CA

Semiconductive properties of organic dyes. A. T. Vartanyan. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 16, 169-85(1952); cf. *C.A.* 45, 3700i.—The dyes were deposited from alc. solns. with a film thickness of 0.1-1.0 μ on quartz plates carrying Au or Pt electrodes 1 mm. apart and treated *in vacuo* at 100°. The specific dark cond. of phthalocyanines is approx. 10^{-8} (Mg phthalocyanine $1.4 \times 10^{-9} \Omega^{-1}$ cm.$^{-1}$). With the exception of free phthalocyanine in dark, cond. of dyes is sensitive to O; this sensitivity increases in Mg and Cu phthalocyanine and decreases in crystal violet and methylene blue. If O is pumped out, the initial sensitivity is re-established. The cond. is a linear function of the applied field and has a pos. temp. coeff. in the interval 20-100° (30-200° for phthalocyanines). The activation energy is of the order of 0.4 to 1.3 e.v. and depends on the dye and the gas atm. (O,H). Most other dyes have dark resistances > 10^{14} Ω. *In vacuo* the resistance is decreased by light. A stationary condition is obtained in Rhodamin 6G in approx. 30 min. and in Eosin in 15-20 sec.; at increasing temps. the inertia decreases in all dyes with the exception of phenosafranine. Photochem. action is responsible for the decrease of photocurrent after the max. is reached for some dyes such as cyanine and crystal violet under certain conditions of wave length and temp. The spectral distribution curves depend on the thickness of the film; the max. of photocond. is slightly shifted to longer wave lengths as compared to the max. of absorption; it drops to very small values at wave length > 600-650 mμ (the max. is at 500 mμ in tripaflavine and at 540 and 593 mμ in Bengal rose). Photocond. is increased with temp. according to the formula $\Delta i = Ce^{-B/T}$; this is attributed to an increase in the no. of carriers under the influence of thermal energy. The carriers are mostly electrons; also some of the cond. is carried by holes. The photocond. $\Delta i = aL^b$, where L is the intensity of light, a and b constants. For high-inertia dyes $b < 0.5$; for low-inertia dyes $0.5 < b < 1$. Δi follows Ohm's law up to fields of 5000 v.cm.$^{-1}$; the exceptions are due to the heating of the film by Joule heat. O, I, and $HCCl_3$ vapor quench photocond. of most dyes strongly even at pressures 0.01-0.001 mm. and "poison" the film. However the photocond. of eosin, erthyrosin, Bengal Rose, and tripaflavine is increased by O but only in the presence of light of a certain wave length. The max. of sensitivity is shifted to longer wave length depending on the duration of illumination and the O pressure according to the formula $\Delta i_0 - \Delta i = ap/(b + cp)$.

S. Pakswer

VARTANYAN, A.T.

Chemical Abstracts
Vol. 48 No. 5
Mar. 10, 1954
Electronic Phenomena and Spectra

2

Influence of water vapor on the photoconductivity of solid films of dyes. A. T. Vartanyan. *Zhur. Fiz. Khim.* 27, 272–80(1953); cf. *C.A.* 45, 3709i.—In order to test the hypothesis of Terenin (*Photochemistry of Dyes*, 1947, sect. 28; *C.A.* 46, 5978e) that the first step in the photochem. decompn. of a dye is the addn. of a mol. of O to form a biradical, films of crystal violet (I), Rhodamine B (II), and Rhodamine 6J (III), purified by many recrystns., were deposited on a quartz surface which bore Pt electrodes set 1 mm. apart. An e.m.f. of 22 v. was applied to I and 276 v. to II and III; the current was observed by means of a mirror galvanometer (sensitivity 6.3×10^{-10} amp.), each film being exposed to light of different wave-length ranges between 275 and 700 mμ from a 250-w. high-pressure quartz-Hg lamp. The films were tested *in vacuo* and in the presence of H_2O vapor (1–2.5 mm. pressure) successively for periods of 60–150 min. Exptl. data are presented graphically. In the wave-length range 600–700 mμ the effect of H_2O vapor on the photocond. was independent of the wave length. When H_2O vapor was admitted to I during exposure to 600-700-mμ light, the cond. fell immediately but fully recovered within 2 hrs. after the H_2O was removed. Radiation of 300–400 mμ causes decompn. of I *in vacuo*; this is inhibited by H_2O vapor. II and III are less affected by H_2O (as regards photocond.) than I. As H_2O pressure approaches the point of condensation on the dye (about 5 mm. for III), its effect is complicated by heating caused by adsorption, increase of photocond., and incipient electrolytic conduction. It is concluded that H_2O vapor reversibly decreases the photocond. of solid dye films as a result of electron capture and that Terenin's hypothesis is correct.

J. W. Loweberg, Jr.

VARTANYAN, A.T

USSR/Physics - Spectral analysis

Card 1/1 Pub. 43 - 53/62

Authors : Vartanyan, A. T.

Title : Absorption spectra of leuco base dyes in solid state

Periodical : Izv. AN SSSR. Ser. fiz. 18/6, 731-732, Nov-Dec 1954

Abstract : A study of the absorption spectra of leuco base dyes: Lauth's violet, methylene blue, thionine blue, capri blue, green malachite, crystal violet, etc., in solid state showed that the presence of gaseous hydrogen sulfide results in the conversion of many solid dyes into an achromatic compound. The rate of reaction of the dye was observed to be increasing with the increase in temperature. Such achromatic compounds sublimate rapidly at temperatures above 50°C. The solid leuco base dyes regain their original color when exposed to atmospheric air. Graph.

Institution : ....

Submitted : ....

VARTANYAN, A. T.

USSR/Chemistry - Photo-Conductivity

Card 1/1

Authors	:	Vartanyan, A. T., and Karpovich, I. A.
Title	:	About the photo-conductivity of colored organic films during illumination with visible light
Periodical	:	Zhur. Fiz. Khim., 28, Ed. 5, 856 - 864, May 1954
Abstract	:	Experiments to determine the photo-conductivity of colored collodion films during illumination with visible light brought only negative results. Photo-conductivity could not be revealed. The increase in electrical conductivity during illumination with visible light, as observed by many researchers, is not due to the internal photo effect but to the heating of the colored film as result of the absorption of the light energy in the natural color absorption band. Arguments in favor of the electrolytical nature of the electrical conductivity of colored collodion films are presented. Fourteen references: 9-USSR, 2-Hungarian, 3-USA. Table, graphs.
Institution	:	...
Submitted	:	Sept. 21, 1953

Vartanyan, A.T.

62

✔ **Influence of hydrogen on the photoconductivity of solid dye films.** A. T. Vartanyan. *Doklady Akad. Nauk S.S.S.R.* 94, 829-32(1954).—The investigations of Petrikaln (C.A. 24, 5613) on the influence of H on the photoconductivity of fuchsin are found to be affected by the temp. variations during the expts. and by the [illegible] indicate [illegible] the [illegible] sensitivity of the dye [illegible] permits not only the detection of O in a photoelectrically inert gas but even detn. of its approx. concn. W. M. Sternberg

VARTANYAN, A.T.

/Absorption spectra of leuco bases in acid solutions and in
the solid state. I. The thiazine and oxazine dyes in acid
solutions. A. T. Vartanyan. *Zhur. Fiz. Khim.* 29,
1304-10(1955).—The app. constructed for the production of
the dyes in a form suitable for absorption measurements is
described. The solid thiazine and oxazine dyes are reduced
by gaseous H_2S to the leuco bases, the rate of formation of
which increases with the temp. These leuco bases are
sublimed in vacuum with an observable velocity at temp. of
80° and higher. In a 0.1*N* HCl they are converted to the
corresponding dyes by oxidation (dehydrogenation). In
5*N* HCl the bases are converted to bivalent ions, the absorp-
tion spectra of which coincide with the absorption spectra of
the dyes in acid soln. During such conversion of the Capri
Blue leuco base, the steric effect of the methyl group in an
ortho position to the dimethylamino group is not manifested,
apparently due to an equal probability of the proton addn.
to the central N atom as to the dimethyl amino group N.
III Leuco bases of triphenylmethane dyes. *Ibid.* 1555-
63.—The method of producing solid leuco compds. developed
for oxazine and thiazine dyes was also used for triphenyl-
methane dyes. The investigation of the spectra of solid
parafuchsin, malachite green, and crystal violet were
similar to the absorption spectra of their alc. solns., but the
max are displaced by about 10 mμ. The long-wave
absorption band of the triphenylmethane dye leuco compds.
at 300 mμ was found to be the triphenylmethane band,
displaced by the introduction of dimethylamino groups, and
the short-wave 260 mμ band is caused by the dimethyl-
amino group. The leuco-base solid films are only partially
converted into the dyes by exposure to sunlight in the air.
The conversion is incomplete, and a fading of the regenerated
dye goes parallel with its regeneration. W. M. S.

VARTANYAN, A.T.

Absorption spectra of leuco-base dyes in acid solutions and as solids. Part 2. Leuco-bases of solid thiazine and oxazine dyes. Zhur.fiz.khim. 29 no.8:1447-1455 Ag '55. (MLRA 9:3)
(Dyes and dyeing--Chemistry) (Absorption spectra)

VARTANYAN, A.T.

USSR/Physical Chemistry - Molecule. Chemical Bond, B-4

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 60753

Author: Vartanyan, A. T.

