

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

PRESENTED: July 12, 1962, by Ya.B. Zel'dovich, Academician

SUBMITTED: July 2, 1962

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Card 4/4

45159

S/020/63/148/002/035/037
B124/B186

// 8300

AUTHORS: Merzhanov, A. G., Barzykin, V. V., Gontkovskaya, V. T.

TITLE: Problem of focal heat explosion

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 2, 1963, 380-383

TEXT: The local heating focus causing a heat explosion is given by a
Π-shaped temperature profile at the initial instant of time in a spherical
system of coordinates. The dimensions of the focus are assumed to be much
smaller than the main mass of the substance. The initial differential
equation $\partial\theta/\partial\tau = e^{\theta/(1+\beta\theta)} + (1/\delta)[(\partial^2\theta/\partial\xi^2) + (2/\xi)(\partial\theta/\partial\xi)]$, $0 \leq \xi < \infty$, $\tau \geq 0$
with the initial and boundary conditions $\tau = 0$, $\theta = 0$ for $\xi \leq 1$; $\theta = -\theta_0$ for
$\xi > 1$; $\theta = -\theta_0$ for $\xi = \infty$ was solved with an electronic computer. .The tem-
perature distribution was determined as a function of time and of the para-
meters of the system $\theta = \theta(\xi,\tau,\delta,\theta_0)$. Here $\theta = (E/RT_0^2)(T-T_0)$; $\xi = x/r$;
$\tau = (QEk_0/c\varrho RT_0^2)e^{-E/RT_0}t$; $\delta = (QEr^2k_0/\lambda RT_0^2)e^{-E/RT_0}$; $\beta = RT_0/E$ and
$\theta_0 = (E/RT_0^2)(T_0-T_1)$, x is the radial coordinate, t is the time, $T(x,t)$ is

Card 1/3

Problem of focal heat explosion

S/020/63/148/002/035/037
B124/B186

the temperature, T_o denotes the initial temperature of the focus, T_1 is the temperature of the mass of the substance at a certain distance from the focus, r is the initial radius of the focus, q is the heat effect of the reaction, k_o is the factor of the exponential function, E is the activation energy, λ is the heat conduction coefficient, c is the thermal capacity and ρ is the density. β was taken to be 0.03; furthermore, $4 < \theta_o < 25$. The approximation formulas $\delta_{crit} \cong 12.1(\ln\theta_o)^{0.6}$,

$r_{crit} \cong 3.48 \; T_o \sqrt{(\lambda R/k_o q E)} e^{E/2RT} \ln[(E/RT_o^2)T_o - T_1)]^{0.3}$ and $\delta_{crit} \cong 20$; $\tau_{crit} \cong 2$;

$\theta_{max \cdot crit} \cong 4$ were obtained. It has been found, for example, that for

$\theta_o = 10.35$ and $\delta/\delta_{crit} = 1.4$ $\tau/\tau_{adiab} = 1.03$ where $\tau_{crit}/\tau_{adiab} = 1.63$.

The properties of the focus depend only slightly on β. The characteristics of the process are hardly influenced by the burn-out. The focal explosion is not influenced by the reactivity of the neighborhood or the fulfillment of the boundary conditions on the surface of the focus. The presence of a neighborhood capable of reaction is, however, of considerable importance in the second stage of the reaction, i.e. when a self-propagating process is

Card 2/3

Problem of focal heat explosion

S/020/63/148/002/035/037
3124/E186

excited in the main mass of the substance. On the basis of calculations it could be concluded that during the induction period the dimensions of the focus reduce to temperature levels that correspond to the reaction maximum. In first approximation $(d_{\xi}/dt)_{initial} = b/\delta$ is valid for the initial propagation rate of the process near the boundary where b depends only slightly on θ_0 and δ so that $(dx/dt)_{initial} = (2 \text{ to } 3)10^3 a/d$ (a denotes the temperature diffusivity and d the initial diameter of the focus). The dependence of the initial propagation rate on the diameter is obviously connected with the non-steady excitation of the process. There are 4 figures and 3 tables.

