"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

The (n,α) Reactions of 14 MeV Neutrons With Cadmium. PA - 3136

14 MeV neutrons radioactive components with halfvalue periods (22± 1) minutes, (5,5± 0,2) hours and (14,0± 0,5) hours were found to exist in the palladium fraction 3. The ratio of the initial activities of these components amounts to (26,4 ± 0,8):(0,41 ± 0,04): 1.0. A table shows the results of the graphical analysis of the decay curves of the cadmium samples which were separated by the different cadmium targets. These results are then discussed in detail.
Measuring of the cross sections of the reactions $Cd^{112}(n,\alpha)Pd^{109}$, $Cd^{114}(n,\alpha)Pd^{111}$, $Cd^{114}(n,\alpha)Pd^{111*}$ and $Ag^{109}(n,p)Pd^{109}$ as well as of the reactions with 14 MeV neutrons. All necessary activities were measured by means of a GEIGER counter at equal geometrical conditions. The cross sections thus computed and the standard deviations are shown together in a table.
(4 ill. and 5 tables)

ASSOCIATION Chemical-Physical Institute of the Academy of Science of the U.S.S.R.
PRESENTED BY KONDRAT'YEV V.N., Member of the Academy
SUBMITTED 20.11.1956
AVAILABLE Library of Congress
Card 2/2

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

Levkovskiy, V.N.

20-4-14/61

AUTHOR: DZANTIYEV, B.G., LEVKOVSKIY, V.N., MALIYEVSKIY, A.D., SERDOBOV, M.V.

TITLE: The Isomer Pd^{111*}.

(Izomer Pd^{111*}. Russian).

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 4, pp 773 - 776 (U.S.S.R.)

ABSTRACT: First of all the authors give some information on relevant preliminary papers. It is the aim of the paper under review to demonstrate unambiguously that the 5.5-hours palladium activity belongs to a certain isotope or isomer of the palladium. For this purpose, experiments were carried out with regard to the radiochemical separation of isomers in the mixture of the radioactive isotopes of palladium which are produced at the reactions Cd(n,α) and Pd(n,γ). The method of the chemical separation of the nuclear isomers is based on the Szilard-Chalmers phenomenon. When working on the methods for the separation of the palladium isomers, the authors of the paper under review tried reagents: dimethyl glyoxime, acetoxime, salicylic aldoxime and α-nitroso-β-naphtol. The best results were obtained with salicylic aldoxime. Salicylic aldoxime is suited for the separation of the nuclear isomers of palladium.

The Separation of the Isomers Pd^{111*} and Pd^{111} Produced at the Reaction $Cd^{114}(n,\alpha)$ Pd^{111}.

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20-4-14/61

The Isomer Pd^{111*}.

During a period of 4 hours, 400 g of cadmium nitrate were exposed to radiation of a current of neutrons of 14 MeV ($\sim 10^7$ neutrons/cm^2/sec.). The experimental arrangements are discussed. In the mixture of the radioactive palladium isotopes produced a t the reactions Cd(n,α) Pd there is contained the isomer Pd^{111*} which is genetically connected with Pd^{111} (T=22 min.).

<u>The Identification of the Pd^{111*} (T=5.5 hours) in the Mixture of the Radioactive Palladium Isotopes</u> which were produced at the reactions Pd(n,γ): The corresponding experiment, described in the paper under review proved the production of Pd^{111*} with T=5.5 hours after the reaction Pd(n,γ) and also its genetic composition as Pd^{111} (T=22 min) and Ag^{111} (T=7.5 days). For the coefficient of the internal conversion the value $\alpha = a/b > 0.185$ was obtained. Taking into consideration the given decay scheme $Pd^{111*} \rightarrow Pd^{111}$ we have $\alpha > 0.185:0.75 = 0.25$.

<u>The determination of the relative yield of the Pd^{111} and of the Pd^{111*} at the reaction (n,γ):</u> done by a study of the relevant kinetics of the accumulation of the radioactive silver in the samples of the palladium exposed to radiation (4 reproductions, 3 charts).

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20-5-24/67

The Cross Section of the Reactions Cd(n,p)Ag at the Neutron Energy of 14 MEV.

measurements for the β-radiations of the Ag^{106}, Ag^{111}, Ag^{112} and Ag^{113}. These data were obtained by measuring the activity of the silver precipitated from the cadmium target. This chart furthermore contains the data of the absorption measurements for the radiation of the Pd^{109} which was used in the computation of the reaction cross sections. The following conclusion can be drawn from this chart: The values, as measured by the author of the paper under review, of the maximum energies of the radiations with the half-value periods 24 minutes, 3.2 hours, 5.3 hours and 7.3 days are in good agreement with the values given in the relevant literature for the β-radiations of the Ag^{106}, Ag^{112}, Ag^{113} and Ag^{111}. Another chart compares the initial activities of Ag^{106}, Ag^{111}, Ag^{112} and Ag^{113} as obtained in two investigations that were conducted independently from each other. The third chart compares the activities of Ag^{111} and Pd^{109} as obtained in three parallel exposures to radiation. The cross sections of the reactions are computed from the data of these charts, and they are compiled in a further chart. (2 reproductions, 4 charts)

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LEVKOVSKIY, V. N.

89-1-12/29

AUTHOR: Levkovskiy, V. N.

TITLE: The Reactions Ga (n,p), Ge (n,p) and Ge (n,α) with 14 MeV Neutrons (Reaktsii (n,p) na gallii i germanii i (n,α) na germanii pri energii neytronov 14 MeV)

PERIODICAL: Atomnaya Energiya, 1958, Vol. 4, Nr 1, pp. 79 - 8o (USSR)

ABSTRACT: The targets were irradiated for from 1 to 3o minutes, and the isotopes formed were radiochemically separated.
The following results were obtained:

1. $Ga^{69}(n,p)$ Zn^{69} $T_{\frac{1}{2}} = 52,5$ m confirmed
   $Ge^{72}(n,\alpha)$ Zn^{69}
2. $Ga^{69}(n,p)$ Zn^{69m} $T_{\frac{1}{2}} = 13,9$ h confirmed
   $Ge^{72}(n,\alpha)$ Zn^{69m}
3. $Ga^{71}(n,p)$ Zn^{71} $T_{\frac{1}{2}} = 2,3$ m confirmed
   $Ge^{74}(n,\alpha)$ Zn^{71}
4. $Ga^{71}(n,p)$ Zn^{71m} new nucleus: $T_{1/2} = 3,92 \pm o,o5$ h
   $Ge^{74}(n,\alpha)$ Zn^{71m} $E_{\beta} = 1,5$ MeV
5. $\sigma(Ge^{72}(n,\alpha)) : \sigma(Ge^{74}(n,\alpha)) = 1 : (o,47 \pm o,o2)$
   $\sigma(Ga^{69}(n,p)) : \sigma(Ga^{71}(n,p)) = 1 : (o,5o \pm o,o5)$

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOVSKIY, Ye., inzh.

The brain is a control panel. IUn.tekh. 3 no.5:35-37 My '59. (MIRA 12:7)

(Brain) (Automatic control)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

KORENDYASEV, A.; LEVKOVSKIY, Ye.

Machine tools "learn" how to work. IUn. tekh. 4 no.10:33-35 O '59. (MIRA 13:1)

(Machine tools--Numerical control)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOVSKIY, Ye., inzh.

Iron muscle. NTO 2 no.11:16-17 N '60. (MIRA 13:11)
(Electrophysiology) (Artificial arms)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

32059
S/024/61/000/006/001/019
E140/E335

1.7000

AUTHORS: Kobrinskiy, A.Ye., Korendyasev, A.I. and Levkovskiy, Ye.I. (Moscow)

TITLE: Informational criteria for automata classification

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Energetika i avtomatika. no. 6, 1961, 3 - 12

TEXT: The authors consider that this is the first attempt to classify automatic machines by the manner of introducing and utilizing information - informational criteria. The introduction, transformation and utilization of energy is fully mechanized in an ordinary machine but the processes concerning information are only partially mechanized. These latter processes are also completely mechanized in automation. This important circumstance should also be reflected in the classification of such machines. In addition to information concerning the immediate operation a programme is given, in automatic machines, to the machine as supplementary information. The authors discuss the well-known comparative advantages and disadvantages of the analogue and

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E140/E335

Informational criteria ....

digital methods of supplying a programme. The greater potential precision, the independence of the programme from factors dictated by the structure and design of the machine and the fact that digital programmes can be generated in high-speed computers away from the machine to be controlled are decisive advantages for the digital method. The programme constitutes a set of input commands, which must be supplemented by information fed-back from the work in process, involving dimensional, kinematic, dynamic, temperature, electrical and other parameters, both from the machine elements and the work, as well as the ambient medium. The present attempted classification, however, does not concern these factors but only those criteria directly related to the logical scheme of the machine, the number of streams of information circulating in it and their possible combinations according to the type of automaton. In the block diagram of an automaton one of the basic organs is the means for introducing the programme into the automaton and for reading it. This naturally implies the existence of a programme memory.

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Informational criteria ....

Although the program contains all the information necessary for carrying out a given technological process, it may be in a form in which it cannot be transmitted to the machine mechanisms. A translation unit may be necessary which interprets the instructions in the programme, so that a control unit is also necessary in the machine. The circuits directly affecting the useful operation of the machine constitute the "operator". These three elements, programme, control, operator, constitute the basic circuit of an open-loop automatic-control system. It is not always possible to establish such a clear division of functions in a machine but the more complicated a machine, the sharper become the divisions of this structural scheme. The open-loop block diagram is characterized by a single stream of information, flowing from the programme to the operator. This scheme may be used when the programme is generated and realized by mechanical circuits composed of rigid couplings, when the programme is given in digital form and realized in pulse operations and when there are not high requirements regarding precision. In remotely controlled systems or when high precision is required, this is no longer possible.

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Informational criteria ....

It becomes necessary to utilize a second stream of information obtained from measurements carried out on the machine or the work-piece. This second stream of information constitutes a feedback and represents a wide class of automata. Several structural schemes are possible using feedback. The information is used immediately and continuously in classical feedback systems: the use of digital control permits a more indirect use of this information, for example - to readjust the automatic machine only when the parameters of the finished product approach or pass a certain tolerance limit. Feedback based on measurements of machine or work parameters taken during the course of the work cannot take into account deformations due to mechanical or thermal deformations and the like. Such information can be obtained only on the finished product, when it is too late to utilize it for the current operation. A third information stream is introduced to overcome this difficulty, which is used to adjust the parameter of the control unit itself. In other words, the third stream of information leads to the concept of a self-adjusting automaton. Such machines are capable of generalizing, storing and

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Informational criteria ....

utilizing the experience of their own work. Machines with three streams of information have much more varied possible structures than machines with two streams. The authors expect that, in the future, even more complicated types of automata will be developed. The authors mention various applications of automatic machines to illustrate these points. Among these are a Soviet dynamic balancer, consisting of a balancing machine, and a drilling-machine. A second example concerns a machine for preselection of balls for ball bearings, as a function of the inner and outer diameters of the ball-bearing races. A third example, which is discussed in great detail, is a self-adjusting digital milling-machine control. Another self-adjusting machine mentioned is a hot-rolling mill for thin steel sheets. The block diagram of the self-adjusting milling-machine control is given herewith:

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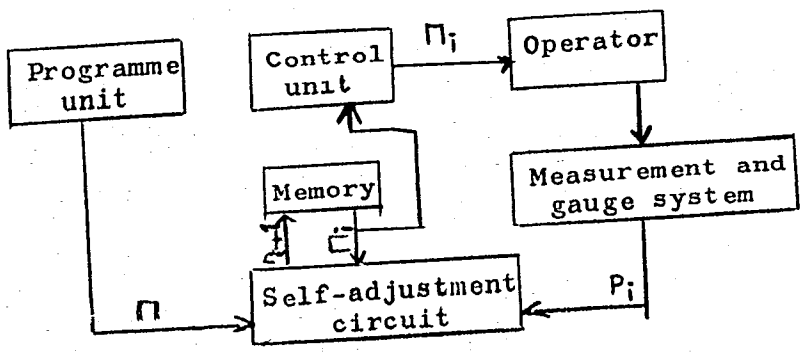
Informational criteria ....

Fig. 4:



The discussion of this automaton centres around the question of the form in which the results of measurements are to be used. Various possibilities are presented, such as the comparison between the absolute values prescribed by the programme and absolute values measured on the machine, measurement of the

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

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E140/E335

Informational criteria ....

difference between the programmed value and the value obtained on the machine, etc. In the view of the authors, such differences, leading to different logical structures, are significant in the study of such machines.
There are 4 figures and 10 references: 8 Soviet-bloc and 2 non-Soviet-bloc. The English-language reference mentioned is: Ref. 7: Peter J. Farmer, Automatic Machine, Aircraft Production, January, 1958.

SUBMITTED: April 4, 1961

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APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

S/030/62/000/005/004/006
B104/B108

AUTHORS: Kobrinskiy, A. Ye., Korendyasev, A. I., Levkovskiy, Ye. I.

TITLE: Mechanical power amplifier

PERIODICAL: Akademiya nauk SSSR. Vestnik, no. 5, 1962, 83-85

TEXT: The action of a self-braking power amplifier is illustrated by the example of a self-braking worm gear. A servomotor drives the axle of the worm; a torque acts on the shaft of a wheel. When the rotor of the servomotor is released by a signal given to the servomotor input the shaft will rotate. Such a mechanical power amplifier has an amplification factor $k = \tan\alpha/\tan(\rho-\alpha)$, where α is the pitch angle of the worm, ρ is the angle of friction. This factor is limited by instabilities of the friction factor of the worm gear. The use of such mechanical amplifiers in gear systems is discussed. A clearance-free adjustment of the worm gear maintains a constant phase difference between input and output signal. There are 2 figures.

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

KOBRINSKIY, A.Ye.; KOLISKOR, A.Sh.; LEVKOVSKIY, Ye.I.

An iteration method in a self-adjusting system of the program control of machine tools. Teor. mash. i mekh. no.107/108:18-24 '65. (MIRA 18:7)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

L 9406-66 EWT(d)/EWT(m)/EWP(w)/EWP(v)/T-2/EWP(t)/EWP(k)/EWT(h)/EWP(b)/EWP(1)

ACC NR: AP5025209 ETC(m) EM/JD/WW SOURCE CODE: UR/0030/65/000/009/0052/0056

AUTHORS: Kobrinskiy, A. Ye.; Koliskor, A. Sh.; Levkovskiy, Ye. I.; Popov, V. Ye.; Sergeyev, V. I. 48 46 B

ORG: Institute of Machine Science, State Committee on Machine Construction under Gosplan SSSR and the Academy of Sciences, SSSR (Institut mashinovedeniya, Gosudarstvennogo komiteta po mashinostroyeniyu pri Gosplane SSSR i Akademii nauk SSSR)

TITLE: A self-adjusting system of programmed machine control 14

SOURCE: AN SSSR. Vestnik, no. 9, 1965, 52-56

TOPIC TAGS: self adaptive control, precision finishing, measuring instrument, control equipment, control system

ABSTRACT: Causes of production errors and means of avoiding them in the case of programmed metal parts manufacture are discussed. It is pointed out that many factors having a significant effect on the accuracy and productivity of work processes cannot be entirely accounted for in preliminary process programming and hence must be accounted for in a self-adjusting control system. Examples of the hard-to-control factors are geometric machining errors, heat and elastic deformation of machine units, and others. The principal feature of the self-adjustment mechanism is an "ability" to absorb information on the results of previous work and to make appropriate adjustments in the process control program for succeeding articles. An example is given of a

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L 9405-66

ACC NR: AP5025209

self-adjusting program-controlled cutting device used in the production of blades for turbojet compressors. A sketch of the cutting configuration is shown in Fig. 1.

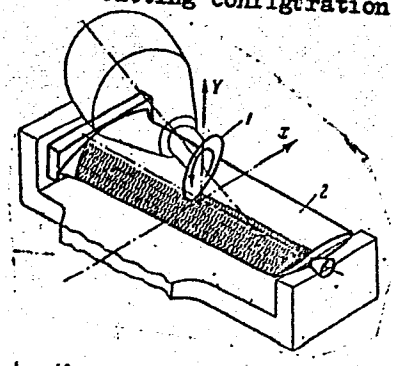

Fig. 1.