Institution: None

Title: Absorption Spectra of Leuco-Bases of Dyestuffs in Acid Solutions and in Solid State. III. Leuco-Bases of Triphenylmeth[illegible]es

Original Periodical: Zh. fiz. khimii, 1955, 29 No 9, 1555 [illegible]5-1563

Abstract: Measured were the ultraviolet absorption spectra (AS) of solid films of leuco-bases (LB) of the triphenylmethane dyes parafuchsin (I), malachite green (II) and crystal violet (III) prepared by sublimation in vacuum (see Communication II, Referat Zhur - Khimiya, 1956, 35001) as well as by reduction of solid films of the dyes with gaseous H_2S at 100° (II and III) and 150° (I). Comparison with AS of alcoholic solutions of LB prepared by dissolution of these solid films and also of synthetic LB shows that the absorption bands of solid films are displaced toward

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USSR/Physical Chemistry - Molecule. Chemical Bond, B-4

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 60753

Abstract: longer waves by 900-1,000 cm^{-1} and the short wave band of alcoholic solutions of [illegible] II and LB III reveal a weak oscillatory structure which is absent in the solid films. In the LB the band 300 mu constitutes a displaced band of phenyl groups of triphenyl methane, while the band 260 mu is caused by the presence of dimethyl amino groups and constitutes a band of the latter displaced from the far ultraviolet region. In the dark on contact with air films of LB of triphenylmethane dyes are stable; under light in the presence of oxygen the dye is regenerated but due to the concurrent process of photochemical oxidation of the dye a complete coincidence is not attained between absorption curves of pure dyes and dyes regenerated from LB. AS of products of photochemical fading show characteristic absorption bands with a $\lambda_{(max)}$ of 358 mu in the case of I and II, and 450 mu in the case of III.

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VARTANYAN, A. I.

PHASE I BOOK EXPLOITATION 811

Akademiya nauk SSSR

Sbornik posvyashchennyy pamyati Akademika P.P. Lazareva (Collection of Articles in Memory of Academician P.P. Lazarev) Moscow, Izd-vo AN SSSR, 1956. 374 p. 1,600 copies printed.

Resp. Ed.: Shuleykin, V.V., Academician; Editorial Board: Shuleykin, V.V., Academician, Deryagin, B.V., Corresponding Member, Academy of Sciences, USSR, Frank, G.M., Corresponding Member, Academy of Medical Sciences, USSR, Volarovich, M.P., Professor, Yefimov, V.V., Professor, Maslov, N.M., Kuzin, A.M., Professor; Ed. of Publishing House: Kuznetsova, Ye.B.; Tech. Ed.: Shevchenko, G.N.

PURPOSE: This compilation of articles is published in honor of P.P. Lazarev.

COVERAGE: The collection consists of three parts; the first group of articles deals with general physics, the second with biophysics and physiology, the third with geophysics. In the Table of Contents, the date on which the article was received follows each title.

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PART I. GENERAL PHYSICS

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SECTION II. BIOPHYSICS AND PHYSIOLOGY

Collection of Articles (Cont.) 811

Card 5/6

Collection of Articles (Cont.) 811

SECTION III. GEOPHYSICS

Kolyubakin, V.V., Ozerskaya, M.L., Petrova, G.N. Field Apparatus for Determining the Magnetic Properties of Rocks (July 1953) 351

Lyapunov, A.A. On the Interference of Seismic Vibrations (July 1953) 363

AVAILABLE: Library of Congress

IS/sfm
1-26-59

Card 6/6

VARTANYAN, A.T.

Academician A.N. Terenin; on his 60th birthday. Zhur. nauch. i prikl. fot. i kin. 1 no.4:310-312 Jl-Ag '56. (MLRA 9:10)

(Terenin, Aleksandr Nikolaevich, 1896-)

Vartanyan, A.T

USSR/Optics - Spectroscopy

K-6

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 13013

Author : Vartanyan, A.T.
Inst : -
Title : Nature of the Absorption Bands of Leuco-Bases of Thiazine Dyes.

Orig Pub : Optika i spektroskopiya, 1956, 1, No 4, 478-489

Abstract : The absorption spectra of solid layers of leuco-bases of thiazine dyes (thionene, methylene blue, azure 1, methylene green GG, toluidene blue O, thianine blue, and neomethylene blue), obtained by direct reduction of the solid dye in an atmosphere of H_2S at 100 -- 170°, were measured. Comparison of the absorption spectra of the simple aromatic amines of leuco-bases of triphenylmethane and thiazine dyes has shown that the long-wave band with a maximum of 335 -- 338 millimicrons is due to absorption of the phenyl group, while the bandwidth and maximum at 255 -- 268 millimicrons is due to the amino group.

Card 1/1

Vartanyan, A.T.

USSR/Optics - Optical Methods of Analysis. Instruments. K-7

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 13099

Author : Vartanyan, A.T.
Inst : -
Title : Obscure Reactions in Dyes.

Orig Pub : Izv. AN SSSR, ser. fiz. , 1956, 20, No 4, 448-454

Abstract : A spectral investigation of sublimated layers of dyes has shown that while methylene blue (I), crystalline violet (II), and rhodamine 6G do not experience substantial changes in the process of sublimation, rhodamines B and G experience partial change, there being formed an uncoloted substance, which is characterized by bands with clearly pronounced maxima at 318, 277 and 235 millimicrons. In the aqueous solution, the uncolored substance changes into a corresponding dye. Upon illuminating the uncolored substance in air, there also takes place a regeneration of the dye. At temperatures above 100%, I and II

Card 1/2

USSR/Optics - Optical Methods of Analysis. Instruments. K-7

Abs Jour : Ref Zhur - Fizika, No 5, 1957, 13099

interact with water vapors, forming uncolored compounds. A spectral photometric investigation has shown that the resultant compounds have properties of leuco bases.

Card 2/2

VARTANYAN, A.T.

Temperature dependence of the electric conductivity of organic semiconductors. Izv.AN SSSR,Ser.fiz. 20 no.12:1541-1547 D '56.

(MLRA 10:3)

(Semiconductors)

VARTANYAN, A.T.

Interaction between solid dye salts and water vapors at temperatures over 100°. Zhur.fiz.khim.30 no.2:424-436 F '56. (MLRA 9:7)
(Dyes and dyeing--Chemistry)

[illegible]

PRIKHOT'KO, A.F.

24(7) p 3 PHASE I BOOK EXPLOITATION SOV/1365

L'vov. Universytet

Materialy X Vsesoyuznogo soveshchaniya po spektroskopii. t. 1: Molekulyarnaya spektroskopiya (Papers of the 10th All-Union Conference on Spectroscopy. Vol. 1: Molecular Spectroscopy) [L'vov] Izd-vo L'vovskogo univ-ta, 1957. 499 p. 4,000 copies printed. (Series: Its: Fizychnyy zbirnyk, vyp. 3/8/)

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii. Ed.: Gazer, S.L.; Tech. Ed.: Saranyuk, T.V.; Editorial Board: Landsberg, G.S., Academician (Resp. Ed., Deceased), Neporent, B.S., Doctor of Physical and Mathematical Sciences, Fabelinskiy, I.L., Doctor of Physical and Mathematical Sciences, Fabrikant, V.A., Doctor of Physical and Mathematical Sciences, Kornitskiy, V.G., Candidate of Technical Sciences, Rayskiy, S.M., Candidate of Physical and Mathematical Sciences, Klimovskiy, L.K., Candidate of Physical and Mathematical Sciences, Miliyanchuk, V.S., Candidate of Physical and Mathematical Sciences, and Glauberman, A. Ye., Candidate of Physical and Mathematical Sciences.

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Card 11/30

VARTANYAN, A.T.

Absorption spectra of sublimed layers of dyes. Fiz. sbor. no.3: 154-156 '57. (MIRA 11:8)

(Pinacyanol—Spectra)
(Rhodamine—Spectra)
(Auramine—Spectra)

VARTANYAN, A.T.

SUBJECT: USSR/Luminescence

AUTHOR: Vartanyan A. T.

48-4-15/48

TITLE: Semiconductor Processes in Organic Dye Layers (Poluprovodnikovyye protsessy v sloyakh organicheskikh krasiteley)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #4, pp 523-524 (USSR)

ABSTRACT: Investigations of electric and photoelectric properties of dyes have shown that they can be considered as a class of organic semiconductors.

Temperature-dependence of electroconductivity for many dyes is described by the formula:

$$\sigma = \sigma_0 \exp\left(-\frac{\varepsilon_m}{2kT}\right).$$

where ε_T is activation energy, which has the following values for various dyes: 2.28 for trypaflavine, 2.13 for eosine, 2.15 for erythrosine, 2.08 for phloxin, 1.8 for pinacyanol, and 1.6 ev for phthalocyanin.

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Photoconductivity-temperature dependence obeys also to an exponential law, but the values of activation energies are

48-4-15/48

TITLE: Semiconductor Processes in Organic Dye Layers (Poluprovodnikovyye protsessy v sloyakh organicheskikh krasiteley)

several times lower than those for electroconductivity.

Under vacuum, the dependence of photocurrent i_{φ} on illumination intensity L is expressed by the formula:

$$i_{\varphi} = aL^{n},$$

where n is a constant for a given layer, having values between 0.5 and 1.
The photoconductivities of eosine, erythrosine, phloxin, phthalocyanin and some other dyes increase in the presence of oxygen.

The values of optical activation energies for some dyes were determined by means of a "photoelectric straight lines" method. The obtained regularities and activation energy values can be used for further studies of photoelectric properties of organic phosphors activated by dyes. No references are cited.

INSTITUTION: (presumably) Institute of Physics of the Estonian Academy of Sciences
PRESENTED BY:
SUBMITTED: No date indicated.
AVAILABLE: At the Library of Congress.
Card 2/2

VARTAN'YAN, A. I.

[illegible] A. I. [illegible]

VARTANYAN, A.T.

20-5-20/67

AUTHOR VARTANYAN A.T., KARPOVICH I.A.

