24(5),24(7)

AUTHORS:	Dzhelepov, B. S., Prikhodtseva, V. P., Khol'nov, Yu. V.	SOV/48-23-7-7/31
TITLE:	The γ-Emission of Cs^{134} (γ-izlucheniye Cs^{134})	
PERIODICAL:	Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 7, pp 826-827 (USSR)	

ABSTRACT:

The object of the measurements carried out by a magnetic spectrometer was the determination of the relative intensity of the γ-lines. The measurement results are shown in two diagrams, the half-width of the lines in the range of 1 Mev is indicated with 3.3 %, and the intensities of the lines are compared. The half-width of the lines could be reduced by a better focusing to 1.6 %. The results of this investigation, the energy and the relative intensity of the γ-lines of Cs^{134} are finally compiled. The authors thank V. A. Yeliseyev and A. Ushakova for the execution of the measurements, and N. N. Zhukovskiy for making possible the measurements by the elotron. There are 1 figure, 1 table, and 11 references, 4 of which are Soviet.

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The γ-Emission of Cs^{134} SOV/48-23-7-7/31

ASSOCIATION: Radiyevyy institut imeni V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin of the Academy of Sciences, USSR)

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PRIKHODTSEVA, V.P.

SOV/48-22-7-15/26

AUTHORS: Grigor'yev, Ye. P., Dzhelepov, B. S., Zolotavin, A. V., Mishin, V. Ya., Prikhodtseva, V. P., Khol'nov, Yu. V., Shchukin, G. Ye.

TITLE: Radiation From As^{74} (Izlucheniye As^{74})

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol. 22, Nr 7, pp. 831-838 (USSR)

ABSTRACT: In December 1957 the authors obtained a radiochemically pure preparation of As^{74} (~4 mCu) with a good specific activity. The characteristic features of this decay were examined and precisely determined. First the production of the preparation is described. This As^{74} was produced by a bombardment of germanium with deuterons with an energy of 10,8 MeV. The results of the investigation of β^+- and β^--spectra are exposed. It is proved that the ground state of As^{74} is of an 2^--type. After the "bypass" [illegible] spectra had been subtracted the Curie diagrams for the soft components of both spectra proved to be rectilinear. In the back-ground of the β^--spectrum the K- and (L+M) conversion-lines of the transitions of 596 and 635 keV are clearly marked. The K-635 line is, without doubt,

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a transition of the type $2^+ \longrightarrow 0^+$. With the $h\nu$ = 596 keV transition, which is connected with the positron branch, conditions are more complicated, as the proportion of the K-capture must be known in order to be able to determine a_K. Two methods of the determination of a_K are given. The spectrum of the γ-radiation of As^{74} was investigated by means of the recoil electrons. The relative intensity of three γ-lines was investigated with an equipment of a better resolution: The annihilation line, at $h\nu$ = 586- and the 635 keV line. With the help of an equipment of a lower resolution, but of a luminous intensity amplified by the hundredfold, it was attempted to find harder γ-lines in the radiation of As^{74}. The decay energy in the transmutation from $As^{74} \longrightarrow Ge^{74}$ gives rise to the assumption that the levels of Ge^{74} are excited up to those of 2500 keV. Actually in the spectral range of 1200 keV a pronounced superelevation of the counting rate above the quiet background connected with the softer lines was observel. The intensity of this line is smaller by a factor of 220 than that of the annihilation line. It is shown that in Ge^{74} the second level of excitation probably has an energy of 1200 keV. If this is true, it should be expected that a transition from the second level to the first one of

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Radiation From As^{74} SOV/48-22-7-15/26

about 600 keV exists and that this level forms a doublet with the 596 keV line. The ramifications in the decay scheme of As^{74} are investigated. In the last chapter some remarks concerning the individual levels are given. As regards the conversion of the transition at ΔE = 596,3 keV of Ge^{74} it is shown that in this transition the ratio is K/L = 9,6 ± [illegible]. In the investigation of the ratio K/β^+ in the As^{74} decay to the level at 596,3 keV of Ge^{74} it is shown that the ratio K/β^+ for this transition is normal. The level at 1200 keV of Ge^{74} is probably a second vibration level with the characteristic 2^+. The second excited level of Se^{74} is probably near 1300 keV and is of the type 2^+.
B. M. Isayev, I. P. Selinov, Ye. Ye. Baroni, Ye. N. Kheprov and their team collaborated in the work. There are 5 figures, 3 tables, and 15 references, 8 of which are Soviet.

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21(7)
SOV/48-23-2-7/20

AUTHORS: Dzhelepov, B. S., Prikhodtseva, V. P., Khol'nov, Yu. V.

TITLE: γ-Spectrum of J^{131} (γ-Spektr J^{131})

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 2, p 206 (USSR)

ABSTRACT: The authors investigated the γ-spectrum of J^{131} within the range of 200-800 kev, determined the intensities of well known γ-lines and the γ-line with 514 kev, of which mention is made in paper (Ref 2). The results of these investigations are contained in a figure. For the intensities of γ-lines the following values were obtained:

E_γ kev:	278	362	514	633.5	722
I_γ % :	5.7	100	$<$ 0.4	8.9	1.9

In addition, a special investigation has shown that the intensity of the γ-line with 514 kev never exceeds 0.4% of the intensity of the γ-line with 362 kev. The authors thank V. A. Yeliseyev for help in the measurements. There are 11 figures and 2 references, 1 of which is Soviet.

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γ-Spectrum of J^{131} SOV/48-23-2-7/20

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin of the Academy of Sciences, USSR)

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21(7) SOV/48-23-2-8/2o

AUTHORS: Dzhelepov, B. S., Yeliseyev, V. A., Prikhodtseva, V. P., Khol'nov, Yu. V.

TITLE: γ-Radiation of Br^{82} (γ-Izlucheniye Br^{82})

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 2, pp 207-210 (USSR)

ABSTRACT: The γ-spectrum was studied by means of the "Rytron" spectrometer. It is given in figure 1. 10 lines were detected. The energies and relative intensities obtained in this and another paper are listed in a table for comparison. The best accordance resulted from reference 8, both for energies and intensities. Within the range 1700-2000kev a weak line at 1780 kev and only one elevation of a point above the background at 1910 kev were found. Within the range 2000-2700 kev no lines with an intensity above 0.2% were found. The conversion coefficient of the main transitions in Br^{82} was determined by means of the intensities obtained. The initial value of α_K for the transition type E2 of transition 777 kev in Kr^{82} was adopted from tables published by Sliv and Band (Ref 13) with an amount of $8.22.10^{-4}$. A decay scheme of $Br^{82} \longrightarrow Kr^{82}$ is given in figure 2. The transition types of the individual transitions

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of Kr^{82} were determined according to a comparison of the theoretical α_K values with the experimental ones (Table 2). The lines 1648 and 1780 kev detected for the first time as levels are not given in the decay scheme. There are 2 figures, 2 tables, and 13 references, 3 of which are Soviet.

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin of the Academy of Sciences, USSR)

GRIGOR'YEV, Ye.P.; DZHELEPOV, B.S.; ZOLOTAVIN, A.V.; MISHIN, V.Ya.;
PRIKHODTSEVA, V.P.; KHOL'NOV, Yu.V.; SHCHUKIN, G.Ye.

Study of As^{74}. Izv. AN S.S.S.R. Ser. fiz. 22 no.7:831-838 Jl '58.
(MIRA 11:9)

(Arsenic--Decay)

SOV/20-121-6-11/45

21(7)

AUTHORS: Dzhelepov, B. S., Corresponding Member, Academy of Sciences, USSR, Prikhodtseva, V. P., Khol'nov, Yu. V.