The milled piece 1 moves relative to the cutter 2 as directed by a program controlling motion of the cutter along the axes X and Y. The machined article passes from the milling tool shown to a measuring device which evaluates machining errors. From the measurements obtained, signals are generated. These cause adjustments to be made in the program controlling the next stage in the machining process for this article. A description and photographs of the major equipment used in the process are given. Experimental tests of the self-adjustment method resulted in marked reductions in machining errors in the case of the compressor blade cutting. Orig. art. has: 5 figures

SUB CODE: 09, 13/ SUBM DATE: none

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APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

KOBRINSKIY, A.Ye. (Moskva); KORENDYASEV, A.I. (Moskva); LEVKOVSKIY, Ye.I. (Moskva)

Use of informational indices in the classification of automatons. Izv. AN SSSR. Otd. tekh. nauk. Energ. i avtom. no.6:3-12 N-D '61. (MIRA 14:12)

(Automatic control)
(Milling machines)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00092971

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

KOBRINSKIY, A.Ye.; KORENDYASEV, A.I.; LEVKOVSKIY, Ye.I.

Mechanical power amplifiers. Vest. AN SSSR 32 no.5:83-85 My '62. (MIRA 15:5)

(Amplifiers (Electronics))

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOVSKIY, Ye.N.

Some problems in the calculation of helical cylindrical springs for durability and reliability under multiple loads. Avt. prom. 31 no.6:23-25 Je '65. (MIRA 18:10)

1. Belorusskiy politekhnicheskiy institut.

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

MIKHO, V.V.; LEVKOVTSEVA, L.V.

Spectrum of near-the-electrode luminescence of aluminum in an electrolytic cell. Opt.i spektr. 12 no.5:651-652 My '62. (MIRA 15:5)

(Aluminum--Spectra) (Luminescence) (Electrolysis)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, F. D.

Textile Machinery - Maintenance and Repair

For a high level of maintenance work. Tekst.prom., 12, no. 8, 1952.

Monthly List of Russian Accessions, Library of Congress, November 1952. Unclassified.

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, F.D.

Improving intrafactory transportation for spinning operations. Tekst. prom. 17 no.7:50-53 Jl '57. (MLRA 10:9)
(Spinning) (Conveying machinery)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, F.D., mekhanik, laureat Stalinskoy premii

Conveying line for lap transport. Tekst.prom. 21 no.3:57-59 Mr '61. (MIRA 14:3)

(Conveying machinery)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

SHOTT-L'VOVA, Ye.A.; SYRKIN, Ya.K.; LEVKOYEV, I.I.; DEYCHMEYSTER, M.V.

Dipole moments of merocyanines, derivatives of 2,4-imidazolidinedione and its thio and dithio substituents. Dokl.AN SSSR 145 no.6:1321-1323 Ag '62. (MIRA 15:8)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M.V. Lomonosova i Vsesoyuznnyy nauchno-issledovatel'skiy kinofotoinstitut. 2. Chlen-korrespondent AN SSSR (for Syrkin).
(Merocyanines--Dipole moments) (Hydantoin)

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

10

CA

Compounds of diazo derivatives with phenols. I. I. Levkoev and V. P. Petrov. Russ. 35,839, Apr. 30, 1934. The diazo derivs. of secondary and tertiary aryl or alkylaryl amines, e. g., *p*-diazodiphenylamine or *p*-diazodimethylaniline, are treated in an acid medium with monohydric or dihydric phenols of the benzene, naphthalene or anthracene series or their derivs. The sepd. ppts. are treated in the usual manner.

COMMON ELEMENTS

MATERIALS INDEX

OVER

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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CA

Nitroso compounds of the naphthalene series. S. V. Bogdanov, I. L. Leykoev and V. V. Durmashkina. *Anilinokrasochnaya Prom.* 4, 70 0(1934).—The study of the α-aminonaphthols and their derivs. was begun with the production of hydroxynitroso compds. The NO compds. of α- and β-$C_{10}H_7OH$, 2,6- and 2,7-$C_{10}H_6(OH)_2$, 2,4-, 2,5-, 2,6- and 2,7-$HOC_{10}H_6SO_3H$, 2,3,6-, 2,3,7- and 2,5,7-$HOC_{10}H_5(SO_3H)_2$, 1,2-, 1,4- and 1,5-$HOC_{10}H_6SO_3H$, and 1,3,6-, 1,3,8- and 1,4,8-$HOC_{10}H_5(SO_3H)_2$ were prepd. by the common method of acidifying with HCl a soln. or suspension of a compd. mixed with $NaNO_2$. The formation of red or violet by products with β-naphtholsulfonic acids (Nietzki and Knap, *Ber.* 30, 187) is avoided by carrying on the reaction at 2-5° and introducing HCl below the surface of the liquid. β-Naphtholdisulfonic and α-naphtholsulfonic acids give no colored by-products and can be acidified at 5-8°. 1,3-$HOC_{10}H_6SO_3H$ acts sluggishly, requiring a temp. of 8-10° and 15-20% excess of $NaNO_2$. The nitrosonaphtholsulfonic acids usually form stable ppts. which can be recrystd. from hot H_2O. β-$C_{10}H_7OH$ gives only 1,2-$ONC_{10}H_6OH$, while α-$C_{10}H_7OH$ gives 1,2- and 1,4-$HOC_{10}H_6OH$, the sepn. of which is based on the different solubilities of their bisulfite compds. (cf. Voroshtzov and B., *C. A.* 23, 2434; U. S. S. R. pat. 14,008). The little known 2,4-$HOC_{10}H_6SO_3H$, obtained from 1,2,4-$ClN_2C_{10}H_5(OH)SO_3H$ by reduction with $Sn(ONa)_2$ or Na_2S (cf. Marschalk, *C. A.* 24, 100), produced a new NO compd. with a highly mobile SO_3H group, in which it resembles 1,2-naphthoquinone-4-sulfonic acid. It gives with aq. $PhNH_2$ at room temp. 1,2,4-$ONC_{10}H_5(OH)NHPh$ and on boiling with dil. alkalies 1,2,4-$ONC_{10}H_5(OH)_2$. Some NO derivs. of α-$C_{10}H_7OH$ were prepd. by special methods. B. (*C. A.* 27, 2684; U. S. S. R. pat. 21,130) showed that the bisulfite compd. of 1,2-$ONC_{10}H_6OH$ with aq. $NH_4OH.HCl$ gives 1,2,4-$HOC_{10}H_5(NO)SO_3H$, from which can be prepd. the difficultly obtained 1,2,4-$HOC_{10}H_5(NH_2)SO_3H$. Similarly the bisulfite compds. of 1,2,6- and 1,2,7-$ONC_{10}H_5(OH)SO_3H$ with NH_4OH produced, resp., 1,2,4,6- and 1,2,4,7-$HOC_{10}H_5(NO)(SO_3H)_2$. The reaction evidently is caused by the rearrangement of the NO group and the fixation of the labile bisulfite group as an SO_3H group in position 4. α-Aminonaphtholsulfonic acids with NH_4OH give also only the β-nitroso compds. of α-naphthol derivs. regardless of the original positions of OH and NH_2 groups in the ring. Thus 1,2,4-$H_2NC_{10}H_5(OH)SO_3H$ and 1,2,4-$HOC_{10}H_5(NH_2)SO_3H$ gave 1,2,4-$HOC_{10}H_5(NO)SO_3H$; 1,2,5-$H_2NC_{10}H_5(OH)SO_3H$ and 1,2,5-$HOC_{10}H_5(NH_2)SO_3H$ gave 1,2,5-$HOC_{10}H_5(NO)SO_3H$. Analogously 1,2,6,7- and 1,2,6,8-$H_2NC_{10}H_5(OH)(SO_3H)_2$ gave, resp., 1,2,6,7- and 1,2,6,8-$HOC_{10}H_5(NO)(SO_3H)_2$, and 1,2,7,4-$H_2NC_{10}H_5(OH)_2SO_3H$ gave 2,1,7,4-$ONC_{10}H_5(OH)SO_3H$. While 1,2,4-$C_{10}H_5(NH_2)SO_3H$ does not react with NH_4OH, 1,2,5-$C_{10}H_5(NH_2)SO_3H$, as well as 1,2,5-$H_2NC_{10}H_5(OH)SO_3H$ and 1,2,5-$HOC_{10}H_5(NH_2)SO_3H$, with 2 mols. of NH_4OH gave 1,2,5-$HOC_{10}H_5(NO)SO_3NH_4$.

Chas. Blanc

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The action of hydroxylamine on certain naphthalene derivatives. S. V. Bogdanov and I. I. Levkoev. *J. Gen. Chem.* (U. S. S. R.) 4, 1353-8(1934); cf. *C. A.* 27, 2084.—A mixt. of 5.54 g. nitroso-β-naphthol bisulfite compd. and 4.8 g. 1,2,4-aminonaphtholsulfonic acid (II) was slowly added to 5 g. $NH_2OH.HCl$ (I) and 1 cc. concd. HCl in 150 cc. boiling H_2O. The boiling was continued for 10 min. On cooling, 10.83 g. of NH_4 2,1,4-nitrosonaphtholsulfonate (III) crystd. Similar treatment of II with I gave 87% of III. With 2,1,4-aminonaphtholsulfonic acid instead of II, the yield of III was approx. the same. No reaction occurred between 1,2,4-naphthalenediaminesulfonic acid and I; while the 1,2,8-isomer formed an unknown nitroso compd., and the 1,2,5-isomer formed NH_4 2,1,5-nitrosonaphtholsulfonate. B. Soyenkoff

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Ca

Action of hydroxylamine on the bisulfite compounds of 1-nitroso-2-naphthol-6- and -7-sulfonic acids. S. V. Bogdanov and I. I. Levkoev. *J. Gen. Chem.* (U.S.S.R.) 5, 18-27(1935); cf. *C. A.* 27, 2684; 28, 4728[1].—A study of the reaction of the bisulfite compds. of nitroso-β-naphthol derivs. with $NH_2OH.HCl$ was continued with 1,2,6-$ONC_{10}H_5(OH)SO_3H$ (I) and 1,2,7-$ONC_{10}H_5(OH)SO_3H$ (II). An equimol. mixt. of I and $NaHSO_3$ in H_2O heated with $NH_2OH.HCl$ gave 75% of 2,1,4,6-HON:$C_{10}H_5$(:O)-$(SO_3H)_2$ (III) (cf. B., *C. A.* 30, 5297). A similar reaction in the presence of NaOAc gave $C_{10}H_5(NOH)_2SO_3Na.NaHSO_3$ (IV). On the basis of the previous study and the following reactions, IV is thus constructed:

$$\begin{array}{l} NaO_3SC_6H_4\text{——}C:NOH \\ \quad\quad\quad\quad\quad\quad\quad\quad | \\ NaO_3SCH.CH_2.C:NOH. \end{array}$$

It gives with dil. NaOH 1,2,6-(HON:)$_2C_{10}H_5SO_3Na$ (V) and with concd. NaOH the dioxime anhydride of V, and with HCl III. The bisulfite compd. of II reacts with $NH_2OH.HCl$ similarly to I, giving 90% of 2,1,4,7-HON:$C_{10}H_5(OH)(SO_3H)_2$. The product of interaction in the presence of NaOAc could not be isolated, but the corresponding dioxime of 1,2-naphthoquinone-7-sulfonic acid and its anhydride were obtained. Chas. Blanc

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Ca

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Light-sensitive diazo compounds. I. I. Levkoev, V. P. Petrov and V. V. Durmashkina. *Photo-Kino Chem. Ind.* (U. S. S. R.) 1936, No. 1, 23-31.—The substances discussed are *p*-diazodimethylaniline and *p*-diazodiphenylamine.
C. E. K. Mees

Structure and properties of Pinacryptol green. I. N. Gorbacheva and I. I. Levkoev. *Photo.-Kino Chem. Ind.* (U. S. S. R.) 1936, No. 1, 59-63.—Pinacryptole green is 1,3-diaminophenyl-4-phenazonium chloride, which is produced by the reaction of chloropicric acid with *o*-$H_2NC_6H_4NHPh$ and reduction of the product with $SnCl_2$.
C. E. K. Mees

A56.5L4 METALLURGICAL LITERATURE CLASSIFICATION

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1ST AND 2ND ORDERS

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The action of hydroxylamine on some naphthalene derivatives. II. S. V. Bogdanov and I. I. Levkoev. *J. Gen. Chem.* (U. S. S. R.) 7, 1539–42(1937); cf. *C. A.* 29, 4003[4].—$NH_2OH.HCl$ reacts with 1-amino-2-naphthol-6-sulfonic acid to give the NH_4 2-nitroso-1-naphthol-6-sulfonate. The Na and K salts are also described. Reduction of the NH_4 salt gives 2-amino-1-naphthol-6-sulfonic acid, thus proving the structure. The isomeric 7- and 8-sulfonic acids undergo the same reactions.

H. M. Leicester

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Light-sensitive layers on various carriers. I. I. Levkovich, V. P. Petrov and N. N. Sveshnikov. Russ. 53,502, July 31, 1938. To prevent the combination of the components in the acidic medium in the prepn. of light-sensitive layers as azo components are used dioxysulfo-, bisoxysulfo-, or oxydisulfonaphthylthiourea or the corresponding guanidine deriva.

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CA

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Diazotype film on nitrate and acetate base. I. I. Levitov and V. P. Petrov. *Kinofotokhim. Prom.* 1938, No. 12, 52-7.—The effect upon gelatin of the various components used in producing a diazotype film was studied. The basic formula used in the tests contained the Zn salt of *p*-diazodimethylaniline-HCl, the coupling components, H_3PO_4, $KCr(SO_4)_2$ and gelatin. Development was by exposure to NH_3 vapor. Coagulation of gelatin solns. is brought about by the addn. of large amts. of phenols, particularly at low pH. H_3PO_4 and lactic acid are most suitable for use, and *p*-diazo derivs. of secondary and tertiary amines do not cause coagulation. Hydroxy compds. and reducing compds., such as thiourea and glucose, lower the gelling temps. of the gelatin solns. Originally transparent films were found to become semiopaque on exposure to strong light; this behavior is attributed to the liberation of N, which cannot escape from the hardened gelatin. J. A. Leermakers

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Anils of 3-hydroxythionaphthene-2-aldehydes and their vinylene homologs. I. I. Levkoev and N. N. Sveshnikov. Russ. 55,421, Aug. 31, 1939. 3-Hydroxythionaphthene or its homologs are condensed in the presence of an inert solvent with a compd. of the general formula ArN:CH-(CR:CR')$_n$NHAr, where Ar is an aromatic radical, R and R' are H, alkyl, halide, alkoxy- or acyloxy or a nitro group, and n is 1 or 2.

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C A

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The desensitizing properties of some flavindulines. I. N. Gorbacheva and I. I. Levkoev. *Kinofotokhim. Prom.* 1939, No. 2, 43-4; *Khim. Referat. Zhur.* 1939, No. 9, 115-16.—The desensitizing properties of 2-aminoflavinduline and of its derivs. (which were proposed as desensitizers for the Ag halide layers by Homolka, *C. A.* 19, 2457) were investigated. 2-Aminoflavinduline chloride possesses greater desensitizing properties than does pinacryptol green (cf. *C. A.* 30, 5227[9]), but it is practically unsuitable as a desensitizer owing to its considerable fogging properties. Flavinduline chloride and 2-nitroflavinduline chloride are inferior in desensitizing properties to 2-aminoflavinduline chloride. They also have a fogging effect (especially the nitro deriv.).