TITLE On the Photoconductance of the Violanthrone (?) and of the Pyranthrone.
(O fotoprovodimosti violantrona i pirantrona.- Russian)

PERIODICAL Doklady Akademii Nauk SSSR 1957, Vol 113, Nr 5, pp 1020-1021 (USSR)

ABSTRACT The paper under review presents the results of the investigations of the photoconductance of layers which are obtained by rubbing-on of the powder of the violanthrone (dark blue indanthrene VO (?)) and of the pyranthrone (golden-orange indanthrene G (?)). The investigation was carried out with the aid of an device that had already been described in an earlier paper. The layers (of a thickness of 0.1 to several microns) were applied to a 'quartz finger' containing platinum electrodes. The photoconductance was investigated in vacuum, although the presence of air does not affect the results in any considerable way. A tungsten incandescent lamp of 100 W was used as source of light, and the light was decomposed by a mirror monochromator with vitreous optical system. The distribution of energy with respect to the wave lengthes was determined by means of a thermoelectric pile. The current intensities of the order of magnitude of 10^{-13} a were measured with the aid of a direct-current amplifier.

Several seconds after the layers have been exposed to light, the

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20-5-20/67

photocurrent becomes constant and then deacreases almost equally fast if the exposure to light is terminated. If the observation is carried on for longer periods, an additional increase in the photocurrent will be frequently noticed. If this long-period exposure to light is suddenly terminated, the photocurrent first of all quickly decreases, but there always remains a remanent photocurrent which decreases only slowly. The photocurrent obeys the Ohm's law, at least at field strengthes up to 4000 V/cm. The dependence of the photocurrent i_Φ on the intensity L of the exposure to light is described by the mathematical relation $i_\Phi = aL^n$, with a and n denoting constants. In the layers under investigation, n always remained below 1 and amounted to 0.7 to 0.9, depending on the thickness of the layer and on the intensity of the exposure to light. A diagram enclosed to the paper under review shows the spectral curves of the photosensitivity S of the thin layers of the violantrone and of the pyranthrone. The optical activation energy was determined with the aid of two different methods, and the results obtained by the authors of the present paper are twice as high than the values given by other authors. This phenomenon probably is caused by

20-5-20/67

On the Photoconductance of the Violanthrone (?) and of the Pyranthrone.

a change of these coloring substances a result of multiple sublimation.
(2 reproductions)

ASSOCIATION: not given.
PRESENTED BY: A.N. Terenin, Member of the Academy, 10.9. 1956
SUBMITTED: 14.9. 1956
AVAILABLE: Library of Congress.

CARD 3/3

20-1-14/42

On the Problem of the Valve-Like Photoelectromotorical Power of the Photoelectric Cells With Dyes.

where A and B denote constants. A further diagram illustrates the volt-ampere dependences of the dark current and the photoelectric current for a photoelectric cell of the type I with pinacyanol. This dependence gives evidence of the existence of a barrier layer.The photoelectric current increases together with the tension in the pass direction and tends towards a saturation;in the barred direction it sinks towards nil.In the case of a photoelectric cell of the type II the pass direction and the barred direction change their parts as against the cells of the type I and vice versa. A photoelectric cell of the type III does not show any rectifying properties,the dark current at small tensions responding to Ohm's law.This result confirms the lack of a barrier layer. The here found results are also valid for photoelectric cells with orthochromine T and with crystalline violet, but they hardly agree with the assumptions on the valve-like nature of the photoelectromotoric power. There is no causative relation between photoelectromotoric power and barrier layer. So far the structure of the barrier layer and the mechanism of the rectifying at the contact dye- metal have not been explained. The photoelectromotorical power exclusively develops from the asymmetry of illumination of both electrodes, it does not depend on the kind of the contact and of the electrode material.

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On the Problem of the Valve-Like Photoelectromotorical Power of the Photoelectric Cells With Dyes. 20-1-14/42

There are 2 figures, and 6 references, 3 of which are Slavic.

PRESENTED:	June 1, 1957, by A. N. Terenin, Academician
SUBMITTED:	May 24, 1957
AVAILABLE:	Library of Congress

Card 3/3

VARTANYAN, A.T

76-1-27/32

AUTHORS: Vartanyan, A. T., Karpovich, I. A.

TITLE: The Semiconductor Properties of Phthalocyanine (Poluprovodnikovyye svoystva ftalotsianinov)
I. Electro- and Photoconductivity of Phthalocyanines in Vacuum and in Oxygen (I. Elektroprovodnost' i fotoprovodimost' ftalotsianinov v vakuume i v kislorode)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 1, pp.178-187 (USSR)

ABSTRACT: Here, the investigation results already given by the authors in reference 10 are treated in a more detailed manner. The apparatus, by which the investigations were carried out, has been described already earlier (reference 11). Phthalocyanine without metal (Ft) and phthalocyanine of copper (Ft - Cu) of zinc (Ft - Zn) and of magnesium (Ft - Mg) were investigated. 1.) Electroconductivity. The Ft - Cu- and Ft - Zn layers obtained by means of distillation in the vacuum and submitted to an additional degassing at 200°C, show an infinitely small electroconductivity at room temperature. ($\sigma < 10^{-15}$ ohm^{-1}). Here, the dependence of electroconductivity of such layers on temperature in the range of about from 60 up to 160°C is shown in a diagram. The variation of electroconductivity according to the temperature can be expressed by the following

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76-1-27/32

The Semiconductor Properties of Phthalocyanine. I. Electro-and Photoconductivity of Phthalocyanines in Vacuum and in Oxygen

equation: $\sigma = \sigma_o \exp(-\varepsilon/2kT)$. At Ft and Ft - Cu $\varepsilon = 1,7 \pm 0,1$ eV and at Ft - Zn $\varepsilon = 1,8 \pm 0,1$ eV. Rough estimates using an application of extrapolation show in the case of the specific conductivity of these phthalocyanines at room temperature values of the order of magnitude of $10^{-12} - 10^{-13}$ $ohm^{-1}cm^{-1}$. Ft - Mg layers under equal conditions show a conductivity being almost 1000 times greater. Values of about 1,2 eV were obtained for the activation energy. As it is shown in the following work this value is smaller than that one obtained for the optic activation energy. It is expected that the conductivity of the Ft - Mg layer at the experiments carried out here, was an impure one. In the presence of oxygen the conductivity of the Ft - Cu-, Ft - Zn- and Ft - Mg layers increases. The sensitivity of the Ft - Mg layers in relation to the oxygen is as great that a pressure of 0,1 mm of mercury is sufficient to cause an essential increase of the electroconductivity. At room temperature the electroconductivity of the layers treated in oxygen at 150 - 200°C is almost by $10^4 - 10^5$ times greater than in vacuum. At a temperature rise the conductivity increases according to the law: $\sigma = \sigma_1 \exp(-\varepsilon_1/2kT)$. However, the value ε_1 is essentially smaller than the value ε, which was obtained in the vacuum. The value ε_1 depends on the oxygen pressure. The

76-1-27/32

The Semiconductor Properties of Phthalocyanine. I. Electro- and Photoconductivity of Phthalocyanines in Vacuum and in Oxygen

behavior of phthalocyanine complexes in oxygen proves the occurrence of an impure conductivity. The increase of the activation energy of Ft in oxygen is to be attributed to the increase of the energy threshold at the boundaries between the microcrystals. 2.) Photoconductivity. An illumination by visible light of phthalocyanine layers carefully degassed with high isolation properties causes an essential increase of the conductivity. The oxygen also increases the photoconductivity. In layers with oxygen generally does not form a space-charge. A noticeable retardation of the stabilization of the steady photo-current and its decrease after stopping the illumination is observed. The photoconductivity of the layers with oxygen is essentially higher, than that in vacuum. The layers of phthalocyanine free from oxygen have an inertialess photoconductivity. In this case the photoconductivity is linearly related to the intensity of illumination, and exponentially increases at a temperature rise. Some results point to the presence of transition resistances in the phthalocyanine layers which were obtained by the sublimation. Taking into consideration the essential increase of the photoconductivity in the layers with oxygen the conclusion is drawn here that besides the recombination (which causes

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76-1-27/32

The Semiconductor Properties of Phthalocyanine. I. Electro- and Photoconductivity of Phthalocyanines in Vacuum and in Oxygen

the linear dependence of photoconductivity on the illumination intensity) a direct recombination of electrons of the free zone takes place with the holes, and causes the "nonlinear" photoconductivity. It is assumed that the light absorption in the molecular crystals of organic compounds are accompanied by a formation of the exitons being movable in the crystal. There are 9 figures, and 13 references, 8 of which are Slavic.

SUBMITTED: September 20, 1956

AVAILABLE: Library of Congress

Card 4/4

76-32-2-8/38

AUTHORS: Vartanyan, A. T., Karpovich, I. A. (Leningrad)

TITLE: The Semiconductor Properties of Phthalocyanines (Poluprovodnikovyye svoystva ftalotsianinov)
II. The Spectral Dependence of the Photoconductivity and of the Optical Activation Energy of Phthalocyanines (II. Spektral'naya zavisimost' fotoprovodimosti i opticheskaya energiya aktivatsii ftalotsianinov)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 2, pp. 274 - 281 (USSR)

ABSTRACT: The spectral curves of the photoconductivity of phthalocyanines as well as the values of the optical activation energy are given. The method of investigation is already described in Reference 1. The authors investigated phthalocyanine without metal, as well as copper-zinc-, and magnesium-phthalocyanines. It is shown that: 1) - The thickness of the layer and the non-linearity of the photoconductivity in phthalocyanines exercize an essential influence on the shape of the

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76-32--2-8/38

The Semiconductor Properties of Phthalocyanines. II. The Spectral Dependence of the Photoconductivity and of the Optical Activation Energy of Phthalocyanines

spectral curve with regard to the photoconductivity and the results in the determination of optical activation energy. 2) In thin layers the spectral curves of the relative photoconductivity calculated by taking into account the non-linearity of photoconductivity show good coincidence with the absorption curves. 3) The introduction of oxygen into the phthalocyanine layer on the one hand essentially increases the total photoelectric sensitivity, but on the other hand does not exercize any essential influence on the spectral distribution of photo-sensitivity. 4) The $\lambda_{1/2}$ method and the method of the "photo-electric straight line" show close values for the optical activation energy of the phthalocyanines when thin layers are used and when the non-linearity of photoconductivity is taken into account. 5) The optical activation energies obtained for phthalocyanine without metal as well as for copper- and zinc phthalocyanines well agree with earlier determined thermal activation energies. 6) The results obtained here coincide with the earlier investigated scheme of the energy levels in phthalocyanines as well as with the conception on the primary formation of the excitons

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76-32-2-8/38

The Semiconductor Properties of Phthalocyanines. II. The Spectral Dependence of the Photoconductivity and of the Optical Activation Energy of Phthalocyanines

in the case of light absorption. There are 7 figures, and 11 references, 6 of which are Soviet.