TITLE: The $0^+ \rightarrow 0^+$-Transition in Ce^{140} ($0^+ \rightarrow 0^+$-perekhod v Ce^{140})

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 6, pp 995-997 (USSR)

ABSTRACT: By some authors the following problem was raised: Do the conversion electrons K-1909 (~1909 keV) correspond to the transition between the excited state (1909 keV, quantum characteristics 0^+) and the ground state (also 0^+) ? In order to solve this problem, the authors carefully investigated the γ-spectrum of La^{140} in the energy region of ~1900 keV. Lanthanum oxide irradiated by thermal neutrons was used as a source. The original activity of the preparation was 2,8 Cu. The results of the measurements are given in a diagram. No γ-line is observed in the energy region 1800-2000 keV. The intensity of the γ-rays ~1900 keV (if they exist at all) is less than 4.10^{-4} quanta per disintegration. These data (together with the data of two previous papers (Refs 1, 2)

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concerning the intensity of the conversion line 1909 keV) enable us to conclude that there is a $0^+ \rightarrow 0^+$-transition. In order to confirm the existence of the line K-1909, and for a more accurate determination of its intensity, the authors investigated the hard part of the spectrum of the conversion electrons of La^{14o} by means of 2 spectrometers of the ketron type. These spectrometers were placed at the authors' disposal by A. A. Bashilov, Leningradskiy universitet (Leningrad University) and K. Ya. Gromov, Radiyevyy institut AN SSSR (Radium Institute AS USSR). La^{14o} was used as a source in both of these cases. According to the results given in a diagram, the existence of the lines K- and L-1909 is beyond any doubt. The transition has the average energy 1902 keV, and the ratio of the intensities K_{1902}/K_{1596} is

equal to 0,220,(i.e. the average value of all the measurement series). For the lower limit of the conversion coefficient of the transition 1902 keV the value $\alpha_{K-1902} > 0,38$ was found.

This leads to the conclusion that the transition with the energy 1902 keV in Ce^{14o} is the hitherto unknown transition $0^+ \rightarrow 0^+$. Besides, the authors sought and found the K- and L-conversion lines which correspond to the γ-lines 2543 and

The $0^+ \rightarrow 0^+$-Transition in Ce^{140} SOV/20-121-6-11/45

2390 keV and to the γ-line 2515 keV. A table gives the experimental and the theoretical conversion coefficients on the K-shell for the transitions discussed in this paper. The authors thank A. A. Bashilov and K. Ya. Gromov (who made it possible to carry out the control experiments by means of their spectrometers), N. D. Novosil'tseva for the chemical separation of La^{140} from a barium solution, and also A. G. Dmitriyev and Yu. A. Gur'yan for their help in carrying out measurements. There are 3 figures, 1 table,and 6 references, 5 of which are Soviet.

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin, AS USSR)

SUBMITTED: June 30, 1958

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DZHELEPOV, B.S., KHOLNOV, Yu. V., PRIKHODTSEVA, V.P.

"A $0^+ \rightarrow 0^+$ Transition in Ce^{140}.", Nuclear Physics, vol. 9, 4, 1959, pp.665-669
(No. Holland Publ. Co., Amsterdam)

Radium Inst, im V.G. Khlopin, Acad. Sci. USSR, Leningrad.

A search has been made for gamma-quanta of energy $\approx$ 1900 keV in the spectrum of La^{140} by means of a gamma-spectrometer by analysis of recoil electrons. It is shown that is such exist, their intensity is $< 0.4 \times 10^{-3}$ quantum per disintegration. It is simultaneously confirmed that the spectrum of conversion electrons contains intense conversion lines corresponding to a transition energy of 1902 keV.

The lower limit of the conversion coefficient of this transition proved equal to 0.38. Such a large value of this limit indicated that it is either a transition of high multipole order ($L > 10$), or a $0^+ \rightarrow 0^+$ transition in which gamma quanta of the given energy are entirely absent. The first assumption may be discarded since in this case the lifetime of the 1900 keV state should be very great ($> 10^{11}$ years), whereas the intensity of the corresponding conversion line falls off with a halflife of $\approx$ 40 hours. We are thus dealing here with a new $0^+ \rightarrow 0^+$ transition.

The paper also discusses the characteristics of several other transitions in Ce^{140}

PRIKHOD'KO, V.S., kand.med.nauk

Clinical and biochemical changes in chronic tonsillitis in children. Sov.med. 25 no.5:99-104 My '62. (MIRA 15:8)

1. Iz kafedry detskikh bolezney lechebnogo i sanitarno-gigiyenicheskogo fakul'tetov (zav. - prof. G.I.Tets) Khar'kovskogo meditsinskogo instituta (dir. - dotsent B.A.Zadorozhnyy) na baze detskoy dorozhnoy bol'nitys (nachal'nik A.G.Kovalenko).
(TONSILS--DISEASES)

18.7400

65695

SOV/136-59-10-12/18

AUTHORS: Karasevich, V.I. and Prikhod'ko, V.Ye.

TITLE: New Developments in the Production of Aluminized Iron

PERIODICAL: Tsvetnyye metally, 1959, Nr 10, pp 68-75 (USSR)

ABSTRACT: A method of producing Al-Fe-Al bimetal sheet, suitable for the manufacture of kitchen utensils, was developed by the staff of VAMI about 25 years ago (Ref 1 to 4). Following the development of other, easier to produce, bimetal materials and owing to the continued increase in the output of aluminium sheet, the Al-Fe-Al bimetal found little application. Interest in this material has been revived recently in connection with the possibility of using it as a substitute for nickel in the manufacture of some components of electron tubes used in the wireless industry. At temperatures above 600°C, the surface of the anode made of aluminized iron, darkens as a result of the formation of the intermetallic compound $FeAl_3$; this makes it possible to eliminate the cumbersome operation of blackening (carbonizing) the bright nickel surface, which at present has to be carried out at all the plants manufacturing electron tubes. By replacing nickel with

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aluminized steel, a large quantity of nickel strip would become available for other applications, the performance of the electron tubes would be improved and their manufacture simplified. It was for this reason that work on the production of aluminized steel by the method developed by the Giprtsvetmetobrabotka Institute, was resumed about ten years ago. Armco- A iron ($<$0.025% C) sheet, 6 mm thick, was used as the starting material, with aluminium AO (GOST 3549-57), 0.5 mm thick, used for cladding. The process employed was quite complex, required a large proportion of manual labour and comprised the following operations: cutting the iron sheet into strips 120 mm wide; normalizing the strips at 850 to 900°C; pickling in a solution containing 10% H_2SO_4 and 3% HNO_3; cleaning the strip with steel wire brushing; rolling the strip to 5 mm; degreasing it with aviation benzene; cleaning the iron strips (5 x 120 mm) and aluminium strips (0.5 x 130 mm) with steel wire brushes; cladding both sides of the iron strip with aluminium; heating the clad material at 450 to 500°C for 1.5 hr; hot-rolling the bimetal strip 6 mm thick to 1.5 mm,

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according to the following rolling schedule: 6→4.8→3.8→3.0→2.5→2.1→1.7→1.5 mm (kerosene being used as the lubricant); cutting the strip in 300 mm lengths; annealing at 450°C for 2 hr; cold-rolling from 1.5 to 0.8 mm, using two passes with 15% reduction and two passes with 10% reduction; annealing for 2 hr at 450°C; cold-rolling from 0.8 to 0.4 mm in two passes (15 and 10% reduction); annealing for 2 hr at 450°C; rolling from 0.4 to 0.2 mm; annealing at 450°C for 2 hr; rolling from 0.2 to 0.1 mm; slitting the sheets to the required width. The finished product, constituting a bimetal strip 90 to 100 mm wide and 0.1 mm thick, was comparatively hard and the attempts to soften it by subsequent heat treatment were not successful. Various annealing temperatures and times were tried in order to produce soft material free from dark stains (indicating the formation of the intermetallic compound $FeAl_3$) but to no avail. In order to simplify the manufacturing technique and to minimize the harmful effects of diffusion of iron into aluminium during annealing, the process outlined above was modified in the following manner: the steel sheet was