W. R. Henn

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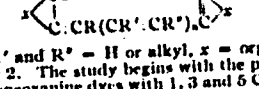
C4

25

Polymethine dyes of the 3-hydroxythianaphthene series. I. Condensation of 3-hydroxythianaphthene with *N,N'*-diphenylformamidine and with the dianils of malonic and glutaconic aldehydes. N. N. Sveshnikov and I. I. Levkoev. *J. Gen. Chem.* (U. S. S. R.) 10, 274-80 (1940).—The subject of investigation is polymethine dyes of the general type:



where R, R' and R'' = H or alkyl, x = org. radical and n = 0, 1 or 2. The study begins with the prepn. of sym. thianaphtheneoxanine dyes with 1, 3 and 5 C atoms in the linking polymethine chain. Refluxing equimol. amts. of 3-hydroxythianaphthene (I) and *N,N'*-diphenylfor. amidine in alc. for 15 min. formed the *anil* of *3-hydroxythianaphthene-2-aldehyde* (II), brown-yellow needles, m. 178-9°, identical with the product obtained from 3-hydroxythianaphthenyl-2-glyoxylic acid and $PhNH_2$ by Fries and Bartholomäus (*C. A.* 8, 3128). The reaction is accompanied by decompn. with liberation of some $PhNH_2$ and formation of a little *2-(3'-hydroxythianaphthenyl-2'-methylene)-3-oxo-2,3-dihydrothianaphthene* (III). Condensation of 0.25 g. II and 0.15 g. I in 5 ml. alc. contg. 0.5 ml. of concd. HCl by refluxing 1 hr. on a water bath yielded 0.28 g. III, m. 270-1°, red needles, sol. in dil. alkalies with violet color. In analogous procedures, the dianil of malonaldehyde and I gave the *anil* of *3-hydroxythianaphthene-2-vinyl-ω-aldehyde*, m. 217-8° (decompn.), dark-green prisms, sol. in alc. with orange-red color, converted with I to *2-(3'-hydroxythianaphthenyl-2'-allylidene)-3-oxo-2,3-dihydrothianaphthene*, m. 255-7° (decompn.), brown crystals with bronze luster, sol. in alkalies with blue color. *Na salt* forms sparkling green needles. I with the dianil of glutaconaldehyde gave the *anil* of *3-hydroxythianaphthene-2-α,γ-butadienyl-ω-aldehyde*, blue-violet needles, m. 201-2° (decompn.), converted with I to *2-(3'-hydroxythianaphthenyl-2'-α,δ-pentadienylidene)-3-oxo-2,3-dihydrothianaphthene*, m. 240-2° (decompn.), brown needles, forms green *Na salt*, sol. in alc. With an increase of the length of polymethine chain by 1 vinyl group the max. of absorption is shifted in the long-wave part of spectrum by 45-65 mμ. The sensitizing effect of the dyes on AgBr emulsions is being investigated. 20 references.

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1ST AND 2ND ORDERS

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2-aldehyde and its vinyl homologs with the quaternary salts of 2-methylbenzothiazole. I. I. Levkoev, N. N. Sveshnikov and V. V. Durmashkina. *J. Gen. Chem.* (U. S. S. R.) 10, 773-8(1940); cf. *C. A.* 34, 7111[9].—Previously it was shown that the anil of 3-hydroxythianaphthene-2-aldehyde (II) and its vinyl homologs react easily with 2-hydroxythianaphthene (II) with cleavage of H_2O, to form sym. polymethine dyes. It was found that I and its homologs react analogously with quaternary alkyl iodide salts of 2-methylbenzothiazole (III) to give polymethine dyes of the "merocyanine" type. The condensation can be effected by refluxing equiv. amts. of I and III derivs. with anhyd. NaOAc in alc. for 0.5 hr., or by treating the 2 reactants in dry C_5H_5N contg. a little piperidine in the dark at room temp. for 24 hrs. I and its homologs were prepd. by the previous method and the *N*-MeI, EtI, PrI and BuI derivs. of III by known methods. The reaction with I gave *2-(3'-methylbenzothiazolinylidene-2'-ethylidene)-3-oxo-2,3-dihydrothianaphthene*, m. 249-50° (decompn.), dark-blue needles; the *Et analog*, m. 210-11° (decompn.), violet needles or prisms with metallic luster; the *Pr analog*, m. 206-9° (decompn.), red-violet needles; the *Bu analog*, m. 177-8°, red needles with a green gloss. Anil of 3-hydroxythianaphthene-2-vinyl-ω-aldehyde and *N*-EtI salt of III gave *2-(3'-ethylbenzothiazolinylidene-2'-butenylidene) - 3 - oxo - 2,3 - dihydrothianaphthene*, m. 219-20° (decompn.), green needles. *2-(3'-Ethylbenzothiazolinylidene-2'-β,δ-butadienylidene) - 3 - oxo - 2,3-dihydrothianaphthene* (from 3 - hydroxythianaphthene-2-α,β - butadienyl - ω - aldehyde), m. 177-8°, blue-green glossy needles. *2 - (3' - Ethylbenzothiazolinylidene - 3')-3-oxo-2,3-dihydrothianaphthene*, a compd. without the linking polymethine chain, was prepd. from II and ethyl-*p*-toluenesulfonate deriv. of 2-methylmercaptobenzothiazole obtained by the method of Beilenson and Hamer (*C. A.* 33, 2524[1]). It forms yellow needles, m. 214-16°. With an increase of the length of polymethine chain by 1 vinyl group the max. absorption is shifted in the long-wave part of the spectrum by 83-90 mμ. The sensitizing effect of the dyes on AgBr emulsions requires further investigation. Chas. Blanc

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CA

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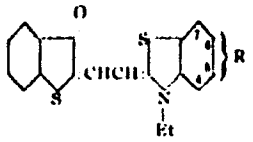
Polymethine dyes of the 3-hydroxythianaphthene series. III. Some substituted 2-[2-(3-ethyl-2(3)-benzothiazolidine)ethylidene] - 3 - oxo-2,3 - dihydrothianaphthenes N. N. Sveshnikov, L. I. Levkoev, and V. V. Durmashkina. *J. Gen. Chem.* (U.S.S.R.) 14, 198-202(1944)(English summary); cf. C.A. 35, 2327[1].—The anil of 3-oxo-2-thianaphthenecarboxaldehyde and the quaternary salt of the corresponding heterocyclic base are refluxed in EtOH with NaOAc to give deriva. of 2-[2-(3-ethyl-2(3)-benzothiazolylidene)ethylidene] - 3 - oxo - 2,3 - dihydrothianaphthene (I) contg. the following substituents in the benzothiazole nucleus: *6-Me*, dark green needles m. 236-7°, *6-MeO*, green prisms m. 219-20°, *6-EtO*, green prisms m. 208-9°, *6-MeS*, green prisms or red-brown needles with a greenish tint, m. 217-19°, *6-Cl*, yellow-green needles m. 200-2°, *6-NO*, (II), red-brown needles with a greenish tint, decomps. about 330°, *6-NH_2*, dark green prisms, m. 269-70°, *6-Me_2N*, dark green platelets, m. 243-4°, *6-AcNH*, dark green needles m. above 300°, *4,5-benzo*, violet needles m. 275-6°, *6,7-benzo*, brown needles m. 290-2°, *4,5(2,3-naphtho)*, dark red needles m.



(I)

281-5°, *6,7(2,3-naphtho)*, dark green needles m. 269-70°. The introduction of the substituents has a bathochromic effect in most cases. The shift in absorption max. is about ½ that caused by the same substituents in sym. thiacarbocyanines. Most of the dyes, with the exception of II, sensitize Ag halide emulsions. H. M. Leicester

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PROPERTIES INDEX

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Cyanine dyes. I. Dye derivatives of anthrathiazoles. I. I. Levkoev and V. V. Durmashkina (Cine-Photo-Inst., Moscow). *J. Gen. Chem.* (U.S.S.R.) 15, 215-24(1945) (English summary).—2-Methylanthra-[4,5,1',2']- and 2-methylanthra-[4,5,2',1']-thiazoles and their quaternary salts were synthesized, and from them cyanine dyes were prepd. and examd. as to optical and photographic value. The absorption max. of 4,5,4',5'- and 6,7,6',7'-dinaphthothiacarbocyanines is 61.5-3.5 mμ farther to the red than that of unsubstituted thiacarbocyanine; the shift is 1-2 mμ greater for the first deriv. than for the second. The dinaphtho derivs. are less effective as sensitizers than are the corresponding dibenzo derivs., probably because of higher mol. wt. and their easier coagulation in aq. soln. α-Aminoanthracene (11.6 g.) in 60 cc. benzene was treated with 7.34 g. Ac_2O and refluxed for 15 min.; on cooling there was obtained 91% *α-acetylaminoanthracene* (I), m. 211-12° (from EtOH). Similarly, 83% *β-acetylaminoanthracene* (II), m. 237-8°, was obtained from β-aminoanthracene and Ac_2O in AmOAc. I (14.1 g.) was ground with 6 g. P_2S_5 and carefully fused at 160° for 1-1.5 min. with stirring, the ground melt was boiled with 200 cc. EtOH, and the filtrate dild. with 800 cc. 5% NaOH, filtered, the filtrate neutralized with dil. AcOH, and the product pptd. by blowing with CO_2; *α-thioacetylaminoanthracene* (40%) so obtained, m. 169-70°; somewhat better yield was obtained by condensation in boiling xylene; crystn. from EtOH gave the pure product, m. 177-8° (III). Treatment of II as above (fusion temp. 200-10°) gave 40% β-thioacetylaminoanthracene (IV), m. 211-12° (from EtOH). III (10.04 g.) in 100 cc. hot EtOH was treated with 128 cc. 5% NaOH, filtered, and cooled; the filtrate was added dropwise at 5° to 27.7 g. $K_3Fe(CN)_6$ in 150 cc. water; the mixt. was allowed to stand overnight, and filtered, and the solid dried; crystn. from 450 cc. EtOH with charcoal gave 70% *2-methylanthra-[4,5,1',2']-thiazole*, m. 161-2° (V), further crystn. increased the m.p. 2°. V heated with excess Et *p*-toluenesulfonate to 160-70° for 6 hrs. gave 62% of the *quaternary salt* (VI), m. 220-7° (decompn.) after crystn. from EtOH. Treatment of its aq.-EtOH soln. with KI gave the *ethiodide* (VII), m. 223-4° (decompn.). IV by an analogous series of reactions gave 80% *2-methylanthra-[4,5,2',1']-thiazole*, m. 132-3° (from EtOH), (VIII); this was converted as above into the Et *p-toluenesulfonate*, m. 224-5° (decompn.), and *ethiodide*, m. 245-6° (decompn.). The dinaphthothiacarbocyanines were prepd. from ethyl *p*-toluenesulfonates of the anthrathiazoles and the corresponding esters of orthoformic and orthoacetic acids in pyridine at 135°; the dyes were purified by crystn. from EtOH, MeOH or $CHCl_3$. The following derivs. were prepd. from VI and VIII: *3,3'-diethyl-4,5,4',5'-dinaphtho(β,β')thiacarbocyanine p-toluenesulfonate* (86%), m. 261-2° (from $CHCl_3$), deep green with golden sheen; *3,3'-diethyl-9-methyl-4,5,4',5'-dinaphtho(β,β')thiacarbocyanine p-toluenesulfonate* (11.5%), m. 225° (from MeOH), deep green with coppery sheen; *3,3'-diethyl-6,7,6',7'-dinaphtho(β,β')thiacarbocyanine p-toluenesulfonate* (83%), m. 305-6° (from EtOH), brown; *3,3'-diethyl-9-methyl-6,7,6',7'-dinaphtho(β,β')thiacarbocyanine p-toluenesulfonate* (45%), m. 253-4° (from EtOH), brown with bronze luster. By pptn. with NaCl and NaI from aq. MeOH the corresponding halides were prepd.: *3,3'-diethyl-4,5,4',5'-dinaphtho(β,β')thiacarbocyanine*

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chloride, deep green, m. 210-12° (decompn.) from MeOH; 3,3'-*diethyl*-4,5,4',5'-*dinaphtho*(β,β')*thiacarbocyanine iodide*, deep blue, m. 343-5° (decompn.) from MeOH; 3,3'-*diethyl*-6,7,6',7'-*dinaphtho*(β,β')*thiacarbocyanine chloride*, brown, m. 235-40° (decompn.) from EtOH; 3,3'-*diethyl*-9-*methyl*-4,5,4',5'-*dinaphtho*(β,β')*thiacarbocyanine chloride*, deep green, m. 194-5° (decompn.) from $CHCl_3$; 3,3'-*diethyl*-9-*methyl*-6,7,6',7'-*dinaphtho*(β,β')*thiacarbocyanine chloride*, deep green with gold luster, decomp. 231° (from $CHCl_3$). VI (0.45 g.) and 0.11 g. malonaldehyde dianil in 6 cc. pyridine were allowed to stand for 24 hrs.; 0.1 g. piperidine was added and after 48 hrs. the pptd. 3,3'-*diethyl*-4,5,4',5'-*dinaphtho*(β,β')*thiadicarbocyanine p-toluenesulfonate* was filtered off and washed with EtOH and Et_2O; yield 38%; bronze needles (from $CHCl_3$) m. 213-14° (decompn.); it was obtained in lower yields by analogous condensation in Ac_2O with NaOAc or with ethoxyacrolein diethylacetal in pyridine; by analogous means there was obtained 52% 3,3'-*diethyl*-6,7,6',7'-*dinaphtho*(β,β')*thiadicarbocyanine p-toluenesulfonate*, m. 248-50° (decompn.) from MeOH, as shiny bronze needles. By the use of dianil of glutaconaldehyde there was obtained 3,3'-*diethyl*-4,5,4',5'-*dinaphtho*(β,β')*thiatricarbocyanine p-toluenesulfonate*, m. 302-4° (decompn., from MeOH), (66%), as shiny bronze needles; 3,3'-*diethyl*-6,7,6',7'-*dinaphtho*(β,β')*thiatricarbocyanine p-toluenesulfonate*, m. 196-9° (decompn.) from MeOH (80%), as copper-red plates. VI (0.45 g.) in 20 cc. EtOH was heated with 0.96 g. quinoline ethiodide, 0.03 g. Na in 2 cc. abs. EtOH was added, the mixt. was refluxed for 0.5 hr., and cooled; there was obtained 71% 3,1'-*diethyl*-4,5-*naphtho*(β,β')*thia*-4'-*isocyanine iodide*, green-brown needles, m. 230-1° (decompn.) from MeOH; analogously there was obtained 75% 3,1'-*diethyl*-6,7-*naphtho*(β,β')*thia*-4'-*isocyanine iodide*, red needles, m. 307-8° (decompn.) from MeOH. Condensation of VI with p-$Me_2NC_6H_4CHO$ in EtOH in the presence of piperidine at reflux gave, on cooling and addn. of Et_2O, a tarry ppt. which was dissolved in EtOH and treated with aq. KI to yield 2-*p-dimethylaminostyryl*-*anthra*-[4,5,1',2']-*thiazole ethiodide*, deep violet prisms, m. 200-7° (decompn.) from EtOH; its abs. max. in MeOH was 535.5 mμ.

G. M. Kosolapoff

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Benzothiazole derivatives. I. The 2-phenyl-4-bromo-5,6-benzobenzothiazole of Fries. I. I. Levkoev and A. Ya. Bashkirova (Kino-photo Inst., Moscow). *J. Gen. Chem.* (U.S.S.R.) 15, 832-5(1945). In an attempt to prep. 2-methyl-5,6-benzobenzothiazole (2-methylnaphtho[2,3]thiazole), the method of Fries and Buchler (*C.A.* 21, 2902) was used by which they obtained a compd. (I), m. 156°. They considered I to be 2-phenyl-4-bromo-5,6-benzobenzothiazole. A mixt. of 1,2-$BrC_{10}H_6NHAc$ and P_2S_5 was gradually added to boiling C_6H_6 and the mixt. refluxed 1 hr. Extn. with 5% NaOH gave 55.0% *2-thioacetamido-1-bromonaphthalene*, m. 146-7°, which was oxidized at 5° with alk. $K_3Fe(CN)_6$ to give a compd. (II), m. 101°. II did not form a picrate. II refluxed with HCl gave S, H_2S, and 1,2-$BrC_{10}H_6NH_2$. Hence II was not the expected compd., but *bis[1-(1-bromo-2-naphthylimino)-ethyl] disulfide*. Further study of I showed that while it was not affected by heating with H_2O or HCl, when it was heated with HCl-HOAc it split to S, H_2S, and 1,2-$BrC_{10}H_6NHBz$ (III). Careful reduction of I with $SnCl_2$ gave *2-thiobenzamido-1-bromonaphthalene*, m. 150-3°. If the reduction is more vigorous, III is formed. Thus, I is actually *bis[(1-bromo-2-naphthylimino)phenylmethyl] disulfide*.