SUBMITTED: September 20, 1956

1. Phthalocyanines--Photoconductivity 2. Phthalocyanines--Spectra 3. Phthalocyanines--Photosensitivity 4. Phthalocyanines--Optical properties

Card 3/3

76-32-3-8/43

AUTHORS: Vartanyan, A. T., Karpovich, I. A.

TITLE: Electrical Conductivity and Photoconductivity of Pinacyanol and Orthochromium T (Elektroprovodnost' i fotoprovodimost' pinatsianola i ortokhroma T)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol 32, Nr 3, pp 543-553 (USSR)

ABSTRACT: Already in preceding papers A. T. Vartanyan (Refs 1, 2, 3) determined the photoconductivity of photographic sensitizers and desensitizers. Ye. K. Putseyko (Ref 4) investigated the photoelectric sensitivity of a number of sensitizers by means of the condenser method. The results obtained by Noddack and Meier (Refs 5, 8) according to the method of the "photoelectric straight line" for pinacyanol, as well as by Nelson (Ref 9) in determining the photoconductivity of a number of cyanine dyes, contain contradictions, which can be explained by the results of the preceding paper. The investigations mentioned in the title were performed in vacuo, as well as in the presence of oxygen and steam. Data on the experimental procedure are mentioned. The investigations in the vacuum

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76-32-3-8/43

Electrical Conductivity and Photoconductivity of Pinacyanol and Orthochromium T

showed a specific conductivity of both mentioned substances of the order of magnitude 10^{-12} and $10^{-12}\,\Omega^{-1}\text{cm}^{-1}$ and a thermal activation energy of 1.8 ± 0.1 or 2.05 ± 0.1 eV respectively. The photoconductivity considerably increases illumination, and its temperature dependence is subject to the exponential law, except for temperatures below 40°C, which fact was not exactly investigated. The form of the spectral curve of photoconductivity depends on the thickness of the layer of dye, as well as on the value n in the equation $\Delta\sigma = aL^n$ (Ref 11). This can be mentioned as an explanation, as against those of Nelson (Ref 9), for the obtained "rapid" component photoconductivity for pinacyanol. The "slow" component photoconductivity depends on the illumination intensity, where, however, the "nonlinear" course has to be considered (also in observing Nelson's investigations). According to Moss (Ref 13), the optic activation energy can be determined from the spectral curves of the photo-sensitivity in thin layers from the "long wave limit" as well as according to the "photoelectric straight line" method of Lange (Ref 14). The obtained results agree well with each other, as well as with the thermal activation energies, whereat the latter cannot exactly be determined, and on.

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76-32-3-8/43

Electrical Conductivity and Photoconductivity of Pinacyanol and Orthochromium T

the other hand, show somewhat higher values because of the effect of the transition resistances on the micro-crystallite boundaries. Dry oxygen has no effect upon the dark-conductivity; however, it diminishes the photoconductivity by means of a chemical reaction with the dye. Experiments on this problem are still to be performed. Steam produces an electrical conductivity, in which case the influence upon the photoconductivity depends on the preliminary treatment of the layer. The investigation with moist oxygen showed a phenomenon, apparently analogous to the Becquerel-effect, of photo-electrochemical nature under formation of an electromotive force. The photo-electromotive force observed by Noddack and Meier (Refs 5, 8) on solid layers can difficultly be identified with the obtained results of this paper. There are 8 figures, 1 table, and 20 references, 12 of which are Soviet.

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76-32-3-8/43

Electrical Conductivity and Photoconductivity of Pinacyanol and Orthochromium T

SUBMITTED: September 20, 1956

Card 4/4

VARTANYAN, A.T.

24(4) PHASE I BOOK EXPLOITATION SOV/3140

Akademiya nauk Ukrainskoy SSR. Institut fiziki

Fotoelektricheskiye i opticheskiye yavleniya v poluprovodnikakh; trudy pervogo vsesoyuznogo soveshchaniya po fotoelektricheskim i opticheskim yavleniyam v poluprovodnikakh, g. Kiyev, 20-26 noyabrya 1957 g (Photoelectric and Optical Phenomena in Semiconductors; Transactions of the First Conference on Photoelectric and Optical Phenomena in Semiconductors...) Kiyev, 1959. 403 p. 4,000 copies printed.

Additional Sponsoring Agency: Akademiya nauk SSSR. Prezidium. Komissiya po poluprovodnikam.

Ed. of Publishing House: I. V. Kisina; Tech. Ed.: A. A. Matveychuk; Resp. Ed.: V. Ye. Lashkarev, Academician, Ukrainian SSR, Academy of Sciences.

PURPOSE: This book is intended for scientists in the field of semiconductor physics, solid state spectroscopy, and semiconductor devices. The collection will be useful to advanced students in universities and institutes of higher technical training specializing in the physics and technical application of semiconductors.

COVERAGE: The collection contains reports and information bulletins (the latter are indicated by asterisks) read at the First All-Union Conference on Optical and Photoelectric Phenomena in Semiconductors. A wide scope of problems in semiconductor physics and technology are considered: photoconductivity, photoelectromotive forces, optical properties, photoelectric cells and photoresistors, the actions of hard and corpuscular radiations, the properties of thin films and complex semiconductor systems, etc. The materials were prepared for publication by S. I. Rashboy, O. V. Snitko, K. B. Tolpygo, A. P. Lubchenko, and M. K. Sheynkman. References and discussion follow each article.

Photoelectric and Optical Phenomena (Cont.) SOV/3140

Card 12/16

SOV/51-6-2-8/39

AUTHORS: Lyzina, L.A. and Vartanyan, A.T.

TITLE: Absorption Spectra of Dye Layers in Vacuum (Spektry pogloshcheniya sloyev krasiteley v vakuume)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 2, pp 172-180 (USSR)

ABSTRACT: The paper describes a technique for production of solid layers of dyes by sublimation and subsequent measurement of their absorption spectra in vacuum. A special glass cell, shown in Fig 1a, was used to prepare dye layers and to measure their spectra. A solid layer of dye was deposited from solution in a cup-like extension O (Fig 1b). A fused quartz plate P was placed above the extension O. The cell was held horizontally, evacuated and the dye layer in O was heated externally by means of a small electric furnace. This produced a sublimated layer on P. The cell was then placed in a vertical position (Fig 1a or 1b) and the plate P dropped to the position 1 in Fig 1a, where two quartz windows were provided. Dimensions of the cell were such that it fitted exactly in the holder of a SF-4 spectrophotometer, which was used for measurements. Measurements were carried out with the cell still evacuated and immediately after deposition of a dye layer. In sublimation of dyes the authors used Vartanyan's data (Ref 3). They

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SOV/51-6-2-8/39

Absorption Spectra of Dye Layers in Vacuum

found that to avoid overheating the initial, deposited from solution, layer of a dye should, in general, be thin and uniform; only rhodamine B layers should be thick. It was not possible to obtain an undecomposed layer of malachite green using the cell shown in Fig 1. Best results were produced by rapid sublimation. To check that the sublimated layer is free from decomposition products the authors measured absorption in the ultraviolet region which was sensitive to impurities. The absorption spectra of sublimated layers of twelve dyes are shown in Figs 2-7 in the form of optical density curves (thickness of the sublimated layers was not measured and no correction was made for reflection). Figs 2-7 show also the spectra of dye layers produced by deposition from solution and spectra of solutions of the same dyes in water, alcohol, benzene etc. For some dyes spectra of sublimated layers measured in air are also given. The curves of Figs 2-7 give the spectra in the visible region; data on absorption in the ultraviolet are given in a table on p 178. Fig 2 shows the spectra of triphenylmethane dyes: (a) fuchsin and (b) crystal violet; curves 1-6 represent, respectively, sublimated layers measured under vacuum, dilute aqueous solutions, concentrated aqueous solutions, alcohol solutions, layers deposited from solution and benzene solutions.