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first rolled to 1.8 mm thickness, normalized, pickled, brush-cleaned and then clad on both sides with aluminium strip 0.2 mm thick. The subsequent hot-rolling operation was carried out at 180 to 200°C since, at this temperature, no diffusion could take place. However, the product obtained by this modified method (whose complete schedule is reproduced in Fig 1) was still unsatisfactory, so to slow down the rate of diffusion of iron and to prevent the formation of the intermetallic alloy $FeAl_3$, an aluminium-base alloy containing 1.0 to 1.3% Si and 0.5% Fe (Ref 5), was used for cladding instead of pure aluminium. With this cladding material, dark stains appeared on the finished product only if the intermediate annealing operations were carried out above 540°C; bimetal that had not been heated above this temperature was stain-free and characterized by comparatively high ductility, the depth of the cup formed on the Erichsen test piece being 4 to 5 mm, ie within the specification limits set by the users. These findings were substantiated by the results of an investigation carried out by A.P.Smiryagin and O.S.Kvurt (Ref 9)

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reproduced in Fig 2, where the thickness (mm) of the intermetallic alloy layer formed at the Fe-Al interface during annealing at 550°C for 1, 3, 6, 12 and 24 hr is plotted against the silicon content (wt-%) in the aluminium alloy. It will be seen that even after 24 hr anneal at 550°C, no intermetallic alloy layer was formed when the silicon content in aluminium was within the 0.5 to 1.0% range; the intermetallic layer was formed when the silicon content was less than 0.5 or more than 1.0%. When the annealing temperature was raised to 600°C, the formation of the intermetallic layer took place irrespective of the silicon content; at this temperature the diffusion rate rapidly increased, owing to the presence of the $\alpha + \beta$ eutectic (melting point - 577°C). Originally, the improved bimetal strip was produced in lengths not exceeding 2 m, which were not convenient for use on automatic presses or punching machines. This necessitated further development work, as a result of which the following technique was found to be most suitable for production of the bimetal strip of the required lengths:

Card 5/10 cladding the iron sheet (6 x 1300 x 1300 mm) with silicon-

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bearing aluminium 0.7 mm thick; hot-rolling (200°C) the clad strip according to the following schedule: 7.4 → 5.3 → 4.4 → 3.0 mm; cold-rolling: 3 → 2.6 → 2.3 → 1.8 → 1.5 → 1.1 → 0.85 → 0.72 → 0.7 → 0.35 → 0.2 → 0.17 → 0.15 → 0.12 → 0.10 mm, with intermediate annealings (2 hr at 400 to 450°C) at the 0.7, 0.2 and 0.15 mm stages. Although strip in coils 20 to 70 m long could be produced in this manner, the process was still uneconomic, mainly owing to the low output of the rolling mills. Application of heavier rolls made it possible to reduce the number of passes and to increase the productivity to 12 machine-hours per 1 t of the finished product. Marked improvement was achieved only after the problem of cold welding of aluminium to steel had been solved and when steel and aluminium strip was used as the starting material instead of single sheets. Before the introduction of cold welding, sticking of aluminium to the rolls occurred frequently when insufficient quantity of lubricant was used or when it was attempted to use heavier drafts; when cold welding (carried out by deformation of 45% or more) was embodied in the process, this effect was eliminated. In its final

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form, the process comprised the following operations: (1) slitting the steel (armco-OM containing less than 0.05% C or steel 08KPOM with 0.05 to 0.12% C) strip (2 mm thick, 220 mm wide, 500 kg coil) into two parts (110 + 110 mm, 110 + 90 mm, 100 + 100 mm); (2) cleaning the strip surface with steel wire brushes; (3) cladding with 0.2 mm thick, Si-bearing aluminium strip (20 mm wider than the steel strip) and rolling (in one pass) from 2.4 to 1.1 mm; (4) cold-rolling according to the schedule reproduced in Table 1 under the following headings thickness (mm), initial and final; reduction (absolute,mm) reduction (relative %) per pass and total; (spindle oil mark "2" or "3" was used as the lubricant); (5) slitting the strip into the required width; (6) annealing the strip in a continuous annealing furnace (dimensions of the muffle: 3300 mm long, 440 mm wide, 180 mm high); the annealing conditions are given in Table 2 under the following headings: thickness (mm) of the strip; rate of passing through the furnace (m/min); muffle temperature, °C Although the material obtained by this method was quite satisfactory (the depth of impression formed in the

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Erichsen test being 5 to 7 mm) and although no dark stains were formed, the formation of a thin $FeAl_3$ layer at the iron-aluminium interface during annealing was unavoidable. Metallographic examination revealed good quality of the bond between iron and aluminium alloy but the clad aluminium layer sometimes showed a tendency to break away from the iron base during the deep drawing operations. This effect was obviously caused by the presence of a brittle $FeAl_3$ layer; the relationship between the thickness of this layer (mm) and the annealing time (min) at 600°C, for iron clad with 0.5 and 1.0% Si-Al alloys, is illustrated in Fig 3; (Abstractor's note:- the units of time used in Fig 3 and Table 3 for the batch annealing are obviously wrong: the former should be sec and the latter hr) photographs, reproduced in Fig 4, show the microstructure of the aluminium clad iron strip (a) 0.10 mm and (b) 0.15 mm thick, annealed by passing through the furnace at 600 and 650°C respectively. To avoid the formation of the brittle $FeAl_3$ layer, continuous annealing was replaced by annealing at lower temperatures and for longer times in a batch furnace with forced air

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circulation. The comparative results obtained by the two annealing methods are given in Table 3 (continuous annealing - top, batch annealing - bottom) under the following headings: nominal thickness of the strip, mm; thickness of the clad layer before annealing (mm and %); annealing temperature (°C) and time (sec); (see Abstractor's note above) the thickness (mm) of (a) chemical compound, (b) silicon-aluminium compound and (c) average total thickness (mm and %). It will be seen that no $FeAl_3$ layer was formed in the batch-annealed material. The improvement of ductility attained by changing over to batch annealing is illustrated by data given in Table 4 under the following headings: thickness of the bimetal strip, mm; depth (mm) of the depression on the Erichsen test piece (a) specified in TU 1053-54 (not less than), (b) actual, after continuous annealing and (c) actual, after batch annealing. (A satisfactory way of batch annealing the 0.10 mm thick bimetal strip has not yet been found.) Several conclusions were reached: (1) 20-Fold increase of the treated material has been attained by the introduction of

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the process described in the present paper. (2) The brittle $FeAl_3$ layer is formed irrespective of the carbon content in steel, its formation having been observed at both low (0.03%) and high (0.12%) carbon content. (3) The formation of the $FeAl_3$ layer has been prevented by the application of an Si-bearing aluminium alloy for cladding and by batch annealing of the finished product. There are 4 figures, 4 tables and 2 Soviet references.

ASSOCIATION: Leningradskiy zavod po obrabotke tsvetnykh metallov (Leningrad Plant for Treatment of Non-Ferrous Metals)

Card 10/10

LEVIN, Mark Mironovich, prof.; ZADOROZHNYY, B.A., dotsent, red.;
BELOUSOV, V.A., prof., red.; BOKARIUS, N.N., prof., red.;
VOROB'YEV, F.P., assistent, red.; GRISHCHENKO, I.I., prof., red.;
DERKACH, V.S., prof., red.; KORSUN', A.Ya., dotsent, red.;
KOSHKIN, M.L., prof., red.; KUDINTSEV, V.I., dotsent, red.;
PIKIN, K.I., prof., red.; PRIKHOD'KOVA, Ye.K., prof., red.;
POPOV, I.D., dotsent, red.; SOLOV'YEV, M.N., prof., red.;
SHTEYNBERG, S.Ya., prof., red.; KHARCHENKO, N.S., prof., red.