H. M. Leicester

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2-(Acylmethylene)-3-alkylbenzothiazoles. I. I. Levkoev and N. N. Svashnikov. U.S.S.R. 66,870, Aug. 31, 1946. These compds., which are effective *photosensitizers*, are obtained by interaction of quaternary salts of 2-methylbenzothiazole or its derivs. and orthoesters of carboxylic acids. The reaction is carried out in C_6H_6N.
M. Hosch

2-Nitro-4-methoxyphenol. I. I. Levkoev, N. N. Svashnikov, and N. S. Barbyn'. U.S.S.R. 66,871, Aug. 31, 1946. 3-Nitro-4-aminoanisole or its acyl derivs. is heated with an aq. alkali soln.
M. Hosch

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Derivative of benzothiazole. II. Action of potassium ferrocyanide on thioacetyl-m-anisidine. N. N. Sveshnikov and I. I. Levkoev. *J. Gen. Chem.* (U.S.S.R.) 16, 1071-6(1946)(in Russian); cf. Kiprianov and Khrapal, *C.A.* 38, 969[1].—*m*-Anisidine (12.3 g.) suspended in 50 cc. H_2O was treated with 12.2 g. Ac_2O at 15-20° to give 91.5% *N-acetyl-m-anisidine*, m. 79-80°. This (3.3 g.) in 16 cc. boiling C_6H_6 was treated with 0.9 g. powd. P_2S_5 and boiled 20 min.; the C_6H_6 ext. of the gummy residue and the original soln. were combined and extd. with 4% NaOH; the ext. was neutralized with AcOH and treated with CO_2 to ppt. *N-thioacetyl-m-anisidine* (37.2%), m. 51.5-2° (from 25% EtOH). This (8.72 g.) in 145 cc. 4% NaOH was added at 3-5° to 36.5 g. K ferrocyanide in 165 cc. H_2O with stirring and allowed to stand overnight, to yield, after Et_2O extn. and treatment with picric acid, 77.5% *picrates of mixed 5-methoxy-* (I) and *7-methoxy-2-methylbenzothiazole* (II), m. 133-40°. Decompn. of the picrates with soda gave 6.61 g. of a crude base mixt. which, warmed with 2 cc. ligroin, cooled, and partially evapd., gave 37.8% (II), m. 56-7° (from ligroin); *picrate* m. 162-3° (from EtOH); *methiodide* m. 203-5° (from EtOH); *ethiodide* m. 181-3° (from EtOH); *propiodide* m. 191-3° (from EtOH). The mother liquor from the II was converted into the *picrate*, m. 141-3°, which after crystn. from EtOH m. 161-2° and gave, after treatment with soda, 7% I, m. 38.5-9° (from ligroin); *picrate* m. 162-3° (from EtOH); *methiodide* m. 228-9° (from EtOH); *ethiodide* m. 187-8° (from EtOH); *Me p-toluenesulfonate* m. 165-6° (from abs. EtOH). I was synthesized for identification purposes by an independent method as follows. 3-Nitro-4-bromoanisole (11.6 g.) in 20 cc. boiling EtOH was treated over 30 min. with a Na polysulfide soln. from 6 g. cryst. Na_2S and 1.2 g. S, and the mixt. boiled 3 hrs.; the sepd. oil was boiled with 10 cc. EtOH, then treated with Et_2O to induce crystn. of *bis(4-methoxy-2-nitrophenyl) sulfide* (38%), m. 161-3° (from C_6H_6) (a 2nd crystn. gave a m.p. of 166-7°). This (3.68 g.) and 6.87 g. Zn dust were mixed and slowly added to 30 cc. AcOH at 80-100°, heated at 100° 0.5 hr., treated with 6.12 g. Ac_2O, heated 3 hrs. at 114-17°, cooled to 70-80°, dild. with 50 cc. H_2O, heated to boiling, and filtered rapidly; the filtrate was made alk. and the oily I was extd. with Et_2O, which was then removed *in vacuo* after drying to give 83.7% of a product, m. 38.5-9° (from ligroin), identical with the product of ferrocyanide oxidation given above.

G. M. Kosolapoff

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CA

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Cyanine dyes. II. Certain isomeric methoxythiacarbocyanines. I. I. Levkoev, N. N. Svyshnikov, and S. A. Khelfets (Kiln-form Research Inst., Moscow). *J. Gen. Chem.* (U.S.S.R.) 16, 1480-94(1946)(in Russian); cf. *C.A.* 40, 2089[9].—Several 4,4'-, 5,5'-, 6,6'-, and 7,7'-dimethoxythiacarbocyanines were synthesized, and their absorption was studied. Introduction of MeO groups in the 5- and 6-positions produces an almost equal, considerable bathochrome effect, while substitution in the 4- and 7-positions shifts the absorption max. only slightly to longer wave lengths. This indicates that in the 4- and 7- and the 5- and 6-derivs. structures with positively charged N and those with positively charged S resonate with approx. equal weight. Thiouretyl-*o*-anisidine (27.1 g.) in 610 cc. 4% NaOH was treated at 0-5° with 103 g. K ferricyanide in 400 cc. water; after standing overnight, the mixt. was extd. with Et_2O, and the ext. treated with alc. picric acid to yield 33.8% *4-methoxy-2-methylbenzothiazole picrate*, m. 161.5-2.5° (from EtOH), *free base*, m. 87-8° (from EtOH); *methiodide*, m. 208 9° (from MeOH), *ethiodide*, m. 185 6° (from EtOH); *n-propiodide*, m. 186-7° (decomp.; from EtOH), *Et p-toluenesulfonate*, m. 186 7° (from EtOH). The other isomers were prepd. similarly according to Jacobson (*Ber.* 19, 1071(1886)). The corresponding 2-methylmethoxybenzothiazoles were heated with a 5% excess of Et *p*-toluenesulfonate for 6 hrs. to 140 50° to prep. the 3,3'-diethyldimethoxythiacarbocyanine iodides; in the case of the dimethyl derivs. the heating was to 130 5°, the crude quaternary salts were treated with pyridine and the corresponding ortho ester (Et orthoformate, orthoacetate, or orthopropionate) and heated to 130 5° for 30-60 min., after which the dyes were isolated by pptn. with KI_3O, soln. in hot MeOH, and addn. of 5% aq. KI. After recrystn., they were dried in vacuo at 70 100°. The properties and yields of the products are: *3,3'-diethyl-4,4'-dimethoxythiacarbocyanine iodide* (62%), blue-violet needles, decomp. 241° (from MeOH), abs. max. 560 mμ; *3,3'-diethyl-9-methyl-4,4'-dimethoxythiacarbocyanine iodide* (54%), brick-red needles, decomp. 224° (from MeOH), abs. max. 544 mμ; *3,3',9-triethyl-4,4'-dimethoxythiacarbocyanine iodide* (40%), blue green plates, decomp. 214° (from MeOH), abs. max. 548 mμ; *3,3'-dimethyl-9-ethyl-4,4'-dimethoxythiacarbocyanine iodide* (25.5%), red-brown needles, decomp. 200° (from MeOH), abs. max. 546 mμ; *3,3'-diethyl-5,5'-dimethoxythiacarbocyanine iodide* (54%), blue needles, decomp. 244° (from EtOH), abs. max. 576 mμ; *3,3'-diethyl-9-methyl-5,5'-dimethoxythiacarbocyanine iodide* (33%), deep violet needles, decomp. 230° (from MeOH), abs. max. 550 mμ; *3,3',9-triethyl-5,5'-dimethoxythiacarbocyanine iodide* (32%), green prisms, decomp. 241° (from EtOH), abs. max. 561 mμ; *3,3'-dimethyl-9-ethyl-5,5'-dimethoxythiacarbocyanine iodide* (56%), brown-green needles, decomp. 227° (from MeOH), abs. max. 558 mμ; *3,3'-diethyl-6,6'-dimethoxythiacarbocyanine iodide* (76%), violet prisms, decomp. 270° (from MeOH), abs. max. 572 mμ; *3,3'-diethyl-9-methyl-6,6'-dimethoxy-*

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thiacarbocyanine iodide (36%), gray-green prisms, decomp. 267° (from MeOH), abs. max. 537 mμ; *3,3',9-triethyl-6,6'-dimethoxythiacarbocyanine iodide* (30%), deep blue prisms, decomp. 242° (from MeOH), abs. max. 563 mμ; *3,3'-dimethyl-9-ethyl-6,6'-dimethoxythiacarbocyanine iodide* (46%), brown-red prisms, decomp. 255° (from MeOH), abs. max. 560 mμ; *3,3'-diethyl-7,7'-dimethoxythiacarbocyanine iodide* (65%), blue-violet prisms, decomp. 260-70° (from MeOH), abs. max. 501 mμ; *3,3'-diethyl-9-methyl-7,7'-dimethoxythiacarbocyanine iodide* (30%), violet-red needles, decomp. 262° (from MeOH), abs. max. 540 mμ; *3,3',9-triethyl-7,7'-dimethoxythiacarbocyanine iodide* (30%), violet-green needles, decomp. 267° (from MeOH), abs. max. 548 mμ; *3,3'-dimethyl-9-ethyl-7,7'-dimethoxythiacarbocyanine iodide* (40%), red needles, decomp. 275° (from MeOH), abs. max. 546 mμ.

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Cyanine dyes. III. Certain 4,5,4',5'-bis(tetramethylene)thiocarbocyanines. I. I. Levkoev and N. N. Sveshnikov (Kino-Foto Res. Inst., Moscow). *J. Gen. Chem.* (U.S.S.R.) 16, 1655-8(1946); cf. *C.A.* 41, 5309c.—Substitution of tetramethylene rings in place of 4,5,4',5'-benzo groups in thiocarbocyanine dyes resulted in increased soly. and in a hypsochromic shift of the abs. max. of 21 mμ; the bathochromic effect in respect to the unsubstituted thiocarbocyanines is about 17 mμ. Replacement of H in the 9-position by Me in these dyes results in a 20-mμ shift of the max. to shorter wavelengths and is similar to that observed in 4,5,4',5'- and 6,7,6',7'-dibenzo derivs. (Brooker and White, *C.A.* 20, 2934[9]). The tetramethylene derivs. are sensitizers of medium effectiveness; their 9-Et derivs., in contrast with the corresponding dibenzo compds., are little inclined to produce sensitization of the 2nd order. *ar-Tetrahydro-1-naphthylamine* (7.35 g.) in 8 cc. dry C_6H_6 and 0.12 g. Ac_2O, heated on a steam bath 0.5 hr. and cooled yielded 7.38 g. *Ac deriv.* (with an addnl. 1.13 g. obtainable from the mother liquor), m. 160-1° (from EtOH). This, boiled in 20 parts dry C_6H_6 with 0.3 mol. P_2S_5 1 hr., yielded, after extn. with aq. NaOH and pptn. by CO_2, 36% *thioacetyl deriv.*, m. 106-7° (from 50% EtOH; charcoal). The latter (4.1 g.) in 80 cc. 4% NaOH, slowly added to 14.2 g. $K_3Fe(CN)_6$ in 60 cc. H_2O at 2-3° and allowed to stand overnight, yielded 55% *2-methyl-4,5-tetramethylenebenzothiazole*, isolated as the *picrate*; *free base* (I) m. 67-8° (from EtOH). I (0.25 g.) and 0.5 g. *p*-$MeC_6H_4SO_3Et$ were heated to 100-70° 10 hrs. under a reflux condenser, with protection from moisture, and the resulting quaternary salt was treated with 1.5 cc. dry pyridine and 0.28 g. $HC(OEt)_3$ and heated to 139-40° 1 hr.; the dye, sepd. by addn. of Et_2O, dissolved in MeOH, and treated with 10% KI soln., yielded 21.3% *3,3'-diethyl-4,5,4',5'-bis(tetramethylene)thiocarbocyanine iodide*, shiny green needles, m. 228-9° (from EtOH), abs. max. 574 mμ. Use of $MeC(OEt)_3$ in the above gave 15% of the corresponding *9-Me deriv.*, red-violet prisms, m. 204-7° (decompn.; from abs. EtOH), abs. max. 554 mμ. $EtC(OEt)_3$ gave 10.2% of the corresponding *9-Et deriv.*, violet prisms, m. 197-9° (from abs. EtOH), abs. max. 558 mμ. I and an equiv. amt. of *p*-$MeC_6H_4SO_3Me$ heated to 130-40° 5 hrs. yielded 71% quaternary salt, m. 202° (from Me_2CO); this with $EtC(OEt)_3$ in pyridine as above yielded 28% *3,3'-dimethyl-9-ethyl-4,5,4',5'-bis(tetramethylene)thiocarbocyanine iodide*, brown-red prisms, m. 103-5° (from abs. EtOH), abs. max. 554 mμ.

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1ST AND 2ND ORDERS

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Relation between the structure of thiacarbocyanines and their capacity for second-type sensitization. I. I. Levkoev and S. Natanson (Research Inst. Cinematography Photography, Moscow). *Acta Physicochim. U.R.S.S.* 21, 437-50(1940).—A study of over 500 dyes was undertaken in order to correlate relative capacity for sensitization of the "2nd type" with structure. Such sensitization is possessed conspicuously by thia- and selenacarbocyanines substituted in the 9 position. The 9-ethyl group is especially favorable; other groups follow in the order Et > Ph > n-Pr > higher alkyls > Me > H. In 9-alkylthiacarbocyanines contg. substituents in the rings, such substituents are effective if located at positions 6 and 6' and especially at 5 and 5'. Nuclear tetra-substitution of the dyes (except the benzo derivatives) is not favorable. The order of decreasingly favorable influence of nuclear substituents is Bz, Ac, Me, EtO, Cl, AcO, MeS, NO, AcNH, NH_2, NR_2. Sensitization of the 2nd type is especially strong with *N,N'*-dimethyl-9-alkylthiacarbocyanines when the rings are either unsubstituted or have 6,6'-substituents and with the *N,N'*-diethyl dyes with 5,5'-substituents. The property is weaker with higher alkyls in the 9-position. In general, selenacarbocyanines show the phenomenon more strongly than the thia dyes.

L. G. S. Brooker

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4-Hydroxythiazoline-2-thione. I. I. Levkoev, N. N. Sveshnikov, and L. V. Rosvadovskaya. U.S.S.R. 68,789, June 30, 1947. S.C(:S).NR.CH:C(CR':CR'')$_s$CH:NAr, where R is H, alkyl, aralkyl, or aryl, R' and R'' are H, alkyl, halogen, alkoxy, acyloxy, or a nitro group, Ar is an aromatic radical, and s is 0, 1, or 2, are obtained by condensation of thiazolidine-2-thione-4-one or its 3-alkyl, aralkyl, or aryl substitution product with compds. of the general formula ArN:C(CR':CR'')$_s$NHAr. The condensation is carried out in pyridine at room temp.
M. Hosch

9-Alkyl-4,5,4',5'-dibenzothiocarbocyanines. I. I. Levkoev, N. N. Sveshnikov, T. V. Belostotskaya, and L. D. Zhilina. U.S.S.R. 69,296, Sept. 30, 1947. In the production of these cyanines by heating quaternary salts of 2-methyl-4,5-benzobenzothiazole with *o*-esters of carboxylic acids in pyridine, the process is carried out in the presence of Ac_2O.
M. Hosch

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LEVKOYEV, I.I.; SVESHNIKOV, N.N.

Some by-products of carbocyannine condensation. Trudy NIKFI no.7: 13-16 '47. (MIRA 11:6)

1. Sinteticheskaya laboratoriya Nauchno-issledovatel'skogo kino-foto-instituta, Moskva. (Cyanine dyes)

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LEVKOYEV, I.I.; NATANSON, S.V.