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SOV/51-6-2-8/39

Absorption Spectra of Dye Layers in Vacuum

Fig 3 shows the spectra of acridine dyes: (a) rhoduline orange and (b) trypaflavine; curves 1-6 represent, respectively, sublimated layers measured under vacuum, dilute aqueous solutions, concentrated aqueous solutions, alcohol solutions, sublimated layers measured in air, layers deposited from solution. Fig 4 shows the spectra of azine dyes: (a) phenosafranine and (b) safranine O; curves 1-6 represent, respectively, sublimated layers measured under vacuum, dilute aqueous solutions, concentrated aqueous solutions, alcohol solutions, layers deposited from solutions and benzene solutions. Fig 5 shows the spectra of xanthane dyes: (a) pyronine and (b) rhodamines 6G and B; curves 1-5 represent, respectively, sublimated layers measured under vacuum, dilute aqueous solutions, concentrated aqueous solutions, alcohol solutions, layers deposited from solution. Fig 6 shows the spectra of auramine O; curves 1-4 represent, respectively, sublimated layers measured under vacuum, aqueous solutions, alcohol solutions, layers deposited from alcohol solution. Fig 7 shows the spectra of thiazine dyes: (a) thionine and (b) methylene blue; curves 1-5 represent, respectively, sublimated layers measured under vacuum, dilute aqueous solutions, concentrated aqueous solutions, alcohol solutions, sublimated layers measured in air. Fig 8 shows the dependence of the absorption of

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Absorption Spectra of Dye Layers in Vacuum

auramine O on the solution concentration: (a) alcohol solutions (b) dichloroethane solutions. In all the twelve dyes absorption by sublimated layers measured under vacuum differs considerably from absorption by layers deposited from alcohol solutions. This difference is the same in all the dyes considered; in the visible region the sublimated layers absorb more strongly at longer wavelengths than do the layers deposited from solution. The converse is true for short wavelengths in the visible range. The differences may be due to the fact that the layers deposited from solutions are more continuous than those prepared by sublimation. Moisture affects strongly the absorption spectra of sublimated layers; the absorption curves are different for sublimated layers measured in vacuo and those measured in air (e.g. Fig 3 curves 1 and 5, Fig 7 curves 1 and 5). The spectra of the sublimated layers measured in vacuo differ also from the spectra of solutions. This difference is smallest in auramine O spectra, where only some broadening occurs due to stronger interaction of the dye molecules in the solid state. In the case of the other dyes the differences between the spectra of sublimated layers measured in vacuo and the spectra of solutions may

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SOV/51-5-2-8/39

Absorption Spectra of Dye Layers in Vacuum

be due to adsorption forces between the sublimated layers and the quartz plates on which they are deposited. There are 8 figures, 1 table and 6 references, 5 of which are Soviet and 1 English.

SUBMITTED: March 4, 1958

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SOV/51-6-4-12/29

24(7), 5(3)

AUTHORS: Lyzina, L.A. and Vartanyan, A.A.

TITLE: The Effect of Water Vapour on the Absorption Spectra of Sublimated Dye Layers (Vliyaniye parov vody na spektry pogloshcheniya vozognannykh sloyev krasiteley)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 4, pp 484-491 (USSR)

ABSTRACT: In an earlier paper (Ref 1) the authors showed that the absorption spectra of sublimated dye layers measured in vacuo differ from the spectra of these layers exposed to air. The differences are due to structural changes due to atmospheric water vapour. These changes were the subject of an investigation reported in the present paper. The method of preparation of sublimated layers and the cell used for measurements of their absorption spectra measured under vacuum were the same as described in Ref 1. After the absorption spectra were measured in vacuo, water vapour of known vapour pressure was admitted into the cell containing samples. The spectra were then re-measured after 20-30 mins from the moment of admission of water vapour. The following dyes were investigated: rhoduline orange (Fig 1a), trypaflavine (Fig 1б), crystal violet (Fig 2a), fuchsin (Fig 2б), phenosafranine (Fig 3a), safranine (Fig 3в), thionine (Fig 4),

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SOV/51-6-4-12/29

The Effect of Water Vapour on the Absorption Spectra of Sublimated Dye Layers

auramine (Fig 5), rhodamine 6G (Fig 6a) and rhodamine B (Fig 6б). The results obtained are interpreted as follows. The dye layers prepared by sublimation in vacuo are originally amorphous. In the presence of water vapour the dyes aggregated to approximately the same degree as in concentrated aqueous solutions. In some dyes water vapour induced crystallization (auramine, methylene blue, thionine). In solid layers of dyes, depending on the external conditions (vacuum, water vapour), there may exist different types of absorbing centres, in the form of "free" molecules, molecules affected by the substrate, aggregated molecules and microcrystallites. The form of the absorption curves is determined by the proportions of these absorbing centres. There are 7 figures and 7 references, 5 of which are Soviet and 2 English.

SUBMITTED: April 23, 1958

Card 2/2

24(3)

SOV/20-124-2-14/71

AUTHORS: Vartanyan, A. T., Rozenshteyn, L. D.

TITLE: The Photoconductivity of Indigo (Fotoprovodimost' Indigo)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 2, pp 295-297 (USSR)

ABSTRACT: As far as the authors know, the electric and photoelectric properties of indigo have hitherto not been investigated. The present paper shows that indigo possesses photoconductivity and is a typical organic semiconductor. Indigo is nearly insoluble in the usual readily volatile solvents. Therefore layers were investigated which had been produced by sublimation of the dye in a vacuum ($\sim 10^{-5}$ mm) at a temperature of 130-140° C. These layers were located on the surface of a quartz vessel upon which platinum electrodes had previously been fitted. Amperages were measured by means of a direct current amplifier, and the light was monochromatized by means of a mirror monochromator ISP-17A. The relative spectral distribution of the energy inciding upon the layer was measured by means of a thermopile. Dark conductivity increases with increasing temperature. The temperature dependence of the dark current, which was determined

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The Photoconductivity of Indigo SOV/20-124-2-14/71

within the interval of 40-110° C, satisfies the equation $i_m = i_o \exp(-\epsilon_m/2kT)$, which holds in the case of many dyes and pigments. Under vacuum conditions the activation energy has the value $\epsilon_m = 1.75 \pm 0.05$ ev , which agrees satisfactorily with the absorption spectrum of a solid indigo layer produced by sublimation. Under vacuum conditions the exposure of indigo layers by means of visible light increases conductivity within the range of absorption. In the case of exposure with monochromatic light conductivity may be increased by the dozen- or hundredfold. Also if oxygen is supplied, indigo conductivity increases, in which case the increase depends on the pressure and the duration of the action of the gas. In a vacuum as well as in an oxygen atmosphere the time necessary for the development of a steady photocurrent during exposure (and for the decrease of the photocurrent in the dark) is less than the time constant of the amplifier circuit.

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The Photoconductivity of Indigo SOV/20-124-2-14/71

The temperature coefficient of the photocurrent is positive. The shape of the spectral curve of photoelectric sensitivity depends to a considerable extent on the thickness of the indigo layer. The optical activation energy is $\sim$1.79 ev, which agrees well with the thermal activation energy of dark conductivity. There are 2 figures and 12 references, 7 of which are Soviet.

PRESENTED: October 2, 1958, by A. N. Terenin, Academician

SUBMITTED: September 25, 1958

Card 3/3

68979

S/020/60/131/02/017/071
B013/B011

24.7700

AUTHORS: Vartanyan, A. T., Rozenshteyn, L. D.

TITLE: On the Participation of the Excited Singlet State in the Electrical Conductivity of a Series of Organic Semiconductors 21

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 2, pp 279 - 282 (USSR)

ABSTRACT: The aim of the present paper is that of determining the electrons (which are situated either on an excited singlet level or on a triplet level) that cause electrical conductivity in the dark, that is, in other words, whether the activation energy of electrical conductivity in the dark corresponds to the height of the triplet level or of the excited singlet level. Reference is made to a new idea advanced by A. N. Terenin (Ref 8) on the nature of photoconductivity. The application of data concerning the phosphorescence of solutions to the solid state is said to be unjustified. The objects investigated here are supposed, on the one hand, to be phosphorescent in the solid state, and on the other hand, the distance between the triplet level and the excited singlet level is expected to be as many times greater as possible compared to the error in measurement ε_m (here ~ 0.1 ev). The investigation was therefore made on benzophenone, anthranilic acid, phenyl anthranylic acid, as well as on

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On the Participation of the Excited Singlet State in the Electrical Conductivity of a Series of Organic Semiconductors

3-acetyl amine-N methyl phthalimide, 3-acetyl amine- N phenyl phthalimide, and 3-benzoyl amine- N methyl phthalimide. Moreover, the electrical conductivity of fluorescein as well as of some other dyes was investigated. Sufficiently thick ($\sim 50\mu$) and dense layers were prepared by sublimation of the substance in high-vacuum ($\sim 10^{-5}$ mm). These layers were sublimated on the surface of a quartz vessel. The voltage source was a dry-cell battery (560 v). In order to be able to measure the absorption spectra, the layers were applied to a quartz plate which, in turn, was fastened to a rotating faceplate. The results of measuring the temperature dependence of electrical conductivity are reproduced in figure 2. The wavelengths corresponding to the thermal activation energies ε_m are in good agreement with the longwave drops of the absorption curves. The totality of the results obtained is indicative of the following: Electrical conductivity of the organic semiconductors investigated occurs on an excited singlet level. This also holds for thionine, crystal violet, phenosafranine, etc. The attribution of ε_m to the excited singlet state leads to the following assumption: This relatively

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On the Participation of the Excited Singlet State in the Electrical Conductivity of a Series of Organic Semiconductors

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slight disturbance is sufficient for the formation of a certain generalized zone within the boundaries of this state. Dark conductivity is found in this generalized zone. The authors thank V. V. Zelinskiy and I. I. Reznikova for having prepared the high-purity phthalimides, and V. L. Yermolayev for having supplied the instrument used to measure the phosphorescence spectra, and also for advice given. There are 2 figures, 1 table, and 10 references, 9 of which are Soviet.

PRESENTED: November 20, 1959, by A. N. Terenin, Academician

SUBMITTED: October 30, 1959

Card 3/3

83898

S/020/60/134/003/008/020
B019/B060

9,4177
26,1512

AUTHORS: Rozenshteyn, L. D., Vartanyan, A. T.