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

PRESENTED: July 12, 1962, by N. N. Semenov, Academician

SUBMITTED: July 12, 1962

Card 3/3

L 17343-63   EPR/EPF(c)/EWT(m)/BDS   AEDC/AFFTC   Ps-4/Pr-4   WW/JWD/H

ACCESSION NR: AP3007239   S/0020/63/152/001/0143/0146

AUTHOR: Merzhanov, A. G.; Filonenko, A. K.

TITLE: Thermal self-ignition of homogeneous gas mixture in a flow

SOURCE: AN SSSR. Doklady*, v. 152, no. 1, 1963, 143-146

TOPIC TAGS: rocket, combustion, solid propellant, combustion regime, thermal self ignition, preflame zone, homogeneous gas mixture, gas combustion

ABSTRACT: An analysis of thermal self-ignition in flowing gas mixtures was made based on the classical combustion theory of Frank-Kamenetskiy and Zel'dovich. The results were applied to the combustion of solid explosives. The regime characterized by thermal self-ignition (induction controlled regime) recently has been shown to exist in rocket motors by Zaydel' and Zel'dovich (Zhurn. prikl. mekh. tekh. fiz., no. 4, 27, 1962). The following dimensionless equation was formulated and solved by electronic computation to to determine the effect of individual parameters in the self-igni-tion regime:

Card 1/6

L 17343-63

ACCESSION NR: AP3007239

$$\frac{d^2\theta}{d\xi^2} - \frac{d\theta}{d\xi} + \delta \exp\left(\theta/(1 + \beta\theta)\right) \frac{(1 - \gamma\theta)^\alpha}{1 + \beta\theta} = 0;$$

boundary conditions: $\xi = 0, \theta = 0, \xi = \infty, d\theta/d\xi = 0,$

where $\theta = \frac{E}{RT_0^2}(T - T_0); \xi = \frac{cu_\varkappa}{\lambda} x; \delta = \frac{Q\lambda\rho_0}{c^2 u_\varkappa^2} \frac{E}{RT_0^2} k_0 \exp\left(-E/RT_0\right);$

$$\beta = \frac{RT_0}{E}; \gamma = \frac{c}{Q}\frac{RT_0^2}{E},$$

where λ is thermal conductivity, u_m is mass flow rate, T_0 is initial temperature, x is coordinate, c is specific heat, and Q is reaction heat. Results show that two combustion regimes exist separated by the critical condition $\delta = \delta_{cr}$ (see Figs. 1-3 of the Enclosure). The self-ignition regime is established at $\delta < \delta_{cr}$, characterized by a wide preflame (induction) zone, small heat fluxes in the induction zone, and a constant overall heat release rate. The reaction taking place at T_0 is controlling for this regime. The "burning" regime is established at $\delta > \delta_{cr}$, characterized by a narrow preflame zone, high heat fluxes into the fresh mixture, and

Card 2/6

L 17343-63

ACCESSION NR: AP3007239

3

a variable overall heat flux depending on δ. The reaction taking place at combustion temperature is controlling for this regime. In the self-ignition regime, $u_m > (u_m)_g$ ($(u_m)_g$ is the normal burning rate); consequently, the flame cannot propagate counter to the gas flow. In the burning regime, $u_m < (u_m)_g$ and the flame moves counter to the gas flow until its position is stabilized at the boundary condition $\xi = 0$. When $u_m = (u_m)_g$, the critical condition, which separates both regimes, prevails. Solution of the equation, neglecting the conductive term, yielded the following expression for the width of the preflame zone:

$$\xi_m = \frac{1 + 8\delta^2 + 0.6\gamma^{1/2}}{6}$$

Experimental data and parameters calculated from the results were used to evaluate the combustion of solid explosives. It was shown that nitroglycerine powder burns under the self-ignition regime and hexogen, under the burning regime. "The authors thank A. Ya. Dubovnitskiy for programming and Z. B. Mayofis for carrying out the

Card 3/6

L 17343-63
ACCESSION NR: AP3007239

computation." The article was presented by N. N. Semenov. Orig.
art. has: 6 figures and 6 formulas.

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

SUBMITTED: 11Apr63   DATE ACQ: 30Sep63   ENCL: 02

SUB CODE: PR, AS   NO REF SOV: 009   OTHER: 002

Card 4/6