Relation between the structure of thiacarbocyanines and their capacity for the sensitizing of the second order. Trudy NIKFI no.7: 17-24 '47. (MIRA 11:6)

1. Sinteticheskaya laboratoriya Nauchno-issledovatel'skogo kino-foto-instituta, Moskva.
(Thiacarbocyanine) (Photographic sensitometry)

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LEVKOYEV, I.I.; SVESHNIKOV, N.N.; GORBACHEVA, I.N.; VOMPE, A.F.

Optical properties of some thiacarbocyanines with substitutes in heterocyclic radicals. Trudy NIKFI no.7:25-33 '47. (MIRA 11:6)

1. Sinteticheskaya laboratoriya Nauchno-issledovatel'skogo kino-foto-instituta, Moskva.
(Thiacarbicyanine--Optical properties)

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CA

Cyanine dyes. Thiocyanine dyes containing thiocarbamide groups. N. F. Turitsyna and I. I. Levkoev. *Doklady Akad. Nauk S.S.S.R.* 66, 871–4(1949).—A no. of 3,3'-diethyl-6,6'-bis(alkylthiocarbamido)thiacarbocyanine dyes were prepd. The necessary 6-allyl- and 6-benzylthiocarbamido-2-methylbenzothiazoles were obtained by condensation of 6-amino-2-methylbenzothiazole with allyl or benzyl isothiocyanates, but the desired quaternary salts could not be obtained from them; esters of p-$MeC_6H_4SO_3H$ or other alkylating agents first formed S-alkylisothiocarbonamide derivs. which yielded, with the excess alkylating agent, quaternary salts of the general type 2-methyl-6-[RN:C(SEt)NH]-3-ethylbenzothiazolium salts (A). The desired salts contg. 6-RNHCSNH-substitution were, however, obtained from alkylisothiocyanates and quaternary salts of 6-amino-2-methylbenzothiazole obtained by hydrolysis of the corresponding 6-AcNH derivs. (the salts of this category are denoted by symbol B in the following). The salts of types A and B were conventionally converted to the thiacyanines contg. 6-RNHCSNH or RN:S(SEt)NH groups. The absorption max. of the dyes are shifted to the shorter wave lengths in comparison with NH_2 derivs., and the products are *optical sensitizers*, with the substances derived from type A intermediates being the most effective, while those derived from type B are feebly active. Potentiometric titration curves in EtOH with $AgNO_3$ and a Ag electrode are given for the following 3,3'-diethylthiacarbocyanine (I) dyes: the mono-p-toluenesulfonates of 6,6'-$(C_2H_5NHCSNH)_2$ deriv., the 6,6'-$[C_2H_5N:C(SEt)NH]_2$ deriv., and of I; and the bromide of 6,6'-$(C_2H_5NHCSNH)_2$, 9-Me of I; and the following starting materials: allylthiocarbamide, 6-(allylthiocarbamido)-2-methylbenzothiazole, and 6-(allylthiocarbamido)-3-ethyl-2-methylbenzothiazolium p-toluenesulfonate. Derivs. of type B react with Ag ions, apparently forming complexes, while NH_4OH solns. of AgCl yield quant. amts. of AgS; derivs. of type A do not react with Ag ions and do not form AgS. The essential absence of chem. sensitization of the products is apparently caused by conditions of their space orientation on microcrystals of Ag halide in the emulsion. G. M. K.

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Chem A

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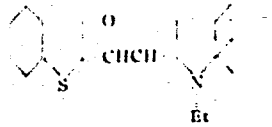
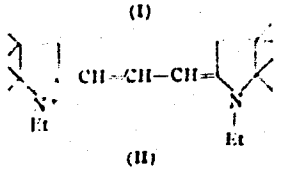
Structure of merocyanine dyes. I. I. Levkoev, N. N. Sveshnikov, and E. B. Lifshits (All Union Cine-Photo Research Inst., Leningrad). *Doklady Akad. Nauk S.S.S.R.* 74, 275-8 (1950); cf. C.A. 39, 2289f.—Examn. of the absorption spectra of merocyanine dyes having the basic structure I, in which the substituent given is N-contg. heterocycle, gave the following max. (mμ in EtOH and $CHCl_3$, resp.): (a) *1,3-dimethylindolenine* 522, 522; (b) *thiazoline* 513, 505; (c) *benzoxazole* 522, 512; (d) *benzoselenazole* 557, 545; (e) *benzothiazole*, 551, 544; (f) *5-methyl-1,3,4-thiadiazole* 544, 536; (g) *2-quinoline* 588, 585; (h) *thiazole* 558, 551; (i) *1-quinoline* 640, 635; (j) *2-pyridine* 555, 572; (k) *1-methylbenzimidazole* 524, 537. Carbocyanines (II) having analogous substituents gave, resp.: (a) 545, 555; (b) 445, 450; (c) 483, 492; (d) 570, 578; (e) 557, 568; (f) 513, 520; (g) 604, 610; (h) 533, 550; (i) 705, 712; (j) 500, 506; (k) 480, 495. As the basicity of the heterocycle increases, the hypsochromic shift drops at first, then begins to increase; this behavior argues against the usually accepted keto-enol formulation of such dyes, which would be expected to give a unidirectional hypsochromic shift. Further examn. of the spectra in MeOH, EtOH, BuOH, $CHCl_3$, C_6H_6, CCl_4, and n-C_6H_{14} showed that dyes based on 3,3-dimethylindolenine, benzothiazole, 5-methylthiadiazole, and thiazoline show a shift of the max. to shorter waves with decreased solvent polarity; dyes with more basic groups (thiazole, pyridine, and benzimidazole) give a bathochromic shift, followed by reversal (about the BuOH or $CHCl_3$ section of the series). Hence, the 1st group of the merocyanines display an approach to a covalent keto structure, while compds. of the 2nd group at first also approach a structure intermediate between the keto and the ionic enol form, then reverse the trend and approach the keto form. In alcs. the structure, thus, approaches the ionic formulation.

G. M. Kosolapoff



(I)



(II)

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CA

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Properties of some thiazolecarbocyanines. B. S. Portnaya, L. I. Levkoev, and N. S. Spasokukotskii (All-Union Cinefoto Inst., Leningrad). *Doklady Akad. Nauk S.S.S.R.* 75, 231-3(1950).—Introduction of either electropos. or electroneg. substituents increases the depth of color, although in the 1st case the basicity of the dye rises, and in 2nd case it falls. Absorption in EtOH soln. and basicity measurements (expressed as molality of HCl necessary in 1×10^{-6} *M* dye soln. in 57% EtOH to cause 50% loss of color) for the following compds. were made, no data on the prepns. are given, except the general statement of condensation of quaternary salts of the appropriate bases in pyridine with ortho esters. Thiazolecarbocyanines with the following substituents: none in the 4,4',5,5'-positions, abs. max. 543 mμ and basicity 9.6×10^{-4} with H on the polymethine link, 4,4'-di-Me, abs. max. 556 and basicity 5.7×10^{-4} with H, 526 and 1.2×10^{-4} with Me, abs. max. 530 with Et on the polymethine chain; 5,5'-dimethyl, 553 and 6×10^{-4} with H, 526 and 1.1×10^{-4} with Me, 530 with Et; 4,4',5,5'-tetramethyl, 503 and 2.4×10^{-4} with H, 530 and 7×10^{-4} with Me; 4,4'-diphenyl; 550 and 5×10^{-4} with H, 530 and 1.2×10^{-4} with Me, 534 with Et; 5,5'-diphenyl, 502 and 2.1×10^{-4} with H, 566 and 6×10^{-4} with Me, 570 with Et; 4,4',5,5'-tetraphenyl, 588 and 1.8×10^{-4} with H, 502 and 1×10^{-4} with Me, 564 with Et on the polymethine link. G. M. Kosolapoff

1951

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Chem A

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Merocyanine dyes of rhodanine derivatives. I. Properties of methylmethosulfate of 2-methylmercapto-5-(3-ethylbenzothiazolin-2-ylideneethylidene)-4(5H)thiazolone. Z. P. Sytnik, I. I. Leukoev, and M. V. Deichmeister (All-Union Cine-Photo Inst., Leningrad). *Zhur. Obshchei Khim.* (J. Gen. Chem.) 21, 768-72(1951).—Refluxing 1.33 g. rhodanine and 1.96 g. diphenylformamidine in 15 ml. Ac_2O 1 hr. gave 70% *5-(acetanilinomethylene)rhodanine*, $C_{12}H_{10}O_2N_2S_2$ (I), yellow needles, m. 240-2° (from EtOH). *3-Methylrhodanine* gave the *3-Me deriv.* (II), plates, m. 166-8° (from EtOH). Heating 0.56 g. I, 0.67 g. 2-methylbenzothiazole-EtI, and 10 ml. pyridine 15 min. to 130° gave 0.33 g. *5-(3-ethylbenzothiazolin-2-ylideneethylidene)-2-thio-2,4-thiazolidinedione* (III), violet, decomp. 270° (from EtOH-pyridine), abs. max. 520 mμ. II gave 50% *3-Me deriv.* (IV), red needles, decomp. 268-9° (from EtOH), abs. max. 522 mμ. Heating 0.64 g. III in 10 ml. EtOH 20 min. on a steam bath with 0.16 g. KOH and 0.44 g. *p*-$MeC_6H_4SO_3Me$ gave 22% *2-methylmercapto-5-(3-ethylbenzothiazolin-2-ylideneethylidene)-4(5H)thiazolone* (V), red-violet needles, decomps. 249-51° (from C_6H_6), abs. max. 526 mμ; the EtOH insol. portion of the prepn. was identical with IV; V forms in 33.7% yield from 0.8 g. III in 7 ml. EtOH contg. 0.17 g. EtONa treated 20 min. at 60° with 0.33 g. Me_2SO_4. Heating 0.33 g. IV and 0.378 g. Me_2SO_4 15 min. to 130°, cooling, filtering, washing with dry Et_2O, and boiling with C_6H_6 gave 90% *2-methylmercapto-5-(3-ethylbenzothiazolin-2-ylideneethylidene)-4(5H)-thiazolone-Me_2SO_4* (VI), red, decomp. 211-12°, also obtained in 63% yield by heating 0.33 g. V with 0.378 g. Me_2SO_4 2 hrs. at 110°; VI has absorption max. 536 mμ. Boiling VI in H_2O 2 hrs. gave much MeSH and an orange ppt. of *3-methyl-(3-ethylbenzothiazolin-2-ylideneethylidene)-2,4-thiazolidinedione*, orange-yellow, decomp. 247-9° (from EtOH), abs. max. 464 mμ. III and IV weakly sensitize AgBr to yellow and green; V is somewhat more effective. VI lowers the sensitivity of the emulsion.

G. M. Kosolapoff

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Cyanine dyes. IV. Some 6,6'-diacetamidothiacarbocyanines. I. I. Levkoev, B. A. Khelfets, and N. S. Harvyn (All-Union Cinephoto Inst., Leningrad). *Zhur. Obshchei Khim.* (J. Gen. Chem.) 21, 1340-9(1951); cf. C.A. 41, 5883i.—Acylation of amino groups of chain-unsubstituted 6,6'-diaminothiacarbocyanines shifts the abs. max. to shorter waves by 15-22 mμ. Most formylated and acetylated products have no less sensitizing ability than the unsubstituted dyes, but the acylamino derivs. do not possess sensitization of the 2nd order. Refluxing 8.2 g. 6-amino-2-methylbenzothiazole with 11.2 HCO_2H 3 hrs. at 120-30° gave 90% yellow *6-formylamino-2-methylbenzothiazole formate*, m. 95-7°; *free base*, m. 111-12° (from C_6H_6); *MeI deriv.*, m. 252-3°; *EtBr deriv.*, m. 238-9°; *EtI deriv.*, m. 243-4°. Heating 18 g. 6-amino-2-methylbenzothiazole with 16.8 g. Ac_2O in C_6H_6 gave 80% *6-acetamido analog*, m. 148-9°; *picrate*, yellow, m. 218-19°; *MeI deriv.*, m. 197°; *EtI deriv.*, m. 230-2°; *Et p-toluenesulfonate*, m. 197°; *Et perchlorate*, m. 262-3° (from H_2O). Similar treatment of the base with $MeSO_2Cl$ gave 80% *6-methylsulfonamido-2-methylbenzothiazole*, m. 145-6° (from EtOH); *EtI deriv.*, by heating the base with Et *p*-toluenesulfonate and treating the product with KI, m. 247-8° (from MeOH). Refluxing the 6-acetamido and 6-methylsulfonamido derivs. with a small excess of Et *p*-toluenesulfonate 6 hrs. to 125-45°, addn. of an ortho carbonate to the product followed by pyridine, and reheating to 130° gave after treatment with KBr the ppts. of the respective dyes listed below: *3,3'-diethyl-6,6'-diacetamido)thiacarbocyanine bromide*, 79%, green, m. 271-2° (from EtOH); the *iodide*, deep green or blue, m. 284-6°; *p-toluenesulfonate*, m. 200-1° (from EtOH), green; *3,3'-diethyl-9-methyl-6,6'-di(acetamido)thiacarbocyanine bromide*, violet, 58%, m. 283° (from MeOH); *p-toluene sulfonate*, blue-violet, m. 261-3°; *iodide*, violet, m. 304-6°; *3,3'-trimethyl-6,6'-di(acetamido)thiacarbocyanine bromide*, 47%, green, m. 300-1° (from EtOH); *iodide*, blue, m. 275°; *3,3'-diethyl-6,6'-di(methylsulfamido)thiacarbocyanine bromide*, 40%, violet, m. 300-1° (from EtOH); *3,3'-diethyl-9-methyl-6,6'-di(methylsulfamido)thiacarbocyanine bromide*, 38%, violet, 34%, violet, m to 8-80° (from EtOH); and *3,3',9-triethyl-6,6'-di(methylsulfamido)thiacarbocyanine bromide*, violet, m. 250-2° (from MeOH). Refluxing 3,3'-diethyl-6,6'-di(acetamido)thiacarbocyanine *p*-toluenesulfonate with 25% HCl and treatment with KI gave *3,3'-diethyl-6,6'-diaminothiacarbocyanine iodide* (I), blue (contains EtOH of crystn.), m. 232°; the *9-Me homolog*, green, m. 237-9° (from EtOH); the *9-Et homolog*, green, m. 231-2° (contains EtOH of crystn.). Boiling I with HCO_2H gives the *diformyl deriv.*, m. 295-7° (contains EtOH of crystn.); similarly the *diformyl deriv.* of *9-Me homolog*, violet, m. 231-3° (contains MeOH of crystn.), and the *diformyl deriv.* of *9-Et homolog*, blue-violet, m. 271-3° (contains MeOH). Refluxing 6-acetamido-2-methylbenzothiazole Et *p*-toluenesulfonate with the HCl salt of malonaldehyde dianil and EtONa in EtOH 20 min. gave *3,3'-diethyl-6,6'-di(acetamido)thiacarbocyanine p-toluenesulfonate*, green, m. 243°, abs. max. 670 mμ. Use of quinoline-Et I in above gave *3,1'-diethyl-6-acetamido-thia-6'-cyanine iodide*, red, m. 301° (from MeOH), abs. max. 512 mμ. Use of *p*-$Me_2NC_6H_4CHO$ in the above reaction using piperidine as the catalyst gave 77% *2-p-dirthylaminostyryl-6-acetamidobenzothiazole ethyl p-toluenesulfonate*, red, m. 273-4°; the *EtI analog* obtained by addn. of KI to the above, blue-violet, m. 285°, abs. max. 532 mμ.