TITLE: A Study of the Surface Recombination in Layers of Organic Dyes - Photoconductors

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 3, pp. 567 - 570

TEXT: By way of introduction the authors discuss the results yielded by investigations, most of which were conducted by the authors themselves. The results concern the photoconductivity of inorganic and organic semiconductors. The formula derived by De Vore (Ref. 6) for the photocurrent is given and discussed. This formula is regarded as being an expression characterizing the change in the photocurrent on a variation of sample thickness l at a determined wavelength of incident light. The authors wanted to carry out a quantitative evaluation of De Vore's theory for the surface recombination rate in linear photoconductors. They further wanted to determine lifetime, diffusion coefficient, and mobility of the photocurrent carrier. For this purpose, they examined variously thick

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A Study of the Surface Recombination in Layers of Organic Dyes - Photoconductors

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trypaflavine and pinacyanol layers for their spectral photoconductivity in vacuum. Fig. 1 shows the photocurrents as functions of the wavelength of incident light along with the absorption relative to the two dyes examined. Figs. 2 and 3 show the photocurrents as functions of the layer thicknesses for three different wavelengths. With the aid of a τ-meter the lifetime was found to be $1.1 \cdot 10^{-4}$ sec, and this quantity served for determining the recombination rate on the surface and the carrier diffusion coefficient. The values are tabulated in Table 1. The diffusion coefficient, the recombination rate, and the carrier mobility of the dyes examined were found to be smaller than those previously observed on inorganic semiconductors. This is partly brought in connection with a reflection effect caused by the smooth surface of the semiconductor. The authors thank Ye. K. Putseyko and I. A. Akimov for having supplied the τ-meter and for valuable advice given. There are 4 figures, 1 table, and 12 references: 6 Soviet, 3 US, 1 British, 1 French, and 1 German.

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PRESENTED: April 29, 1960, by A. N. Terenin, Academician

SUBMITTED: April 19, 1960

Card 2/2

VARTANYAN, A.T., mladshiy nauchnyy sotrudnik

Use of the new muscle relaxant bromotilin in intratracheal ether-oxygen narcosis. Vop.rent.i onk. 6:273-278 '61. (MIRA 16:2)

(MUSCLE RELAXANTS) (INTRATRACHEAL ANESTHESIA)

VARTANYAN, A.T.; ROZENSHTEYN, L.D.

Thermal activation energies of dark conduction in organic compounds.
Fiz. tver. tela 3 no.3:713-722 Mr '61. (MIRA 14:5)

1. Gosudarstvennyy opticheskiy institut imeni S.I. Vavilova, Leningrad.
(Electric conductivity) (Organic compounds--Electric properties)

20854
S/048/61/025/003/044/047
B104/B203

9,4300 (1138,1164,1395)

AUTHORS: Vartanyan, A. T. and Rozenshteyn, L. D.

TITLE: Comparison of the thermal activation energy of electrical conductivity with the absorption spectra and phosphorescence spectra of layers of a number of organic compounds

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 3, 1961, 428-430

TEXT: This paper was read at the 9th Conference on Luminescence (Crystal Phosphors) in Kiyev, June 20-25, 1960. The authors determined the activation energy from the temperature dependence of the electrical conductivity, which is described for organic semiconductors by the formula $\sigma = \sigma_0 \exp(-\varepsilon_T/2kT)$, where ε_T is the thermal activation energy. Fig. 1 shows the temperature dependence of the dark conductivity for a number of substances. Table 1 compiles the results of measurement for a great number of compounds. The spectral range (indicated in Column 5) in which the longwave drop of the spectral absorption curve occurs corresponds, according

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Comparison of the thermal...

to the authors' opinion, to a singlet-singlet transition in light absorption. The energy corresponding to the shortwave edge of the fluorescent band is given in Column 6, and permits a determination of the height of the triplet level in that state of the compound in which it was investigated. A comparison of results shows that the carriers participating in dark conduction are produced in singlet-singlet electron transitions. There are 1 figure, 1 table, and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc.

Соединение	Температурный интервал, °C	ϵ_T, eV	λ, соответствующая ϵ_T, mμ	Участок длинноволнового спада спектральной кривой поглощения твердого слоя, mμ	Энергия, соответствующая коротковолновой границе полосы фосфоресценции твердого слоя, eV
1	2	3	4	5	6
Малахитовый зеленый	40÷112	1,65	749	655÷750	
Яркий зеленый	66÷110	1,71	722	659÷740	
Фуксин	40÷85	1,79	690	580÷700	
Кристаллический фиолетовый	63÷100	1,78	694	630÷710	
Водный голубой	19÷147	1,75	706	610÷750	
Уранин	54÷153	2,05	603	510÷605	
Эозин	60÷154	2,30	536	520÷590	
Эритрозин	64÷161	2,22	566	530÷600	

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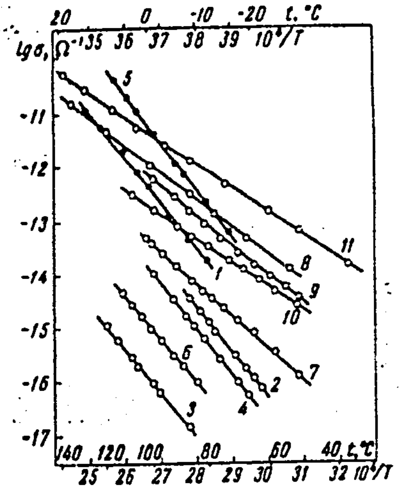
B104/B203

Comparison of the thermal...

Legend to Fig. 1: Temperature dependence of electrical conductivity of solid layers. (1) (Upper axis of abscissas) benzophenone, (2) anthranilic acid, (3) phenyl anthranilic acid, (4) 3-acetyl-amino-N-methyl phthalimide, (5) 3-acetylamino-N-phenyl phthalimide, (6) 3-benzoyl-amino-N-methyl phthalimide, (7) fluorescein, (8) uranine, (9) phosphine, (10) indigotin, (11) soluble blue.



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Comparison of the thermal...

Legend to Table 1: (1) Compound, (2) temperature range, (3) ε_T in ev, (4) λ corresponding to ε_T in mμ, (5) spectral part in which the longwave drop of the absorption curve for the solid layer occurs, (6) energy corresponding to the shortwave edge of the phosphorescent band, in ev. Compounds in Column 1 from top to bottom: malachite green, bright green, fuchsine, crystalline violet, soluble blue, uranine, eosin, erythrosine, phloxine, Bengal green, rhodamine B, colorless product of rhodamine B, rhodamine 6G, fluorescein, phenosafranine, tripaflavine, phosphine, capri blue, Nile blue, thionine, indigotin, pinacyanol, Orthichrome T, phthalocyanine without metal, copper phthalocyanine, zinc phthalocyanine, benzophenone, anthranilic acid, phenyl anthranilic acid, 3-acetyl-N-phenyl phthalimide, 3-acetylamino-N-methyl phthalimide, 3-methoxy-N-methyl phthalimide, 3-hydroxy-N-methyl phthalimide, 4-amino phthalimide, 4 amino-N-cyclohexyl phthalimide.

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Comparison of the thermal...

Флоксин	60÷160	2,07	597	530÷600	
Бенгальский розовый	52÷153	2,05	603	560÷610	
Родамин B	52÷100	2,10	588	578÷630	
Бесцветный продукт родамина B	100÷155	3,70	334	317÷350	
Родамин 6 G	53÷106	2,07	597	555÷620	
Флуоресцеин	51÷103	2,44	506	490÷530	
Феносафранин	64÷131	2,08	595	570÷620	
Трипафлавин	58÷100	2,3	536	480÷540	
Фосфин	55÷100	2,26	546	468÷550	
Капри синий	18÷ 76	1,67	740	700÷780	
Нильский голубой	10÷100	1,63	758	680÷780	
Тионин	45÷118	1,83	675	650÷700	
Индиго	40÷110	1,75	705	660÷720	
Пинацианол	35÷ 87	1,90	650	642÷720	
Ортохром T	40÷ 80	2,05	603	584÷640	
Фталоцианин без металла	60÷163	1,7	725	688÷790	
Фталоцианин меди	88÷158	1,7	725	685÷780	
Фталоцианин цинка	109÷160	1,7	725	714÷810	
Бензофенон	—23÷ 14	3,34	370	330÷400	2,8 [6]
Антраниловая кислота	62÷ 86	3,38	366	342÷400	2,8
Фенилантраниловая кислота	87÷119	3,30	375	375÷430	2,7
3-ацетиламино-N-метилфталимид	67÷100	3,46	357	350÷390	2,9
3-ацетиламино-N-фенилфталимид	54÷124	3,50	353	340÷400	2,7
3-бензоиламино-N-метилфталимид	84÷112	3,28	377	360÷410	2,8
3-метокси-N-метилфталимид	54÷ 78	3,18	388	355÷390	
3-гидрокси-N-метилфталимид	60÷ 91	3,8	325	350÷390	
4-аминофталимид	123÷151	2,78	444	410÷510	
4-амино-N-циклогексилфталимид	73÷100	2,90	426	375÷440	

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VARTANYAN, A.T. (Leningrad)

Reversible bleaching of solid layers of triphenylmethane dyes in hydrazine vapors. Zhur.fiz.khim. 35 no.10:2241-2248 O '61. (MIRA 14:11)

(Methane) (Dyes and dyeing) (Hydrazine)

38165

S/058/62/000/004/062/160
A058/A101

9,4160

AUTHOR: Karpovich, I. A., Vartanyan, A. T.