[Repeated surgery in stomach diseases following operations]
Povtornye operatsii pri zabolevaniiakh operirovannogo zheludka.
Khar'kov, Izd-vo Khar'kovskogo gos.univ., 1961. 177 p.
(Kharkov. Medychnyi institut. Trudy, vol.58). (MIRA 16:2)
(STOMACH--SURGERY)

PUTILIN, N.I., prof., otv. red.; ALEKSENTSEVA, E.S., prof., red.; MAKARCHENKO, A.F., akademik, red.; PRIKHOD'KOVA, Ye.K., prof., red.; SKLYAROV, Ya.P., prof., red.; TORSKAYA, I.V., kand. biol. nauk, red.; FEL'DMAN, A.B., prof., red.; FILIPPOVA, A.G., kand. biol. nauk, red.; FUGOL', O.M., prof., red.; YANKOVSKAYA, Z.B., red. izd-va; MATVEYCHUK, A.A., tekhn. red.

[Selected works]Izbrannye trudy. Kiev, Izd-vo Akad. nauk USSR, 1962. 454 p. (MIRA 16:3)

1. Akademiya nauk Ukr. SSSR (for Makarchenko).
(PHYSIOLOGY)

TOLMACHEV, V.N.; PRIKHOL'KO, L.S.

Spectrophotometric determination of chromium in the form of chromic ions in high-chromium steels. Izv.vys.ucheb.zav.; khim.i khim.tekh. 3 no.6:985-987 '60. (MIRA 14:4)

1. Khar'kovskiy gosudarstvennyy gosudarstvennyy universitet imeni A.M.Gor'kogo, kafedra tekhnicheskoy khimii.
(Chromium--Analysis) (Chromium steel)

USSR/Cultivated Plants - Commercial. Oil-Bearing. Sugar-Bearing. M

Abs Jour : Ref Zhur Biol., No 18, 1958, 82464

Author : Prikhol'ko, M.

Inst : All-Union Scientific Research Institute of Tobacco

Title : Effect of Bacterial Fertilizers on the Yield of Tobacco Seedlings.

Orig Pub : Byul. nauchno-tekhn. inform. Vses. n.-i. in-t tabaka i makhorki, 1957, 3, 39-42

Abstract : The effect of azotobacterin and phosphorobacterin on the acceleration of the forced maturing of tobacco seedlings was studied. Experiments, repeated twice, were conducted at the All-Union Scientific Research Institute of Tobacco and Rustic Tobacco Makhorka (Nicotiana rustica) in the city of Krasnodar in 1955-1956 on the tobacco variety Ostrolist 2747 on the hothouse plots of 2 square meters.

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USSR/Cultivated Plants - Commercial. Oil-Bearing. Sugar-Bearing. M

Abs Jour : Ref Zhur Biol., No 18, 1958, 82464

Bacterial fertilizers were applied during the crosslet stage of the seedlings (azotobacterin was applied at the rate of one hectare lot to 60 square meters of the hothouse area, and phosphorobacterin in the amount of 50 cubic centimeters of liquid or 5 grams of dry preparation on the same area). According to the data of microscopic analyses, the medium of the tobacco seedbed was favorable for the development of azotobacter. This was confirmed by the appearance of an ungroken film of azotobacter on plots which received azotobacterin. In addition to the local or apontaneous azotobacter, the applied azotobacter also developed well in them and its amount increased upon application of phosphorabacterin. Mineral fertilizers intensified the development of azotobacter. Bacterial fertilizers did not increase the aggregate crop of the seedlings fit for transplanting, but they accelerated their maturing (especially

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USSR/Cultivated Plants - Commercial. Oil-Bearing. Sugar-Bearing. M

Abs Jour : Ref Zhur Biol., N 18, 1958, 82464

phosphorobacterin) which is important in carrying out tobacco planting during earlier periods. Bacterial fertilizers did not show any substantial effect on the height of the plants, but they increased their weight somewhat. There was a large amount of small lumps of soil on the roots of the seedlings which increases their ability to take root upon transplanting. -- L.A. Lomakina

Card 3/3

PRIKHONIKOV, G. F.

PA 245T88

USSR/Meteorology - Fog

Nov 52

"Causes of the Formation of Advective and Frontal Fogs," G. F. Prikhonikov, Cand of Geog Sci, Kiev State U

"Meteorol i Gidrol" No 11, pp 40, 41

Radiational cooling in the process of lowering air temperature is important in fog formation. Concludes that advection fog is formed between 2200 and 0900 hrs in 45% of the cases. 85% of the time frontal fogs are formed in the evening, night, and early morning hrs.

245T88

PRIKHOROV, E.

Reloader for the sinking cutter-loader. Sov.shakht. 11 no.4:29 Ap '62.

(Coal mining machinery) (MIRA 15:3)

PRIKHOROVICH, Ye.F., BOGDANOVICH, N.A., KOGAN, M.S., BLOKH, G.A. and ZHITKOVA, Z.N.

"USSR work on formulation of rubber for protection against x-rays," Khimicheskaya Promyshlennost', No 2, pp 100-101, (36, 37).

SO: Translation -W-30667, 12 Jul 1954.

PRIKHOT'KO, A.; SKOROBOGAT'KO, A.

Spectral studies of azulene. Part 1. Opt. i spektr. 18 no.3: 396-402 Mr '65.

(MIRA 18:5)

1ST AND 2ND ORDERS

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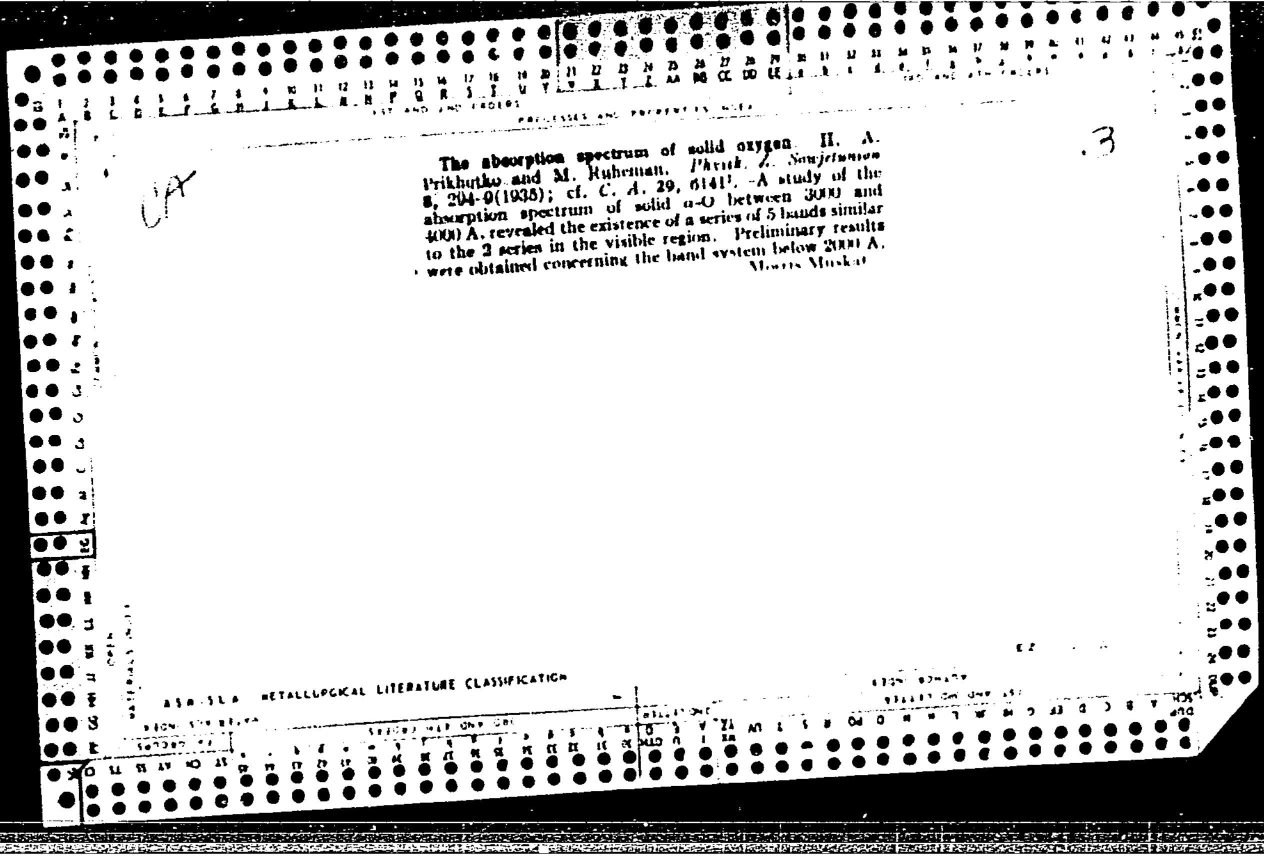
ca