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Cyanine dyes. VI. Properties of 7,7'-bis(dimethylamino)thiacarbocyanines. I. I. Levkoev and B. S. Portnaya (Kinophoto Inst., Leningrad). *Zhur. Obshchei Khim.* (J. Gen. Chem.) 21, 2050-5(1951); cf. *C.A.* 41, 5300*k*; 45, 10107*a*.—Addn. at 0-3° of 58 g. HNO_3 (d. 1.36) and 182 g. concd. H_2SO_4 to 60.5 g. Me_2NPh in 1210 g. concd. H_2SO_4 gave after 4-5 hrs. 51.5% *m-nitrodimethylaniline*, m. 60°, and 33.7% of the *p-isomer*. Reduction of the former with $SnCl_2$-HCl gave 90% *m-aminodimethylaniline*, b. 158°; reduction with Zn dust in HCl at 0-2° gave an 80% yield. Treatment with Ac_2O gave the *N-Ac deriv.*, m. 85°; *picrate*, m. 187°. Heating the *Ac deriv.* with P_2S_5 in xylene gave 27% *m-thioacetamidodimethylaniline*, oil, yielding yellow *picrate*, m. 168°. The product (5 g. crude oil) in 40 ml. 8% KOH added slowly to cold (0-1°) soln. of 17 g. K ferricyanide in H_2O and let stand overnight gave 52% *7-dimethylamino-2-methylbenzothiazole*, m. 43-4° (from petr. ether), forming *picrate*, m. 175°; the *free base* in 154-5°; *methiodide*, m. 188°; *ethiodide*, m. 182°. Heating 7-dimethylamino-2-methylbenzothiazole methiodide, ethiodide, or Et *p*-toluenesulfonate with the corresponding esters of orthocarboxylic acid in pyridine 30-40 min. at 130-5° gave the following 7,7'-bis(dimethylamino)thiacarbocyanines, purified either by crystn. from EtOH or by pptn. with Et_2O and isolation as perchlorates. *3,3'-Dimethyl-7,7'-bis(dimethylamino)thiacarbocyanine iodide*, 72.7%, green plates, m. 249-50°. *3,3',9-Trimethyl-7,7'-bis(dimethylamino)thiacarbocyanine perchlorate*, 34%, red-brown needles, m. 214°; *3,3'-dimethyl-9-ethyl analog*, 37.6%, green needles, m. 216°; *3,3'-diethyl analog*, 60%, almost black prisms, m. 226°; *3,3'-diethyl-9-methyl analog*, 23.7%, brown prisms, m. 224°; and *3,3',9-triethyl analog*, 32.3%, brown crystals, m. 200°. The abs. max. of the thiacarbocyanine ethiodide with H in 9 position is 557 mμ; with 9-Me it is 543, with 9-Et it is 547; with 5,5'-bis(dimethylamino) groups the values are, resp. 608, —, and —; with 6,6'-bis(dimethylamino) groups they are: 612, 595, and —; with 7,7'-bis(dimethylamino) groups they are, resp. 568, 548, and 552; the methiodides of the latter give, resp. 565, 548, and 552 mμ, abs. max. The 7,7-bis(dimethylamino) derivs. are rather weak sensitizers and noticeably lower the light sensitivity of an emulsion.

G. M. Kosolapoff

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~~Electrochemistry~~ 1.
Photography -S

Cyanine dyes. V. Thiazyanine dyes with thiocarbamide groups. N. F. Turitsyna and I. I. Levkoev (Cine-Photo Inst., Moscow). *Zhur. Obshchei Khim.* (J. Gen. Chem.) 22, 309-21(1952); cf. *C.A.* 46, 2335*b*; Kiprianov, *et al.*, *C.A.* 46, 2307*b*.—Heating 8.7 g. 2-methyl-6-acetamidobenzothiazole with 8.88 g. *p*-$MeC_6H_4SO_3Et$ 6 hrs. at 120-35°, and refluxing 4 hrs. with concd. HCl gave 97% *2-methyl-6-aminobenzothiazole ethyl p-toluenesulfonate·HCl* (I), m. 202° (from EtOH); with $NaClO_4$ it gave the *perchlorate*, m. 204° (from H_2O); *iodide*, m. 241° (from EtOH). Heating 0.5 g. 2-methyl-6-aminobenzothiazole with 0.31 g. CH_2:$CHCH_2NCS$ in EtOH gave 78.5% *2-methyl-6-(allylthiocarbamido)benzothiazole* (II), m. 161° (from EtOH). I (16.5 g.) refluxed 5 hrs. with 8.08 g. allyl isothiocyanate in 45 ml. EtOH and 4.4 g. pyridine gave 60% *2-methyl-6-(allylthiocarbamido)benzothiazole ethyl p-toluenesulfonate* (III), m. 175° (from EtOH); with $NaClO_4$ it yields the *perchlorate*, m. 139° (from EtOH); *iodide*, m. 179°. 2-Methyl-6-aminobenzothiazole (0.41 g.) and 0.45 g. $PhCH_2NCS$ in hot EtOH gave 92% *2-methyl-6(benzylthiocarbamido)benzothiazole*, m. 191° (from EtOH); similar reaction of I in the presence of pyridine gave 60.7% of the *corresponding* analog of III, m. 200° (from EtOH); *iodide*, m. 200° (from EtOH). II (2.1 g.) and 1.6 g. $EtO_3SC_6H_4Me$-*p* dild. with H_2O after 6 hrs. at 140° and treated with 3 ml. pyridine gave 43.4% *2-methyl-6-(allyl-S-ethylisothiocarbamido)benzothiazole*, m. 79° (from petr. ether); addn. of $NaClO_4$ to the filtrate gave no ppt.; the *p-toluenesulfonate salt* of the above base m. 149° (from Me_2CO). If 2.1 g. II and 3.21 g. $EtO_3SC_6H_4Me$-*p* are heated 6 hrs. at 130-40° and the product, dild. with H_2O, is treated with 2 ml. pyridine and 1.5 g. $NaClO_4$ there is formed 68% *2-methyl-6-(allyl-S-ethylisothiocarbamido)benzothiazole ethyl perchlorate*, m. 149° (from EtOH); a mercaptan odor is present during the soln. of the initial product. Similarly was obtained 43% *2-methyl-6-(benzyl-S-ethylisothiocarbamido)benzothiazole*, m. 98° (from petr. ether); its *hl p-toluenesulfonate*, m. 190.5° (from EtOH); *ethiodide*, m. 191°. The quaternary salts listed above, heated 0.5 hr. at 140° with $HC(OEt)_3$, $MeC(OEt)_3$, or $EtC(OEt)_3$ in pyridine gave the desired carbocyanines. The dicarbocyanines were obtained from the quaternary salts and $EtOCH$:$CHCH(OEt)_2$ in pyridine at 130-5°; tricarbocyanines were obtained from the quaternary salts and PhN:$CHCH$:$CHCH_2CH$:NPh HCl salt with EtONa in EtOH; the isocyanines were ob-

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LEVKOYEV, I. I.

USSR/Chemistry - Photography Mar 52

"Some Derivatives of Benzthiazole. III. 2,5,6- and 2,6,7-Trimethylbenzthiazoles," I. I. Levkoyev, N. N. Sveshnikov, N. S. Barbyn', M. P. Pashin, All-Union Sci Res Inst of Cinematography and Photography

"Zhur Obshch Khim" Vol XXII, No 3, 1952, pp 516-521

When oxidized, 3,4-dimethyl thioacetanilide and 3,4-dimethyl phenyl thiourea, through breaking of the thiazole ring in the o- and p-positions with reference to the methyl group, form mixts of 5,6-dimethylbenzthiazoles which contain methyl or amino groups, respect, in the "2" position. These compds and some of their derivs were studied.

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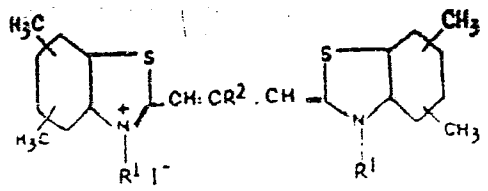
Cyanine Dyes. VII. Properties of Tetramethylthiacarbocyanines. I. I. Levkoev, A. P. Vompe, N. N. Sveshnikov and N. S. Barvyn. *J. Gen. Chem. U.S.S.R.*, 1952, 22, 879-886 — The synthesis and properties are described of two symmetrical tetramethylthiacarbocyanines of formula :—



(R^1 = CH_3 or C_2H_5, R^2 = H, CH_3, or C_2H_5), each of the six possible [illegible] Introduction of an extra

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SVESHNIKOV, N.N.; LEVKOYEV, I.I.; KRASNOVA, T.V.

Action of nitrous acid on o-methoxy-N, N-dimethylaniline. Zhur. Obshchey Khim. 22, 1170-2 '52. (MLRA 5:8)
(CA 47 no.13:6363 '53)

1. All-Union CinePhoto Inst., Leningrad.

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LEVKOYEV, I.I.

MeroCyanine Dyes of Rhodanine Derivatives. IV. Structure of Products of Decomposition of Quaternary Salts of Dimethinemerocyanines [illegible]

are decomposed in water or alcohol. No rupture of the carbonyl-carrying ring takes place. The action of heat on a dimethine*mero*cyanine with the 2,4-thiazolidinedione residue in alcoholic caustic potash does cause rupture of the carbonyl-carrying ring with a loss of carbon dioxide and the forma[illegible] [illegible]-mercaptoamide. The latter [illegible] the passage [illegible]

[illegible] in 50 per cent ethyl alcohol in carbon dioxide-free air for [illegible] until free from carbon dioxide: a yield of 87.6 per cent of 3-ethyl-5-(3-ethyl-2-benzothiazolinylidene-ethylidene)-2,4-thiazolidinedione was obtained. When the latter is refluxed for fifteen minutes in ethanolic caustic potash the products include ethylamine and potassium carbonate. The passage of air through [illegible]

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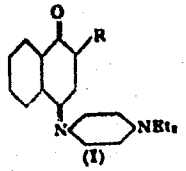
Effect of intramolecular hydrogen bond on color of indoaniline dyes of 1-naphthol derivatives. B. S. Portnaya, I. I. Levkoev, and N. S. Spasokukotskii (All Union Cine-Photo Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 82, 603-5(1952).—The following abs. max. were observed for derivs. of I, obtained by oxidation with AgCl of diethyl-*p*-phenylenediamine and the corresponding 1-naphthol deriv. in alc. alk. soln. (*R* shown): *H* 630 mμ; *Cl*, 636; *CO₂Me*, 660; *CONEt₂*, 636; *CONMePh*, 638; *CONPh₂*, 642; *CO₂H*, 737; *CONH₂*, 680; *CONHEt*, 678; *CONHPh*, 700; *SO₂NHPh*, 680; *SO₂NEtPh*, 680; *SO₂NPh₂*, 688. While the results generally fall in line with the expected shift from considerations of electronic properties of the R groups, the large shifts with CO_2H and CONHR groups are explainable by chelation at the quinone O with these groups via H bonding. No such effect occurs with the sulfonamides owing possibly to too-large interat. spacing. G. M. K.



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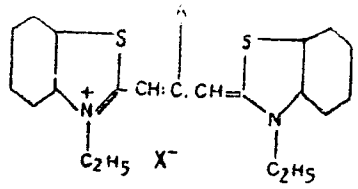
LEVKOEV

6

Action of Amines on Certain Thiacarbocyanines Containing an Alkoxy or Alkylthio Group in the *meso*-Position. N. N. SVESHNIKOV, I. I. LEVKOEV, B. S. PORTNAYA and E. B. LIESHITS. *Doklady Akad. Nauk S.S.S.R.* 1952, 86, 333-336. Thiacarbocyanine



(X = anion and A = O.alkyl or S.alkyl) react very readily with primary and secondary amines to give a new group of thiacarbocyanines (A = NH.R, *etc.*), which show a hypsochromic shift, attributable to the electron donating power of the nitrogen, of 56-89μ in their absorption maximum compared with the corresponding molecule where A = H. They react also with tertiary amines, alkyl X being removed with formation of [illegible] the grouping [illegible] [illegible] with caustic soda [illegible] [illegible] thiacarbocyanines [illegible] [illegible] low for all the dyes. This fact and the relatively small hypsochromic shift in the non-acylated compounds are attributed to lack of planarity in the molecules arising from steric factors. *J. Soc. Dyers and Colourists*

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Lovkov V I I

7

Effect of Steric Hindrance on the Colour of 5:6:5′:6′-Tetrasubstituted Thiacarbocyanines. [illegible] Lev[illegible] N. N. Sveshnikov and N. S. [illegible] *Doklady Akad. Nauk S.S.S.R.* [illegible] 85 [illegible] —Absorption [illegible] determined for thiacarbocyanines [illegible] type investigated by K[illegible] Zhu[illegible] see *Phot.* [illegible]

[illegible]

greater bathochromic effects the magnitudes [illegible] good accuracy on the basis of simple [illegible] H[illegible] R = OCH$_3$ into the [illegible] dimethylamino [illegible] shift of 8 μ instead of the calculated bathochromic shift of [illegible] This [illegible] behaviour is explained by steric interaction between NCH$_{3/2}$ and [illegible] leading to deflection [illegible] reduced [illegible]

[illegible] Dyers and Colourists.

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

USSR

Cyanine dyes. VIII. Some 5,5'- and 6,6'-disubstituted thiacarbocyanines. I. I. Levkoev, V. G. Zhiryakov, N. N. Sveshnikov, and N. S. Baryyp (M. V. Lomonosov Inst. Fine Chem. Technol., Moscow). *Sbornik Statei Obshchei Khim.* 2, 1263-72(1953); cf. *C.A.* 41, 5309*c*; 43, 9453*d*; 48, 2499*a*.—Heating 53.7 g. *p*-EtOC$_6$H$_4$NHAc and 200 ml. HNO$_3$ (d. 1.1) in 0.5 hr. to 40° followed by stirring 0.3 hr. at 40°, diln. with H$_2$O, heating slowly to 50° for 15 min. gave after cooling 66% *3-nitro-4-acetamidophenetole*, m. 96-8°; hydrolysis of this with aq. alc. NaOH gave 70% *3-nitro-4-aminophenetole*, m. 107-8°. This diazotized in 60% H$_2$SO$_4$ and treated with hot Cu$_2$Br$_2$ soln. gave 61% *3-nitro-4-bromophenetole*, m. 56-7° (from ligroine), which refluxed with Na$_2$S$_2$ soln. 4.5 hrs. gave 45% *2,2'-dinitro-4,4'-diethoxydiphenyl disulfide*, m. 164-5° (from C$_6$H$_6$). This (11.88 g.) and 31.9 g. Zn dust added to 120 ml. AcOH and heated 1 hr. on a steam bath, followed by heating 4 hrs. to 140° with 53 ml. Ac$_2$O gave on cooling, filtration and extn. with Et$_2$O, 57% *5-ethoxy-2-methylbenzothiazole*, b$_{17}$ 161-3°, which solidified on cooling; *picrate*, m. 177-8° (cf. Brooker, *et al.*, *C.A.* 40, 1515[4]). Oxidation of thioacetyl-*p*-phenetidine with K$_3$Fe(CN)$_6$ in alk. soln. gave 80% *6-ethoxy-2-methylbenzothiazole*, m. 56-7°; *picrate*, m. 160-70°. Reduction of *4-nitrodiphenyl ether* with SnCl$_2$ gave 71% *amino analog*, m. 83-5°; treatment with Ac$_2$O gave 89% *4-acetamidodiphenyl ether*, m. 130°. This (2.27 g.) in 10 ml. C$_6$H$_6$ treated at reflux with 0.66 g. P$_2$S$_5$ gave after refluxing 0.5 hr., extn. with 5% NaOH and passage of CO$_2$ into the ext. after acidification with AcOH, gave 40% *4-thioacetamidodiphenyl ether*, m. 94-5° (from dil. EtOH). This