TITLE: Concerning "valve" photo-emf in dye phototubes

PERIODICAL: Referativnyy zhurnal, Fizika, no. 4, 1962, 23, abstract 4G189 (V sb. "Fotoelektr. i optich. yavleniya v poluprovodnikakh". Kiev, AN USSR, 1959, 290-300)

TEXT: The authors give the results of investigating phototubes in air. Under longitudinal illumination in air, one of the dye-layer contacts with the electrodes is seen to give rise to a photo-emf, the sign and magnitude of which are determined by the nature of the dye but which does not depend on the nature of the illuminated contact (push or natural contact). The photo-emf (E_∞) and short-circuiting current (I_0) are assiciated with illumination intensity by the relations $E_\infty = A \ln (1 + BL)$ and $I_0 = kL^n$. Photosensitivity is observed in the natural-absorption region of the dyes in the solid state. The rectifying properties of dye phototubes are caused by the presence of a barrier layer on the metal-dye push contact. In contrast to Noddak and Meyer, the present authors found that the appearance of photo-emf is not associated with the presence of a

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S/058/62/000/004/062/160
A058/A101

Concerning "valve" photo-emf in dye phototubes

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barrier layer. They advance arguments in favour of the photoelectrochemical nature of the non-valve photo-emf that arises incident to the illumination in air of metal-dye contacts.

[Abstracter's note: Complete translation]

Card 2/2

VARTANYAN, A.T. (Leningrad)

Reversible discoloration of solid layers of xanthene dyes in hydrazine vapors. Zhur. fiz. khim. 36 no.9:1890-1896 S '62. (MIRA 17:6)

VARTANYAN, A.T. (Leningrad)

Spectral study of the reaction of neutral dyes with phenol hydroxy groups and hydrazine. Zhur.fiz.khim. 36 no.10:2118-2125 0 '62.
(MIRA 17:4)

37380
S/020/62/143/006/009/024
B163/B102

37.1200

AUTHOR: Vartanyan, A. T.

TITLE: Semiconductor properties of blood pigments

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 6, 1962, 1317-1320

TEXT: The electrical conductivity and the spectral photoelectric sensitivity of layers of blood pigments such as haematine, heamine, and haematoporphyrine were measured. The layers were prepared between platinum electrodes on a quartz substrate and thoroughly outgassed, haemine and haematine at a temperature of 140°C, haematoporphyrine at 100°C. The currents were measured with a ЭМУ-3 (EMU-3) d-c amplifier with a set of input resistors up to $6.8 \cdot 10^9$ ohms. after the layers had been kept in the dark for a long period. In the photoelectric measurements the direction of the illumination was perpendicular to the direction of the electric field. Monochromatic light was supplied from a ИСП-17А (ISP-17A) mirror monochromator. For the determination of the optical activation energy of photoconductivity a СИ-16 (SI-16) incandescent tungsten lamp calibrated from the brightness temperature for 656 mμ was used. The

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S/020/62/143/006/009/024
B163/B102

Semiconductor properties of...

light intensity was controlled by means of blackened metallic grids. The dark current and photo-currents were found to follow Ohm's law up to field strengths of 10^4 v/cm. In the investigated temperature intervals (haematine 52 to 155°C, haemine 35-140°C, haematoporphyrine 35-100°C) the conductivity σ followed the law

$$\sigma = \sigma_0 \exp(-\varepsilon_T/2kT)$$

The values ε_T of the activation energy measured in vacuum (haematine 2.03 ev, haemine 1.85 ev, haematoporphyrine 2.07 ev) agree well with values from absorption spectra. The corresponding wave lengths (609, 667, 597 mμ resp.) belong to parts of the absorption spectra corresponding to singlet-singlet transitions. When haematoporphyrine is heated to 135°C, it is converted to protoporphyrine (activation energy 1.83 ev). The activation energy of haematine is considerably lower than that of haemoglobine (2.66 ev) which is thought to be determined mainly by its protein content. In presence of oxygen (cf. Fig. 1), the conductivity-temperature-curve of haematine shows a peculiar form: Above 110°C oxygen has no effect, but at lower temperatures the conductivity is considerably

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enhanced by oxygen adsorption. The dependence of the photo-current i_{phot} on the illumination intensity L was found to be of the form $i_{phot} = aL^n$ with n near to 1. For haematoporphyrine and haemine the temperature dependence follows the law $i_{phot} = i_o \exp(-\varepsilon_{phot}/kT)$ at 5-80°C with $\varepsilon_{phot} = 0.2$ and 0.18 ev resp. For haematine, log i_{phot} was not a linear function of T^{-1} except between -30 and +30°C where $\varepsilon_{phot} = 0.1$ ev. The spectral photoelectric sensitivity curves of haematoporphyrin and haemine are similar to the optical absorption curves. From the experimental results it is concluded that in vacuum the investigated blood pigments are intrinsic semiconductors. There are 1 table and 2 figures.

PRESENTED: November 17, 1961, by A. N. Terenin, Academician

SUBMITTED: November 10, 1961

S/048/63/027/001/016/043
B163/B180

AUTHOR: Vartanyan, A. T.

TITLE: Spectroscopic investigation of the interaction of dyes with hydrazine

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 27, no. 1, 1963, 37-41

TEXT: Layers of dyes are decolorized by reaction with hydrazine vapor at room temperature. There is evidence for a specific interaction, different from the formation of a true leuco-base. If the hydrazine is pumped out and the layer is heated to 60°, or if the decolorized layer is exposed to air, the original dye is quickly regenerated. This cycle can be repeated many times. Unlike true leuco-bases the undyed products are in most cases unstable intermolecular compounds, called quasi-leuco-bases. The spectra of astraphloxin, aurin, hemine and hematine are shown in figures together with those of their quasi-leuco-bases and the regeneration products. The absorption spectra of the solid layers of colorless compounds obtained from diphenylmethane and triphenylmethane dyes are

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S/048/63/027/001/016/043
B163/B180

similar to those of the leuco-base layers. They consist of two bands whose maxima are between 250-270 and 290-310 mμ, respectively, depending on the state of substitution in the end amino group. The spectra of the quasi-leuco-bases of rhodamine group dyes consist of three bands at about 232-238, 265-276 and 302-317 mμ, respectively. Some of the rhodamines can also be reversibly decolorized by vacuum heating or the action of gaseous H_2S at room temperature. The bands of aurin (268 nm) and its quasi-leuco-base (281 nm) are close to those of phenol (270 nm) and the phenolate ion (282 nm). In the interaction of hydrazine with aurin fluorescin, and gallein, a reversible bathochromic shift is observed if the hydrazine vapor pressure is low. Considering the ease with which a number of dyes change and lose their color, one must assume that in the interaction with hydrazine the proton is only partially drawn off by the hydrazine, or the electron is only partially attracted by the dye, just enough for charge redistribution in the electron shell of the dye molecule which is characteristic for an anion, i.e. a molecule which has lost a proton, and for a reduced dye, i.e. a molecule which has accepted an electron. This paper was presented at the 14th Conference on Spectroscopy

S/020/63/149/003/010/028
B102/B186

AUTHOR: Vartanyan, A. T.

TITLE: Spectral distribution of photoconductivity of chlorophyll a in relation to the layer thickness

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149, no. 3, 1963, 563-566

TEXT: Pure and homogeneous chlorophyll a, obtained from the Botanicheskiy institut AN SSSR (Botanical Institute AS USSR) was precipitated from a chloroform solution into the 0.5 mm gap between Pt electrodes in a quartz ampule. The layer thickness varied between several tens and several hundreds of μ. The spectra were investigated at room temperature, both in vacuo (10^{-5} mm Hg) and in an oxygen atmosphere. For current measurement an ЭМУ-3 (EMU-3) d-c amplifier was used with a sensitivity of $1.5 \cdot 10^{-14}$ a with maximum resistance ($68 \cdot 10^{12}$ ohm). For determining the spectral distribution a mirror monochromator (0.4-0.8μ) of type ИСП-17А (ISP-17A) was used. A 100-w incandescent lamp was the light source. As

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S/020/63/149/003/010/028
B102/B186

Spectral distribution of ...

in a great many previous publications, it was again observed that there is a tight correlation between the spectra of photoelectric sensitivity of the deposited layers of chlorophyll and the optical absorption spectra of the pigment solutions. In all cases the bands were very broad. For the layer the 673-mμ band had a width of 850 cm^{-1} for the solution this maximum is at 662 mμ and has a width of 650 cm^{-1}. The shift of the red maximum amounts to 250 cm^{-1}. The presence of dry oxygen (250 mm Hg) in the ampule raised the conductivity; the dark current remained weak. Illumination of the absorption band with monochromatic light raised the conductivity by a factor of 10^1-10^2. Stationary photocurrent was reached after less than 4 sec, the drop took 10-15 sec; these times are much shorter than those observed by Nelson (J.Chem.Phys, 27,864,1957). The absorption spectrum of the layer proves to be red-shifted with respect to that of the solution. The absorption spectra compared for two layer thicknesses show a considerable difference: whereas the blue bands correspond, this is not the case for the red bands; there is a shift so that the thin layer has an absorption peak where the thick one has a minimum. There is 1 figure.

PRESENTED: October 8, 1962, by A.N. Terenin, Academician

SUBMITTED: September 26, 1962

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S/020/63/149/004/009/025
B104/B186

AUTHOR: Vartanyan, A. T.

TITLE: The activation energy of the dark conductivity and the photoconductivity of chlorophyll a

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149, no. 4, 1963, 812 - 815

TEXT: Amorphous layers of pure chlorophyll a obtained by precipitation from concentrated pigment solutions were investigated in high vacuo and in oxygen at temperatures not exceeding 70°C. Detailed descriptions of the experiments are given in a previous paper (DAN, 149, no. 3 (1963)). The activation energy ε_{ph} of the photoconductivity was determined by measuring the photocurrent set up in a layer by irradiating it with a СИ -16 (SI-16) lamp at various tungsten band temperatures (1200-2200°C). Between 2200 and 1600°C the nonlinearity index n_T varies from 0.72 to 0.76, and between 1600 and 1200°C n_T varies from 0.76 to 1.01. The thermal

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S/020/63/149/004/009/025
B104/B186

The activation energy of the ...

activation energy ε_T of the electric conductivity determined from temperature dependence of electric conductivity is 1.74 ev. In an oxygen atmosphere ε_T is 1.63 ev and the conductivity is ten times greater than in vacuo. The activation energy ε_{ph} of the photoconductivity is 0.15 ev. As with other organic photoconductors ε_{ph} is smaller than ε_T by one order of magnitude. The hyperbolic decay of photoconductivity after illumination is taken to imply a bimolecular scheme of carrier decrease: $di/dt = -\gamma^2 i$. There are 3 figures.