3

The absorption spectrum of solid oxygen. I. A. Prikhotko, M. Ruhemann and A. Federitenko. *Physik. Z. Sowjetunion* 7, 410-31(1935).—Methods are described for producing solid O in its 3 modifications, and absorption spectra were obtained in the visible for all 3 forms and in the near ultraviolet for the α- and γ-forms. In all 3 modifications the general distribution of the spectrum is similar to that of the liquid and compressed gaseous O. The α- and β-phase spectra differ from the spectrum of the γ-phase in showing both continuous absorption and structural elements consisting of single lines and widely spaced doublets. No conclusive interpretation as to the origin of the spectra could be established. Morris Muskat

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



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.3

The absorption spectrum of solid oxygen. II. A. Prikhotko and M. Ruhemann. *Physik. Z. Sowjetunion* 8, 204-9(1935); cf. *C. A.* 29, 6141². —A study of the absorption spectrum of solid α-O between 3000 and 4000 A. revealed the existence of a series of 5 bands similar to the 2 series in the visible region. Preliminary results were obtained concerning the band system below 2000 A.

Morris Muskat

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PRIKHOT'KO, A.F.

RT-727 [The fluorescence spectrum of anthracene and phenanthrene crystals] Spektr fluorestsentsii kristallov antratsena i fenantrena.
<u>Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki</u>, 6(10): 1062-1074, 1936.

1ST AND 2ND ORDERS

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8a

A 33

P

2198. Absorption Spectrum of Phenanthrene and Spectrum of Anthracene at 20° Abs. **I. W. Obreimov and A. Prikhotjko.** *Phys. Zeits. d. Sowjetunion*, 9. 1. *pp.* 34-56, 1936. *In English.*—The absorption spectrum of phenanthrene in polarised light consists of three regions; the first, of frequency 28,000-29,000 cm^{-1}., consists of a few lines or narrow weak bands; the second, 29,000-33,000 cm^{-1}., is the main spectrum; the third, beyond 33,000 cm^{-1}., consists of broad diffuse bands. The spectrum for the light vector parallel to the (010) plane consists of bands which are a little narrower than in the spectrum of the other component. These constitute the narrow and broad spectra. Photographs, measurements, intensities and data for these two spectra in each of the three regions, with thick and thin crystals, are given and discussed. The spectrum of anthracene is similarly described, the two spectra in polarised light showing a general resemblance. The absorption bands are so broad and numerous that they overlap and give the impression of five very broad bands. With polarised light, these bands show a different width according to the orientation of the polarisation. The spectrum of gaseous anthracene is very similar to that of the crystal, being a superposition of both crystalline spectra, the broad and the narrow. Results are discussed in relation to crystalline structure. L

N. M. B.

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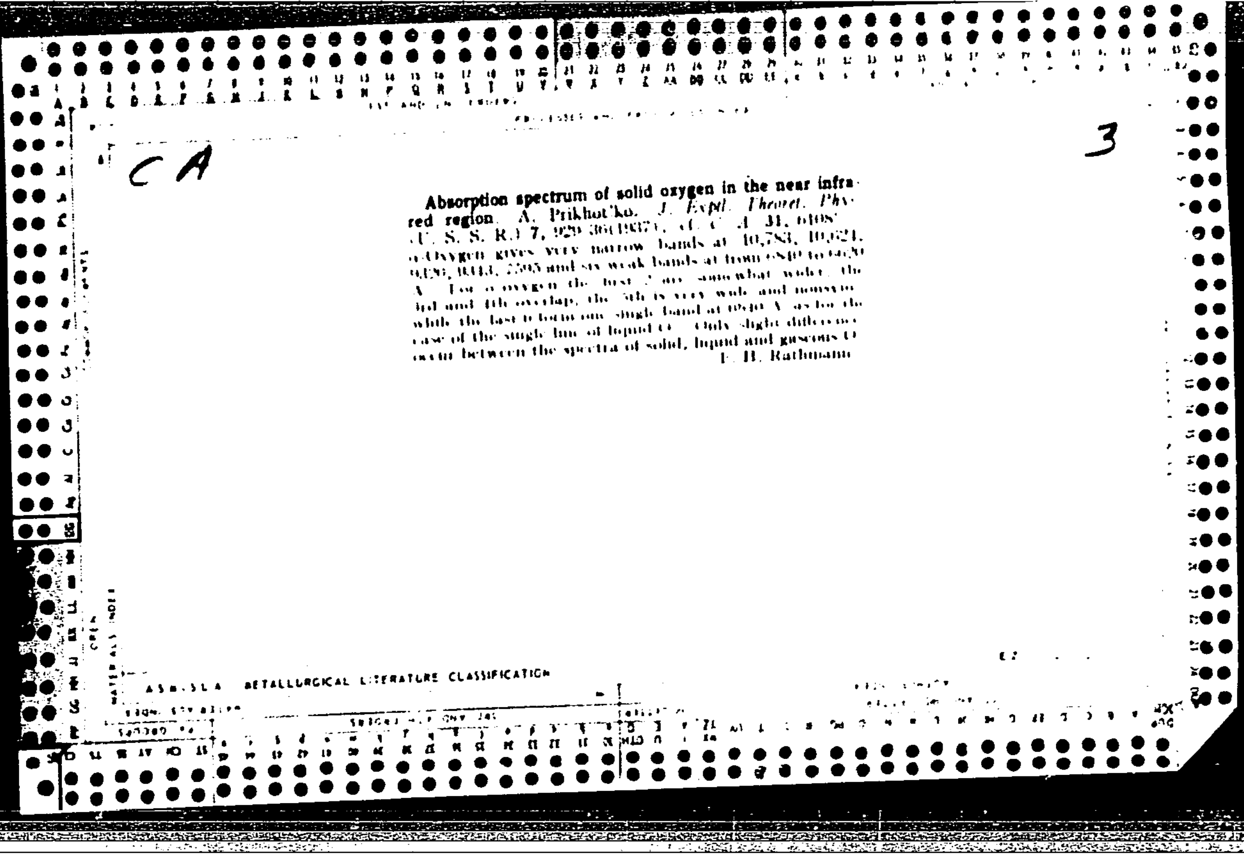

CA

3

Absorption spectrum of solid oxygen in the near infrared region. A. Prikhot'ko. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 7, 929-36(1937); cf. C. A. 31, 6108.—α-Oxygen gives very narrow bands at 10,783, 10,621, [illegible], 8013, [illegible] and six weak bands at from [illegible] to [illegible] Å. For [illegible]-oxygen the first 2 are somewhat wider, the 3rd and 4th overlap, the 5th is very wide and nonsym- while the last [illegible] form one single band at [illegible] Å, as for the case of the single line of liquid O_2. Only slight differences occur between the spectra of solid, liquid and gaseous O_2.