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(2.43 g.) in 3 ml. EtOH was treated hot with 1.2 g. NaOH in 30 ml. H_2O, filtered and treated with 6.6 g. $K_3Fe(CN)_6$ in 85 ml. H_2O at 4–5°, yielding after 1 hr. 0.78 g. *6-phenoxy-2-methylbenzothiazole*, m. 120° (from EtOH). Heating 5-methoxy-2-methylbenzothiazole with HBr (d. 1.475) 6 hrs. gave 87% *5-hydroxy-2-methylbenzothiazole* (I), m. 188–9° (from EtOH). Similarly was prepd. 78% *6-hydroxy-2-methylbenzothiazole*, b_1 28°, m. 161–2°. I (0.5 g.) and 0.1 g. Na in 3 ml. EtOH heated with 0.74 g. $ClCH_2CO_2Et$ 20 min. to 125–30°, then shaken out with 5% KOH, gave 41% *6-carbethoxymethoxy-2-methylbenzothiazole*, m. 41–2° (from ligroine); *picrate*, m. 162–3°. Similar reaction with $CH_2{:}CHCH_2Cl$ gave 46% *6-allyloxy-2-methylbenzothiazole*, $b_{1.5}$ 140–1°, whose *picrate*, m. 107–8°. The use of $PhCH_2Cl$ similarly gave 60% *5-benzyloxy-2-methylbenzothiazole*, m. 78–9° (from ligroine); *picrate*, m. 184–5°. Refluxing 13.2 g. 6-hydroxy-2-methylbenzothiazole with 14.64 g. $ClCH_2CO_2Et$ and 11.06 g. powd. K_2CO_3 in dry Me_2CO 8 hrs. gave 52% *6-carbethoxymethoxy-2-methylbenzothiazole*, m. 40–8° (from ligroine); *picrate*, m. 154–5°; *methiodide*, m. 172–3°; *ethiodide*, m. 149–50°. Similarly the use of $CH_2{:}CHCH_2Br$ gave 35% *6-allyloxy-2-methylbenzothiazole*, b_3 152°, m. 31–2° (cf. Ochiai and Nishizawa, *C.A.* 36, 5475[1]); *picrate*, m. 153–4°; *methiodide*, m. 200–1°; *ethiodide*, m. 126–7°. Similarly $PhCH_2Cl$ gave 69% *6-benzyloxy-2-methylbenzothiazole*, m. 73–4°; *picrate*, m. 144–5°; *methiodide*, m. 206–7°; *ethiodide*, m. 184–5°. Heating 6.2 g. 6-carbethoxymethoxy-2-methylbenzothiazole in 30 ml. 10% KOH 0.5 hr. on a steam bath gave after acidification 91% *6-carboxymethoxy-2-methylbenzothiazole*, m. 197–8° (from EtOH); *picrate*, m. 189–90°. The 5- and 6-alkoxy-2-

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methylbenzothiazoles were heated with 5% excess *p*-Me-$C_6H_4SO_3Et$ 6 hrs. at 140–50° to yield the corresponding quaternary salts, which were treated with pyridine and the desired orthocarboxylic acid ester and heated 1 hr. at 130–5°, the product taken up in EtOH and treated with KI soln. to yield the following thiacarbocyanine iodides (substituents given): *3,3'-diethyl-5,5'-diethoxy*, green, decomp. 250°; *3,3'-diethyl-9-methyl-5,5'-diethoxy*, green, decomp. 234°; *3,3',9-triethyl-5,5'-diethoxy*, green, decomp. 237°; *3,3'-dimethyl-9-ethyl-5,5'-diethoxy*, red, decomp. 212°; *3,3'-diethyl-6,6'-diethoxy*, green, decomp. 250°; *3,3'-diethyl-9-methyl-6,6'-diethoxy*, red-violet, decomp. 265°; *3,3',9-triethyl-6,6'-diethoxy*, green, decomp. 240°; *3,3'-dimethyl-9-ethyl-6,6'-diethoxy*, red, decomp. 239°; *3,3'-diethyl-5,5'-dibenzyloxy*, violet-brown, decomp. 221°; *3,3'-diethyl-9-methyl-5,5'-dibenzyloxy*, red-brown, decomp. 222°; *3,3',9-triethyl-5,5'-dibenzyloxy*, blue-violet, decomp. 185°; *3,3'-diethyl-6,6'-dibenzyloxy*, green, decomp. 237°; *3,3'-diethyl-9-methyl-6,6'-dibenzyloxy*, red-brown, decomp. 238°; *3,3',9-triethyl-6,6'-dibenzyloxy*, blue, decomp. 211°; *3,3'-dimethyl-9-ethyl-6,6'-dibenzyloxy*, red-brown, decomp. 225°; *3,3'-diethyl-5,5'-dicarbethoxymethoxy*, violet, decomp. 201°; *3,3'-diethyl-9-methyl-5,5'-dicarbethoxymethoxy*, red-brown, decomp. 223°; *3,3',9-triethyl-5,5'-dicarbethoxymethoxy*, blue, decomp. 195°; *3,3'-diethyl-6,6'-dicarbethoxymethoxy*, green,

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decomp. 132°; *3,3'-diethyl-9-methyl-6,6'-dicarbethoxymethoxy*, red-brown, decomp. 242°; *3,3',9-triethyl-6,6'-dicarbethoxymethoxy*, red-violet, decomp. 163°; *3,3'-dimethyl-9-ethyl-6,6'-dicarbethoxymethoxy*, red-violet, decomp. 221°; *3,3'-diethyl-5,5'-diallyloxy*, green, decomp. 256°; *3,3'-diethyl-9-methyl-5,5'-diallyloxy*, green, decomp. 247°; *3,3',9-triethyl-5,5'-diallyloxy*, green, decomp. 227°; *3,3'-diethyl-6,6'-diallyloxy*, green, decomp. 230°; *3,3'-diethyl-9-methyl-6,6'-diallyloxy*, violet, decomp. 237°; *3,3',9-triethyl-6,6'-diallyloxy*, violet, decomp. 213°; *3,3'-dimethyl-9-ethyl-6,6'-diallyloxy*, violet-grey, decomp. 237°; *3,3'-diethyl-6,6'-dicarboxymethoxy*, green, decomp. 230°; *3,3'-diethyl-9-methyl-6,6'-dicarboxymethoxy*, violet, decomp. 232°; *3,3',9-triethyl-6,6'-dicarboxymethoxy*, brown, decomp. 240°; *3,3'-dimethyl-9-ethyl-6,6'-dicarboxymethoxy*, brown, decomp. 242°; *3,3'-diethyl-6,6'-diphenoxy*, green, decomp. 242°; *3,3',9-triethyl-6,6'-diphenoxy*, green, decomp. 226°. The

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following abs. max. (in mμ) were observed in EtOH for dialkoxythiacarbocyanines (substituents at the hetero ring and in 5,5′, then 6,6′ positions given, resp.): H, H 557; H, H 557; H, Me 543, H, Me 543; H, Et 547; H, Et 547; MeO, H 576, MeO, H 572; MeO, Me 556; MeO, Me 557; MeO, Et 561; MeO, Et 563; EtO, H 576; EtO, H 572; EtO, Me 556; EtO, Me 559; EtO, Et 561; EtO, Et 561; $PhCH_2O$, H 578, $PhCH_2O$, H 572; $PhCH_2O$, Me 562; $PhCH_2O$, Me 560; $PhCH_2O$, Et 564; $PhCH_2O$, Et 564; EtO_2CCH_2O, H 575; EtO_2CCH_2O, H 570; EtO_2CCH_2O, Me 558; EtO_2CCH_2O, Me 556; EtO_2CCH_2O, Et 561; EtO_2CCH_2O, Et 562; $CH_2{:}CHCH_2O$, H 578; $CH_2{:}CHCH_2O$, H 572; $CH_2{:}CHCH_2O$, Me 556; $CH_2{:}CHCH_2O$, Me 559; $CH_2{:}CHCH_2O$, Et 563; $CH_2{:}CHCH_2O$, Et 561; HO_2CCH_2O, H —; HO_2CCH_2O, H 572; HO_2CCH_2O, Me —; HO_2CCH_2O, Me 558; HO_2CCH_2O, Et —; HO_2CCH_2O, Et —; HO_2CCH_2O, Et 564; PhO, H —; PhO, H 569; PhO, Me —; PhO, Me —; PhO, Et —; PhO, Et 562. The abs. max. (in mμ) of 9-ethyl-x,x′-dialkoxythiacarbocyanines are as follows: 5,5′-disubstituted derivs. (with substituent on the heterocyclic atom shown): H 542; OMe 558; OEt 556; 6,6′-disubstituted derivs. (with substituent on the heterocyclic atom shown): H 542; OMe 560; OEt 558; $PhCH_2O$ 561; EtO_2CCH_2O 558; $CH_2{:}CHCH_2O$ 560; HO_2CCH_2O 560. G. M. Kosolapoff

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LEVKOYEV, I. I.

USSR/Chemistry - Dyestuffs Sep 53

"Concerning Merocyanine Dyestuffs, Derivatives of Rhodanine. V. Certain Tetramethinemerocyanines and Hexamethinemerocyanines, Derivatives of 3-Ethyl Rhodanine," M.V. Deychmeyster, I.I. Levkoyev, and E.B. Lifshits, All-Union Sci-Res Cinematog Inst

Zhur Obshch Khim, Vol 23, No 9, pp 1529-1535

Certain tetramethinemerocyanines and hexamethinemerocyanines, derivatives of 3-ethyl rhodanine (I), were synthesized, as well the corresponding trimethine oxanines and pentamethine oxanines. The spectra of absorption in various solvents

268T30

were measured for eight dimethinemerocyanines, derivatives of I, which differ with respect to the N-heterocyclic group. On the basis of investigations of the spectra of absorption of the merocyanines derived from I, it was shown that the distribution of electron density in their polymethine chromophore may change considerably depending on the basicity of the heterocyclic groups and the length of the external polymethine chain.

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1. N. N. SVESHNIKOV, I.I. LEVKOYEV, A. F. VOMPE, B. S. PORTNAYA

2. USSR (600)

4. Alkylation

7. Productions of reaction of acylmethylene derivatives of N-substituted heretocyclic radicals with alkylating agents and their reactions. Dokl. AN SSSR 88 no. 2. 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

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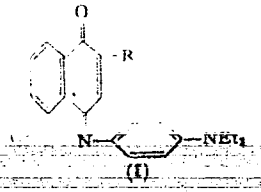
CO_2H weakens the [illegible] group in the above dyes except for the p-carboxyaniline, it acts as an electropo[illegible] group giving a hypsochromic shift of absorption.



(I)

Consideration of properties of carboxylic derivs. indicates that interaction with the rest of the org. molecule takes place not only through the π-electrons, but also through the σ-electrons. The sulfo group failed to affect the absorption max. because of its complete ionization even in acid soln.

M. Kosolapoff

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LEVKOYEV, I.I.

USSR

530 771.534.21

Position of Sensitization Maxima in Photographic Emulsions Sensitized by Polymethin MeroCyanines. M. V. DEICHMEISTER, I. I. LEVKOEV, E. B. LIFSHITS, and S. V. NATANSON. *Doklady Akad. Nauk. S.S.S.R.*, 1953, 93, 1057-1059.—The tetra- and hexa-methin *mero*cyanines referred to in the previous abstract, and the corresponding dimethin dyes, have sensitization maxima in silver bromide emulsions which are displaced from their absorption maxima (in alcoholic solution) by 32-189 mμ in the direction of the long waves (the usual displacement for cyanine dyes is 25-45 mμ). Also, whereas the bathochromic shifts in the absorption maxima due to lengthening of the polymethin chain average 82 and 30 mμ for di→tetra- and tetra→hexa-methin respectively, the corresponding average shifts in the sensitization maxima are each 110 mμ. It is considered that the main factor determining this behaviour is the polarizing action of silver bromide on the adsorbed dye, an effect that is greatest in dyes of low polarity. *J. Soc. Dyers and Col.*

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3

All-Union Sci. Res. Cine-Photo. Inst.

Evaluation B-83873. 28 Mar 57

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LEVKOYEV, I.I.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr 1954)

Name	Title of Work	Nominated by
Levkoyev, I.I. Sveshnikov, N.N. Vompe, A.F. Portnaya, B.S. Spasokukotskiy, N.S. Deychmeyster, M.V.	"Investigations in the Field of Polymethine Dyes"	Ministry of Culture USSR

SO: W-30604, 7 July 1954

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I.I.; SYTNIK, Z.P.; NATANSON, S.V.

Color motion-picture film photosensitizers. Usp.nauch.fot. 2:11-27 '54. (MLRA 7:5)

(Color cinematography--Films) (Photographic chemistry)

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I.I.

USSR/Chemistry - Synthesis

Card 1/1 Pub. 151 - 19/38

Authors : Levkoev, I. I.; Sveshnikov, N. N.; Gorbacheva, I. N.; Barvyn, N. S.; and Krasnova, T. V.

Title : Certain benzthiazole derivatives. Part 5.- Synthesis of 5-substituted 6-dimethylamino-2-methylbenzthiazoles

Periodical : Zhur. ob. khim. 24/2, 280-291, Feb 1954

Abstract : The reaction of oxidation with potassium bichromate of various 2-substituted 4-aminomethyl- and dimethylanilines in the presence of sodium thiosulfate was investigated. The synthesis of homologous thiosulfonic acids is described. A new general method for the conversion of p-phenylene diamino thiosulfonic acids into 6-amino-derivatives of methylbenzthiazole, is introduced. The conditions most favorable for the synthesis of 5-substituted 6-dimethylamino-2-methylbenzthiazoles, as well as homologous 6-amino- and 6-methylamino-5-methoxy-derivatives, are discussed. Twenty references: 3-USA; 3-French; 5-USSR; 1-Scandinavian and 8-German (1889-1953).

Institution : Scientific Research Motion Picture and Photo-Institute

Submitted : August 20, 1953

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I.I.

USSR/Chemistry

Card 1/1

Authors : Zhiryakov, V. G.; and Levkoyev, I. I.

Title : Color of certain merocynaine dyes-derivatives of indandione-1, 3.

Periodical : Zhur. Ob. Khim. 24, Ed. 4, 710-717, April 1954

Abstract : Synthesized were certain di-, tetra- and hexamethinemerocyanines-derivatives of indandione-1, 3 and corresponding tri- and pentamethinoxanines. Investigated were the absorption spectra of these merocyanines in mixtures close by their nature to solvents having different polarity. A majority of merocyanines - derivatives of indandione-1, 3 - is characterized by relatively equal distribution of electron density in the polymethine chromophore and reduced polarizability. Ten references; 2 USSR since 1940; 4 German since 1904; 4 English since 1933. Tables.

Institution : All-Union Scientific-Research Motion Picture-Photo Institute

Submitted : November 10, 1953

Evaluation B-83873, 28 Mar 55

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

USSR/Chemistry

Card 1/1

Authors : Deychmeyster, M. V.; Sytnik, Z. P.; Levkoev, I. I.; and Lifshits, E. B.

Title : Merocyanine dyes derivatives of rhodanine. Part 6.- Dimethine-merocyanines having the alkyl or phenyl group in the polymethine chain.

Periodical : Zhur. Ob. Khim. 24, Ed. 5, 898 - 905, May 1954

Abstract : Report describes the synthesis of dimethinemerocyanines, derivatives of 3-ethylrhodanine with different heterocyclic nitrous radicals having the alkyl or phenyl group in alpha-or beta-positions of the polymethine chain. The arrangement of the alkyl or phenyl groups in alpha- or beta-positions of the polymethine chain of dimethinemerocyanines having benzthiazole and benzoxazole radicals causes a bathochrome displacement of the absorption maximum. This bathochrome displacement decreases with the increase in the basicity of the nitrous heterocyclic radical and in the case of a dye with a 4-phenylthiazole radical the displacement becomes hysochromic. Twenty-five references. Tables.