PRESENTED: October 20, 1962, by A. N. Terenin, Academician

SUBMITTED: October 16, 1962

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VARTANYAN, A.T.

Photosemiconducting properties of methylchlorophyllide a.
Dokl. AN SSSR 153 no.1:70-73 N '63. (MIRA 17:1)

1. Predstavleno akademikom A.N. Tereninym.

VARTANYAN, A.T.

Spectral study of the interaction between solid layers of porphine dyes and hydrazine vapors. Dokl. AN SSSR 155 no.6:1394-1397 Ap '64. (MIRA 17:4)

1. Predstavleno akademikom A.N.Tereninym.

VARTANYAN, A.T.

Activation of the electric conductivity of dyes by hydrazine vapors.
Dokl. AN SSSR 160 no.3:638-641 Ja '65. (MIRA 18:3)

1. Submitted July 24, 1964.

VASIL'YEV, A.T., student

Morphology and optical properties of orthoclase phenocrysts from orthophyres of the Aldan Shield. Izv.vys.ucheb.zav.; geol. i razv. 8 no.1:58-64 Ja '65. (MIRA 18:3)

1. Moskovskiy geologorazvedochnyy institut im. S.Ordzhonikidze.

VASIL'YEV, A.V.

Device for the automatic connection of the transmission for roll release on polyethylene coating machines. Bum. i der. prom. no.3: 45 Jl-S '65. (MIRA 18:9)

VASIL'YEV, A.V.

Literature for communication workers published in 1961. Vest. sviazi 21 no.1:28-29 Ja '61. (MIRA 15:5)

1. Nachal'nik Gosudarstvennogo izdatel'stva literatury po voprosam svyazi i radio.
(Telecommunication--Bibliography)

112-57-8-16144D

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1957, Nr 8, p 12 (USSR)

AUTHOR: Vasil'yev, A. V.

TITLE: Investigation of Some Semiconductor Alloys for Thermocouples (Issledovaniye nekotorykh poluprovodnikovykh splavov dlya termoelementov)

ABSTRACT: Bibliographic entry on the author's dissertation for the degree of Candidate of Technical Sciences, presented to Khar'kovsk. politekhn. in-t (The Khar'kov Polytechnic Institute), Khar'kov, 1955.

ASSOCIATION: Khar'kovsk. politekhn. in-t (The Khar'kov Polytechnic Institute)

Card 1/1

VASIL'YEV, A.V.

Books for communications men. Vest.sviazi 19 no.2:33-34 F '59.
(MIRA 12:3)

1. Nachal'nik Svyaz'izdata.
(Bibliography--Telecommunication)

VELICHKIN, I.N., kand.tekhn. nauk; AKOPYAN, S.I., kand. tekhn.nauk, otv.red.; GOSTEV, B.I., kand.tekhn.nauk, zam.otv.red; VASIL'YEV, A.V., kand. tekhn.nauk, red.; KRISTI, M.K., prof., red.; L'VOV, Ye.D., prof., red.; MALASHKIN, O.M., kand.tekhn.nauk; YUDUSHKIN, N.G., inzh.; UVAROVA, A.F., tekhn.red.

[Some characteristics of the performance of gas-producer engines] Nekotorye osobennosti rabochego protsessa gazogeneratornykh dvigatelei Moskva, Gos. nauchno-tekhn izd-vo mashinostroit. litry, 1958. 37 p. (Moscow. Gosudarstvennyi soiuznyi nauchno-issledovatel'skii traktornyi institut [Trudy], no.16) (MIRA 12:3)
(Gas and oil engines—Testing)

ORAZMETOV, Z.; GORELKIN, L.M.; POTYAYEV, M.Ye.; ZARUDI, Ye.O., metodist;
MITENEV, V.S.; VASIL'YEV, A.V.; GORSHENKOV, N.G.;
RUTKOVSKIY, O.O.; KUSYAPKULOVA, T.Sh.

Letters to the editors. Geog. v shkole 22 no.2:72-76
Mr-Ap '59. (MIRA 12:6)

1. 1-ya shkola pos. Andreyevka Turkmenskoy SSR (for Orazmetov). 2. Shkola pri shakhte No.11 Karachayevskogo rayona Stavropol'skogo kraya (for Gorelkin). 3. Andreyevskaya semiletnyaya shkola Penzenskoy oblasti (for Potyayev). 4. Bashkirskiy institut usovershenstvovaniya uchiteley (for Zarudi). 5. Rayonnyy pedagogicheskiy kabinet s.Kich-Gorodok Vologodskoy oblasti (for Mitenev). 6. Alekseyevskaya shkola Stalingradskoy oblasti (for Vasil'yev). 7. Yakhromskaya shkola No.2 Moskovskoy oblasti (for Gorshenkov). 8. 4-ya shkola g.Alma-Ata (for Rutkovskiy). 9. 64-ya shkola g.Alma-Ata (for Kusyapkulova).

(Geography--Study and teaching)

VASIL'YEV, A.V.; SEMENOV, A.S.

Magnetic susceptibility of soils. Uch. zap. LGU no.286:110-113 '60.
(MIRA 14:3)
(Transbaikalia—Soils—Magnetic properties)

BASHKATOV, D.N.; VASIL'YEV, A.V.; ROMANOV, V.G.

Studying the vibration drilling method for purposes of engineering geology. Razved. i okh. nedr 27 no.5:25-28 My '61. (MIRA 14:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut gidrogeologii i inzhenernoy geologii.
(Boring machinery) (Vibrators) (Engineering geology)

ABRAMOV, E.A., kand.istor.nauk; KRUGLIKOV, F.V., kand.istor.nauk; ROZENSHTEYN, A.L., kand.istor.nauk; VASIL'YEV, A.V., nauchnyy red.; VOROB'YEV, G.S., red.izd-va; GURDZHIYEVA, A.M., tekhn. red.

[Brigades of communist labor] Brigady kommunisticheskogo truda. Leningrad, Ob-vo po rasprostraneniiu polit. i nauchnykh znanii RSFSR, Leningr.otd-nie, 1959. 46 p. (MIRA 13:2)
(Socialist competition) (Efficiency, Industrial)

VASIL'YEV, A.V., inzhener; YAKOVLEV, V.N., inzhener.

Reconstructing the inclined vault of a boiler model TP-230-2. Elek.sta. 24 no.4:5-7 Ap '53. (MLRA 6:5)
(Steam boilers)

VASIL'YEV, A. V.

"Handbook on Analysis of Fuel Gases," State Publishing House for Energetics, Moscow-Leningrad, 1954. 23 pp.

The book describes the most widely utilized types of gas-analysers manufactured by Soviet industry. It gives a description of their structure abd gives the methods of utilizing them. It also studies the methods of utilizing the results obtained by these apparatuses.

Translation of TABCON and summary of context. D 310099, 9 Sep 55

VASIL'YEV, A. V.

VASIL'YEV, A. V.: "Investigation of certain intermediate alloys for termal elements." Khar'kov Polytechnic Inst imeni V. I. Lenin. Khar'kov, 1956. (DISSERTATION FOR THE DEGREE OF CANDIDATE IN TECHNICAL SCIENCE).

So.: Knizhnaya Letopis', No. 15, Moscow

Vasil'yev, A.V.

133-2-4/19

AUTHORS: Borodin, V.P., Darmanyan, P.E., Yudson, A.A. and Vasil'yev, A.V. (Engineers)

TITLE: A Four-Period System of the Complex Automatic Control of Thermal Conditions of a Fuel-Oil Fired Open Hearth Furnace (Chetyrekhperiodnaya skhema svyazannogo avtoregulirovaniya teplovogo rezhima mazutnoy martenovskoy pechi)

PERIODICAL: Stal', 1958, 18, Nr 2, pp.114-120 (USSR)

ABSTRACT: A scheme of automatic control of thermal conditions of oil-fired open hearth furnaces developed by the Central Laboratory of Automation and installed on the Nr 10 furnace of the above works is described. The scheme operates according to four programmes corresponding to four technological periods of the smelting process. Programme 1 includes a considerable part of the charging period and two thirds of the melting period; it is switched on by a motor relay of time, operated by photorelay during the tapping of steel. Programme 2 includes the remaining part of the smelting period; it is switched on by a motor relay of time operated when a stable excess in the preset roof temperature is attained. Programme 3 includes the refining period and is switched on by a motor relay of time operated at the moment of tapping slag. Programme 4 includes the fettling period

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133-2-4/19

A Four-Period System of the Complex Automatic Control of Thermal Conditions of a Fuel-Oil Fired Open Hearth Furnace.

and the beginning of the charging period of the next heat. Changing of programmes can also be hand operated. The scheme is shown in Fig.1. Fuel consumption is controlled according to the temperatures of the roof and regenerators. The following parameters are controlled: consumption of fuel oil, air-fuel ratio, amount of compressed air used in the atomiser, pressure of gases in the furnace, reverses, waste gas temperature at the bottom of the regenerators and draught in the waste gas flue. Characteristic data on the furnace on which the scheme was operated, operating practice and operating results are briefly described. The scheme operated satisfactorily, but the final conclusion regarding the efficiency of the scheme can be made only after an analysis of operating results of a few furnace campaigns. There are 9 figures.

ASSOCIATION: "Krasniy Oktyabr" Works and TsLA (Zavod "Krasnyy Oktyabr'" i TsLA)

AVAILABLE: Library of Congress.

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