F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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5A

A5-9
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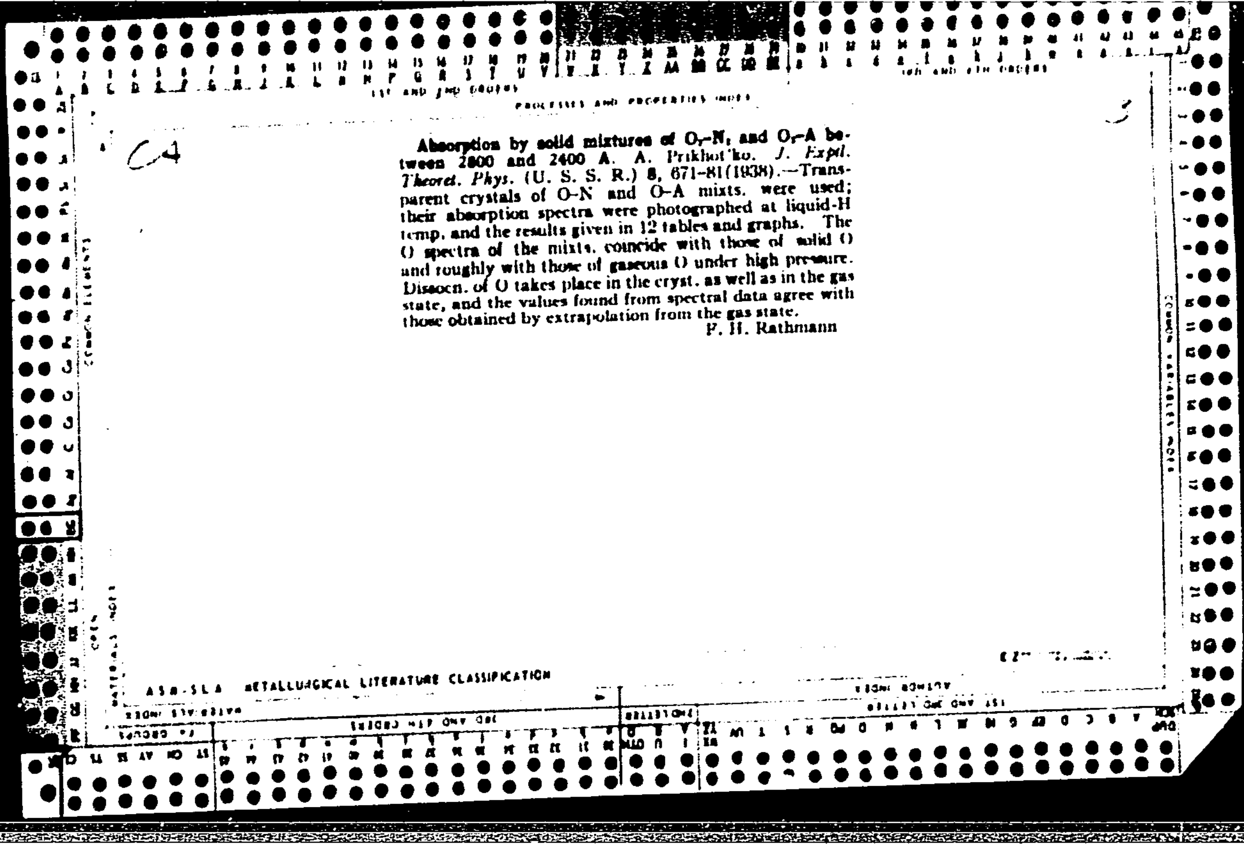
3111. Absorption Spectrum of Solid Oxygen in the Far Red. A. Prikhotko. *Phys. Zeits. d. Sowjetunion*, 11. 5. pp. 465–477, 1937. *In English.*—By slow cooling comparatively transparent crystals of the α-modification of O_2 and large homogeneous crystals of the γ-modification were obtained. The absorption spectra of γ, α and liquid O_2 have been photographed in the far red region of the spectrum. It has been shown that the absorption bands in the crystals are identical with the atmospheric bands of gaseous O_2 and are due to the same transitions $^3\Sigma_g^- \rightarrow {}^1\Delta_g$ and $^3\Sigma_g^- \rightarrow {}^1\Sigma_g^+$. In the spectrum of solid oxygen a complicated structure of the bands was observed which is absent in the gas and characteristic for the crystal [illegible] AUTHOR.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



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3

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Absorption by solid mixtures of O_2–N_2 and O_2–A between 2800 and 2400 A. A. Prikhot'ko. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 8, 671–81(1938).—Transparent crystals of O–N and O–A mixts. were used; their absorption spectra were photographed at liquid-H temp. and the results given in 12 tables and graphs. The O spectra of the mixts. coincide with those of solid O and roughly with those of gaseous O under high pressure. Dissocn. of O takes place in the cryst. as well as in the gas state, and the values found from spectral data agree with those obtained by extrapolation from the gas state.

F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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The absorption of solid mixtures of O_2-N_2 and O_2-A in the region of 2800-2400 A. A. Prikhot'ko. *Acta Physicochim. U. R. S. S.* 10, 913 34(1939)(in English).– See *C. A.* 33, 5200.

F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1 CA

Absorption of light by crystals of bromine and other halogens at 20.4°K. A. Nikitina and A. Prikhot'ko. *Acta Physicochim. U. R. S. S.* 11, 631-40(1939)(in English); *J. Exptl. Theoret. Phys.* (U. S. S. R.) 9, 1188-94 (1939). Exptl. data on the absorption spectra of Br_2, Cl_2 and I_2 crystals over the range λ = 7000 to 2100 A. are shown in 15 photographs and figs. The X_2 crystals are much lighter in color than the liquids, so that layers up to 0.4 mm. thickness were used. Br_2 absorption at 20.4°K. consists of three bands at 5.0-4.7, 4.3-4.1 and 3.7-3.6 × 10^3 A., the middle band being most intense. At liquid-N temp. only the 4.3-3.6 × 10^3-A. band with continuous absorption below 3240 A. was found. I_2 has a strong band at 5.0-4.5 × 10^3 A. and a very weak band near 5520 A. Cl_2 showed only one band, 5140-4000 A. Both I_2 and Cl_2 show continuous absorption in the ultraviolet region. From the potential-energy curves, N. and P. conclude that absorption occurs only in transitions from the vibrational state v = 0. F. H. R.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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CA

2

Investigation of solid mixtures of oxygen and nitrogen. A. Prikhot'ko and A. Yavnel. *Acta Physicochim. U. R. S. S.* 11, 783-98(1939)(in English).—O_2 and N_2 form solid solns. in the range 0-15.7% N_2 and 0-69% O_2 with a eutectic point at 22.6% N_2 at 50.1°K. When O_2-N_2 crystals formed by very rapid cooling, and of various compns., are heated from 20.4°K. up to the m. p. (always < 65°K.), the crystals first become turbid, then again abs. clear and finally melt. Below 10% O_2, the crystals remain clear and melt at 62.5° for 0%, 60.4 for 15% O_2; from 15 to 50% O_2 they are clear at 20.4°, become turbid at about 27°, but again clarify at 36-41°K. before melting, 58° for 30%, 54.2° for 50%; from 50 to 69% the crystals are turbid already at 20.4°, but become clear at about 44°, and melt at 51.5° for 65%, 50.1° for 77.5% O_2; from 69 to 84.3°, the mixts. are turbid throughout the range studied, and from 84.3 to nearly 100% O_2 the turbid mixts. clarify at about 42° before melting at 51.3° for 85, 55.0° for 100% O_2. The absorption spectra of the turbid phase show more intense bands, spread out more toward the violet. The two transparent phases show similar spectra except that at the higher temp. the bands are wider and show less structure. It is concluded that the crystals obtained were unstable undercooled crystals of oxygen in β-nitrogen, which disintegrate on warming above 27°K. and then on further warming again form crystals of O_2 in β-nitrogen (about 40°). The O_2 bands are shifted by 100 A. and 16 A. for the 1st and 2nd series with respect to those for α-oxygen, and most of them appear as doublets.