Institution : All-Union Scientific-Research Motion Picture-Photo Institute

Submitted : December 23, 1954

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

Cyanine dyes IX Some tetramethoxy[illegible]
nines [illegible]
Durmashkin, T. [illegible]
Photo Ke[illegible]
24, [illegible]
dimethoxy- to tetrame[illegible]
the color of the dyes, prob[illegible]
the electronic interaction of [illegible]
chromophores. Treatment of [illegible]
0.4 ml. Ac_2O overnight gave 35% [illegible]
82-3°. This (1.95 g.) in hot C_6H_6 was treated [illegible]
P_2S_5 and refluxed 25 min. yielding, after extn. with C_6H_6
and extn. of the org. layer with 5% NaOH, 41% [illegible]
acetamido-1,2-dimethoxybenzene (I), m. 81° (from [illegible]
Similarly was prepd. 51% *4-thioacetamido* [illegible]
benzene (II), m. 89-90°. I oxidized in 8% [illegible]
$K_3Fe(CN)_6$ at 0-5° overnight gave 61% *2-me*[illegible]
methoxybenzothiazole, m. 61.5-2° (from petr. ether); [illegible]
larly II gave 31% *2-methyl-4,6-dimethoxybenzoth*[illegible]
58-9°, *picrate*, m. 173-4°. *2-Thioacetamido-1,4-d*[illegible]
benzene gave similarly 75% *2-methyl-4,7-dimeth*[illegible]
thiazole, m. 100-1°; *picrate*, m. 155-6°; *methiodide* [illegible]
10°; *ethiodide*, m. 221-2°; *propiodide*, m. 186-[illegible]
p-toluenesulfonate, m. 140-50°. Oxidation of 4-thio[illegible]
veratrole with $K_3Fe(CN)_6$ gave *2-methyl-5,6-dimethoxybenzothiazole*, m. 75-6°; *picrate*, m. 204-5°. The dimethoxy-2-methylbenzothiazoles were heated with 5% excess *p*-$MeC_6H_4SO_3Et$ 6 hrs. to 140-5° (130-5° for the prepn. of 5,7-dimethyl deriv.), and the resulting quaternary salts were heated 1 hr. at 130-5° with pyridine and $C(OEt)_4$. After the usual treatment the thiacarbocyanines were ppd. as

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iodides with a [illegible]

[illegible]

max (in EtOH) [illegible] red, m. [illegible] *tetramethoxy*, 48% [illegible] *4,4',5,5'* [illegible] *dimethyl-9-* [illegible] 5.2, [illegible] 24[illegible] 50°, 571; *3,3'-diethyl-9-m*[illegible] violet, m. 33%, blue-violet, m. 224-5°, 562; *3,3'-diethyl-4,4',6,6'-tetramethoxy*, 42%, brown-green, m. 222-3°, 565; *3,3'-dimethyl-9-ethyl-4,4',6,6'-tetramethoxy* (isolated as [illegible]), 38%, brown-green, m. 174-6°, 562; *3,3'-d*[illegible] *tetramethoxy*, 75%, blue-violet, m. 224-5°, 564; *3,3'-diethyl-9-methyl-4,4',7,7'-tetramethoxy*, 35%, brown-red, m. 206-7°, 548; *3,3',9-triethyl-4,4',7,7'-tetramethoxy*, 23.5%, green, m. 210-12°, 552; *3,3'-dimethyl-9-ethyl-4,4',7,7'-tetramethoxy*, 34%, red-violet, m. 210-11°, 550; *3,3'-diethyl-5,5',6,6'-tetramethoxy*, 78%, green, m. 249-50°, 596; *3,3'-diethyl-9-methyl-5,5',6,6'-tetramethoxy*, 46%, blue-violet, m. 241-2°, 575; *3,3',9-triethyl-5,5',6,6'-tetramethoxy*, 34%, blue, m. 222-3°, 580; *3,3'-dimethyl-9-ethyl-5,5',6,6'-tetramethoxy*, 30%, red-brown, m. 236-7°, 576.

G. M. [illegible]

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I. I.

USSR/Chemistry - Physical chemistry

Card 1/1 Pub. 147 - 7/27

Authors : Lifshitz, E. B.; Natanson, S. B.; and Levkoyev, I. I.

Title : Absorption spectra of solutions of certain carbocyanine and rhodacyanine dyes in the presence of colored non-diffusion components

Periodical : Zhur. fiz. khim. 28/9, 1572-1580, Sep 1954

Abstract : The effect of colored non-diffusing components as well as other compounds on the absorption spectra of aqueous solutions of numerous cyanine and rhodacyanine dyes, was investigated. It was established that the presence of these compounds results in the appearance of a new absorption band (in the absorption spectra of the dyes) which is somewhat shifted toward the long-wave zone. The origination of these new absorption bands was found to be connected with the presence of high molecular hydrocarbon radicals in the molecule of the aqueous solution. Twenty references: 5-USSR; 6-German; 8-USA and 1-English (1909-1953). Graphs.

Institution : The All-Union Scientific Research Motion Picture Photo Institute, Moscow

Submitted : November 20, 1953

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6

Stability of color-photographic images composed of the dyes of color development

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[illegible] V, V. I.

Levinos, I.; Freedman, I.M.; Chel'tsov, V.S.;

base. In the presence of $Na_2S_2O_3$ (0.05 g./sq. m.) values of D/D_0 for Y, M, and C fell in 3 years to 55, 55, and 20%, resp. In the same way the stability was detd. of [illegible] images formed with [illegible] hydroxy-4-sulfo [illegible] II [illegible] hydroxy-2 [illegible] amide III [illegible] naphthyl [illegible] IV [illegible] V [illegible] days at 70° (relative humidity 75%) graphed values of D/D_0 for II-V were 40, 50, 95, and 8[illegible]%, resp. Values of D/D_0 were also detd. for images formed with the phenylamide (VI), the o-, m-, and p-aminophenylamides, the o-, m-, and p-acetamidophenylamides, the 1- and 2-naphthylamides, and the diphenylamide of 1-hydroxy-2-naphthoic acid. For images formed from VI with diethyl-p-phenylenediamine (VII) and diethyl-p-tolylenediamine (VIII) values of D/D_0 after 30 days under the given conditions were 95 and 45%, resp.; for images formed from 1-hydroxy-2-naphthoic acid octadecylamide with VII and VIII they were 60 and 35%, resp. I. W. Loweberg, Jr.

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I. I., LEVSHITS, E. B., et al

"On the influence of the structure and of some physico-chemical factors on the sensitising effect of polymethine dyes," a paper submitted at the International Conference of Scientific Photography, Cologne, FRG, 24-27 Sep 56.

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I. I., PORTNAYA, B. S. et al.

"On the Interdependence of Color and Structure of Some Dyestuffs Formed in Color Development," a paper given at the International Conference on Scientific Photography, Cologne, 24-27 Sep 1956

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

Levkoyev, I. I.

USSR/Photochemistry. Radiation Chemistry. Theory of Photographic Process. B-10

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26270

Author : S.V. Natanson, E.B. Lifshits. I.I. Levkoyev

Title : Causes of Supression of Sensibilizing Action of Dyes by Colored Non-Diffusion Components.

Orig Pub : Zh. nauch. i prikl. fotogr. i kinematogr., 1956, 1, No 3, 174-182

Abstract : The adsorption and desorption of sensibilizing dyes (D) 3, 3', 9-triethyl- 5,5' - dimethylthiacarbocyanine of tolusulfonate (I), 3,3' -dicarboxyethyl-5,5' - dimethyl-9-ethylthiacarbocyanine-betaine (II) and rhodacyanine - 3-ethyl-2,3-dihydro-2-[(3'-ethylthiazolene-2')-methylidene[-5-]β-(3'-ethyl-2', 3'-dihydrothizolinilidene-2)-ethylidene]-thuazoline-4-on of perchlorate (III) in presence of the non-diffusion component of color display of sodium salt of N-octadecyl-N-α-naphthylamide 1-oxy-4-sulfo-2-naphthoic acid (IV) on silver bromide powder were measured. AgBr was produced by mixing 2 n. solutions of $AgNO_3$ and KBr with an 0.2% excess of the latter. The adsorbability of D decreases first sharply and after that slowly with the increase of the amount of IV. At very great amounts of IV

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

USSR/Photochemistry. Radiation Chemistry. Theory of Photographic Process. B-10

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26270

(1×10^{-4} moles per 1 g of AgBr) the adsorption of all the three K-s does not practically exist. Same regularities are observed also in desorption of K-s, but in this case, even if the amount of IV was increased to 800 mols per mol of adsorbed D, only 78, 46 and 35% of I, III, and II are desorbed. The incomplete desorption of K-s proves that the surface of AgBr is not uniform. The coincidence of desorption data with the magnitude and course of the decrease of the sensibilitizing capacity of K-s after the introduction of various amounts of IV into silver halide emulsions shows that this decrease is caused by the dislodgement of sensibilizators from the surface of the emulsion microcrystals. Comparative tests with several rhodacyanines prove that the "componential stability" of K-s can be fixed by the determination of their desorbability. Parallel experiments with diffusion components showed that the decrease of the sensibilizing action in presence of non-diffusion components was connected mainly with the presence of the high-molecular alifatic radical in molecules of these components.

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LEVKOYEV, I.I.

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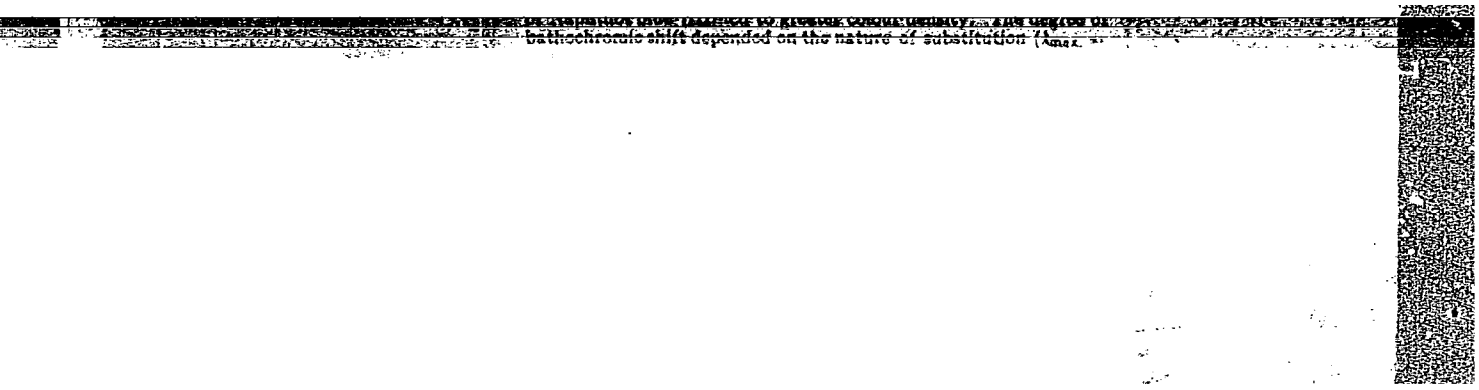

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LEVKOYEV, I.I.

Complex compounds of polymethine dyes with silver ions. I. The formation of silver ions of carbo- and polycarbocyanines. K. I. Pokrovskaya, I. I. Levkoev, and S. V. Natanson (Kino-Photo Inst., Moscow). *Zhur. Fiz. Khim.* 30, 161-71(1956).—The ability to form complex compds. with Ag ions was investigated for 32 symmetric cyanine dyes, which differed in their heterocyclic residues and the length of their polymethine chains. Increasing the basicity of the cyanine dyes, caused by the character of the heterocyclic residues and by the length of polymethine chains, increases their reactivity with Ag ions, and therefore also the fogging effects caused by them in photographic emulsions.

W. M. Sternberg

3 M. A. YOUT

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LEVKOYEV, I.I.

BOGOMOLOV, K.S., kand.khim.nauk; KIRILLOV, N.I., doktor tekhn.nauk; LEVKOYEV, I.I., kand.tekhn.nauk

International conference on scientific photography. Khim.nauka i prom. 2 no.4:497-498 '57. (MIRA 10:11)
(Cologne--Photography)

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I.I

AUTHORS: Deychmeyster, M. V.; Levkoyev, I. I.; Lifshits, E. B.

TITLE: Investigation of Cyanine Dyes. Part 10. About Certain merocyanine-carbocyanines (Issledovaniya v oblasti tsianinovykh krasiteley. X. O nekotorykh merotsianinokarbotsianinakh).

PERIODICAL: Zhurnal Obshchey Khimii, 1957, Vol. 27, No. 1, pp. 202-215 (U.S.S.R.)

ABSTRACT: In order to investigate the properties of merocyaninecarbocyanines and to observe how their color is affected by the elongation of the outer chain in the merocyanine and cyanine parts of the molecule, by the nature of the heterocyclic nitrous radicals and the presence of substituting groups in position 7 of the polymethylene chain, the authors synthesized numerous zero-and dimethinemerocyaninecarbocyanines. These products were derivatives of thiazolinone with benzthiazole and quinoline radicals in the merocyanine part of the molecule and benzthiazole, benzoxazole, 3,3-dimethylindolenyl, pyridine-(2) and 4,5-diphenylthiazole radicals in the cyanine part of the molecule. It was established that during the elongation of the polymethylene chain in the cyanine and merocyanine part of the molecule of the dyes investigated, the bathochromic displacement of the basic absorption maximum was noticeably decreased.

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This phenomenon indicates an increase in the asymmetry of the dye molecule. A noticeably smaller bathochromic displacement of the absorption maximum was observed during the change over from mono- to tri- methine derivatives even in the case of dye having the dimethine chain in the merocyanine part of the molecule. It is explained that the increase in color intensity of the dyes is due to the increase in basicity of the heterocyclic nitrous radical in the cyanine part of the merocyaninecarbocyanine molecule. The data in table 2 show that by changing from a dye with low-basic indolenine radical to thia- and 4,5-diphenylthiazole derivatives, one can observe a hypsochromic displacement of the absorption maximum which is due to the increase in the basicity difference of the right and central hetero radicals and increase in nonuniformity of electron density distribution in the chromophore of the dye. It was established that the vinylene displacements during the change over from zero- to dimethine derivatives depend upon the basicity of the changing hetero radical and the asymmetry of the dye molecule. Five tables and three graphs. There are 31 references, of which 11 are Slavic.

Card 2/2

ASSOCIATION: All-Union Scientific Research Motion Picure Institute (Vsesoyuznyy Nauchno-Issledovatel'skiy Kinofotoinstitut)

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

LEVKOYEV, I. I.

AUTHORS: Levkoyev, I. I., Sveshnikov, N. N., Kulik, Ye. Z., Krasnova, T. V. 79-11-40/56

TITLE: Investigations in the Field of Cyanine Dyes. XI. On Some 7,7'-Dimethylthiacarbocyanines (Issledovaniya v oblasti tsianinovykh krasiteley. XI. O nekotorykh 7,7' - Dimetiltiakarbotsianinakh).

PERIODICAL: Zhurnal Obshchey Khimii, 1957, Vol. 27, Nr 11, pp. 3097-3106 (USSR)

ABSTRACT: Disubstituted thiacarbocyanines with metoxy-, oxy-, acetoxy-, amino-, acetamino- and dimethylamino-groups in 7,7'-positions possess properties of dyes, but they are weak sensitizers for silver halide photographic emulsions. In order to find out how far the specific properties of these dyes are connected with the electron-influence of the substituents, the authors had to investigate the thiacarbocyanines with comparatively neutral methyl groups in 7,7'-positions. The synthesis of 2,7-dimethylbenzthiazole was carried out. From the quarternary salts of this base and other dimethylbenzthiazoles the authors obtained a number of carbo- and dicarbocyanines, as well as 2-p-dimethylaminostyrene derivatives. By oxidation of

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"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710

Investigations in the Field of Cyanine Dyes. XI. On Some 7,7' - Dimethylthiacarbocyanines 79-11-40/56

thioacetyl-m-toluidine with potassium ferrocyanide a mixture of 2,7- and 2,5-dimethylbenzthiazoles is obtained. The entry of the methyl groups into the hetero-residues of thiacarbocyanines causes a practically equal deep-colored effect as well in the 4,4' and 7,7' as in the 5,5' - 6,6' positions. But the presence of these groups in the above-mentioned positions exerts a different influence on the basicity of the dyes and the benzthiazole-residue. The part played by the electron-dislocations in connection with the changes in color remains problematical.
There are 2 tables, and 28 references, 14 of which are Slavic.

ASSOCIATION: All-Union Cinema- and Photographic Scientific Research Institute (Vsesoyuznyy nauchnoissledovatel'skiy kinofotoinstitut)

SUBMITTED: November 5, 1956

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1. Cyanine dyes - Chemical analysis 2. 7,7'-Dimethylthiacarbocyanines - Derivatives
3. 2,7' - Dimethylbenzthiazole - Synthesis

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[illegible]

[illegible] for the following 5-substituted deriva[illegible]

[illegible]

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