P. H. Rathmann

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Ca

3

Absorption of light by solid and liquid ammonia I. Measurements in the visible and ultraviolet region. A. Prikhot'ko. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 10, 398-401(1940).—From 5000 to 2000 A., the absorption spectrum of liquid and cryst. NH_3 near the transition point is continuous, and is strongly shifted into the ultraviolet (1600 cm. for the liquid, 6000 cm. for the gas) relative to that of initial absorption of the gas. The absorption limits for gas, liquid and solid are, resp.; 2430, 2345 and 2316 A. **II. Measurements in the infrared region.** *Ibid.* 402-6.—The absorption spectra of liquid and solid NH_3 from 5000 to 10,000 A. contain considerably more lines than that of the gas, and are the same except for a few doublets. The differences between the absorption spectra of the gas, liquid and solid phases are similar to the differences found in the Raman spectra. The doublets are overtone doublets with ν = 3330 cm.$^{-1}$. the absorption spectrum of the solid is shifted by 300 cm.$^{-1}$ with respect to that of the gas. F. H. R.

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Absorption of light in solid and liquid ammonia. I. The absorption spectrum from 5000 to 2000 A. II. The absorption spectrum from 10140 to 5000 A. A. Prikhot'ko. *Acta Physicochim. U. R. S. S.* 12, 559–64, 565–72(1940)(in English).—See *C. A.* 35, 358. E. J. C.

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Fe GROUPS

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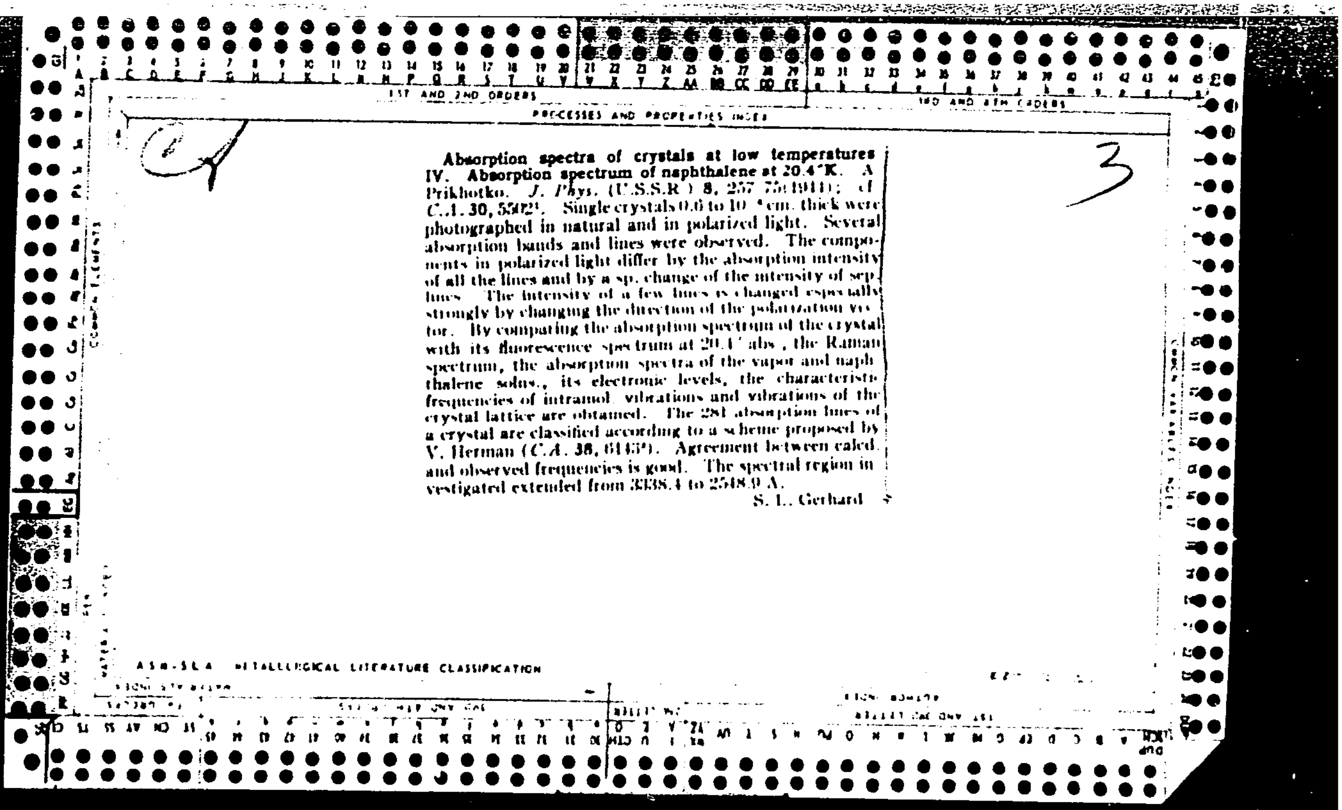
1ST AND 2ND LETTER



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3

Absorption spectra of crystals at low temperatures IV. Absorption spectrum of naphthalene at 20.4°K. A. Prikhotko. *J. Phys.* (U.S.S.R.) **8**, 257-75(1944); cf. *C.A.* **30**, 5502^4. Single crystals 0.6 to 10^{-4} cm. thick were photographed in natural and in polarized light. Several absorption bands and lines were observed. The components in polarized light differ by the absorption intensity of all the lines and by a sp. change of the intensity of sep. lines. The intensity of a few lines is changed especially strongly by changing the direction of the polarization vector. By comparing the absorption spectrum of the crystal with its fluorescence spectrum at 20.4° abs., the Raman spectrum, the absorption spectra of the vapor and naphthalene solns., its electronic levels, the characteristic frequencies of intramol. vibrations and vibrations of the crystal lattice are obtained. The 281 absorption lines of a crystal are classified according to a scheme proposed by V. Herman (*C.A.* **38**, 6145^4). Agreement between calcd. and observed frequencies is good. The spectral region investigated extended from 3338.4 to 2548.9 A.

S. L. Gerhard

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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3

Absorption spectra of single crystals of naphthalene at 20°K. A. Prikhot'ko. *Bull. acad. sci. U.R.S.S., Ser. phys.*, 9, 214-17(1945)(in Russian). At room temp., the absorption spectrum of naphthalene consists of three broad diffuse bands, in the region from 3300 to 2500 A. On cooling down to the temp. of liquid hydrogen, the bands are resolved into a multitude of lines, narrow bands and bands with a complex structure, some of them only noticeable in crystals 1-6 mm. thick, others so intense that details of structure can be observed only in very thin layers. The bands occupy the region from 3318 to 2510 A. and number about 300. At 20 K., both the absorption and the fluorescence spectrum were studied in nonpolarized light. Lines corresponding to pure electronic transitions coincide in fluorescence and in absorption; the wave numbers (in absorption) of the coinciding lines are: 29945, 31058.7, 31900.1, and 31636 $cm.^{-1}$. From these lines, the following 18 periods of vibrational progressions could be derived: ν = 190, 210, 300, 415, 520, 715, 775, 880, 960, 1080, 1135, 1200, 1275, 1310, 1390, 1475, 1580, 3060 $cm.^{-1}$. Analogous progressions can also be derived starting from the line 33730 $cm.^{-1}$, which therefore can also be considered as corresponding to a purely electronic transition. The correspondence of these periods to intramol. vibrations is proved by their identity with Raman frequencies and with infrared frequencies of solns. of naphthalene. The low wave numbers ν = 21, 45, 67, and 101 $cm.^{-1}$, doubtless present in absorption, and distinctly visible in fluorescence, probably belong to intermol. vibrations in the lattice of solid naphthalene. N. T.

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PRIKHOT'KO, A. F.

PA 19/49T89

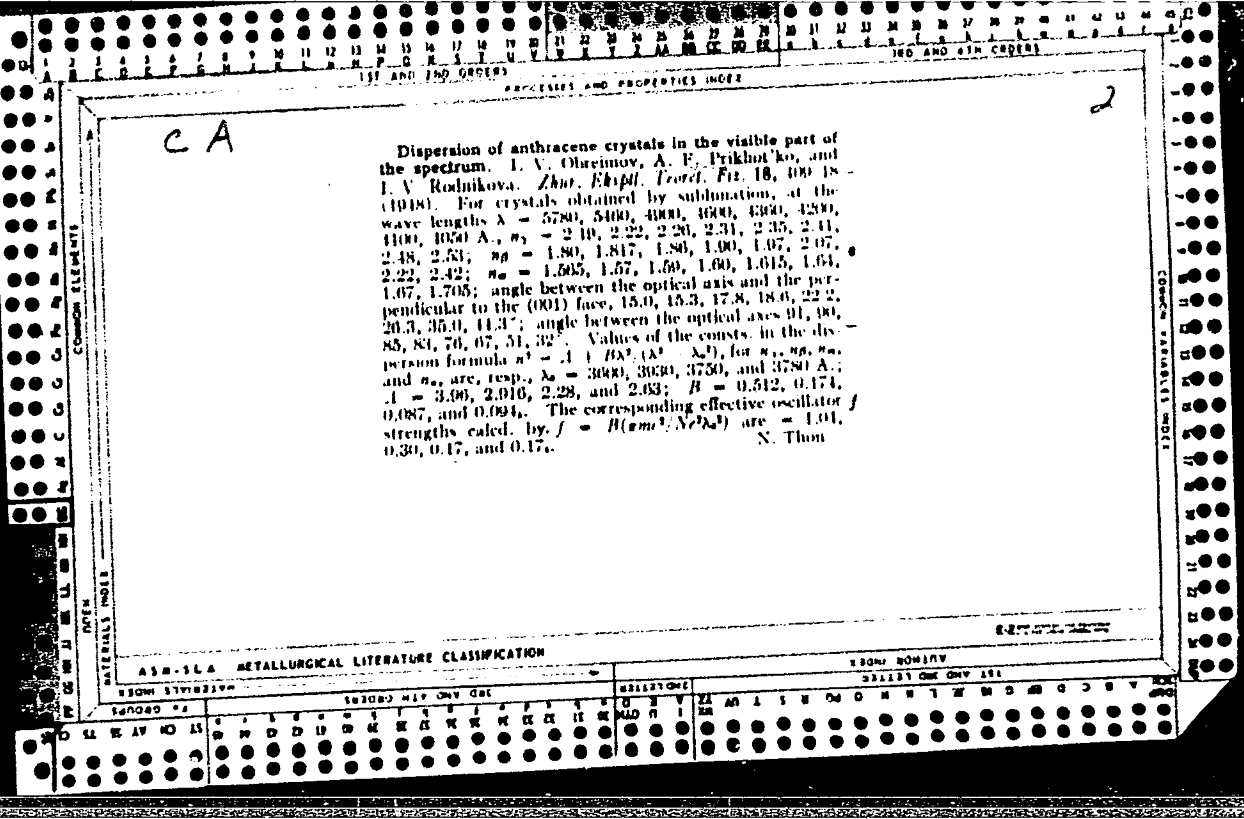
USSR/Physics Sep/Oct 48
Crystals, Organic
Crystals - Oscillations

"Electronic and Oscillatory Levels of Naphthalene Crystals and Molecules," A. F. Prikhot'ko, Phys Inst, Acad Sci Ukrainian SSR, 4 3/4 pp

"Iz Ak Nauk SSSR, Ser Fiz" Vol XII, No 5
p. 499-503

Treat subject under vapor spectrum, classification of spectrum lines of a crystal, and A-lines and B-zones. Special diagram shows results.

[redacted] 19/49T89



CA

2

Dispersion of anthracene crystals in the visible part of the spectrum. I. V. Obreimov, A. F. Prikhot'ko, and I. V Rodnikova. *Zhur. Eksptl. Teoret. Fiz.* **18**, 409-18 (1948). For crystals obtained by sublimation, at the wave lengths λ = 5780, 5400, 4900, 4600, 4300, 4200, 4100, 4050 A., n_γ = 2.10, 2.22, 2.26, 2.31, 2.35, 2.41, 2.48, 2.53; n_β = 1.80, 1.817, 1.86, 1.90, 1.97, 2.07, 2.22, 2.42; n_α = 1.565, 1.57, 1.59, 1.60, 1.615, 1.64, 1.67, 1.705; angle between the optical axis and the perpendicular to the (001) face, 15.0, 15.3, 17.8, 18.6, 22.2, 20.3, 35.0, 44.3°; angle between the optical axes 91, 90, 85, 84, 76, 67, 51, 32°. Values of the consts. in the dispersion formula $n^2 = A + B\lambda^2/(\lambda^2 - \lambda_0^2)$, for n_γ, n_β, n_α, and n_α, are, resp., λ_0 = 3900, 3030, 3750, and 3780 A.; A = 3.06, 2.916, 2.28, and 2.63; B = 0.512, 0.174, 0.087, and 0.094. The corresponding effective oscillator strengths calcd. by $f = B(\pi mc^2/Ne^2\lambda_0^2)$ are = 1.01, 0.30, 0.17, and 0.17.

N. Thon

cH

3

Electronic and vibrational levels of the crystal and the molecule of naphthalene. A. F. Prikhot'ko. *Zhur. Eksptl. Teoret. Fiz.* 10, 383-95(1949); cf. *C.A.* 44, 4331*b*.—The newly detd. spectrum of the vapor coincides with that of Henri and László (*C.A.* 18, 2469) only in the frequency of the 1st electronic transition $\nu_{\mathrm{I}}' = 32455$ cm.$^{-1}$ but differs in the vibrational structure. The vibrational frequencies assocd. with ν_{I}' are 473, 703, 1002, 1181, 1415, 1449, and 1693 cm.$^{-1}$, without distinct combinations. The 2nd electronic transition $\nu_{\mathrm{II}}' = 35905$ is assocd. with the vibrations 493 and 1379 cm.$^{-1}$, with intense combination frequencies. The rotational branches, disposed on the long-wave side of the band heads, are unresolved but do show alternations of intensity. A few weak bands are due to transitions from excited vibrational states of the ground level. The spectrum of the crystal consists of *b* lines, appearing in light polarized parallel to the monoclinic axis *b* lying in the plane of the flake, and *a* lines, parallel to the *a* axis perpendicular to *b*; as a rule, *b* lines are more intense than *a*. Rotational structure and shading are completely absent. Part of the lines, or bands, can be grouped into series. Other lines from satellites of lesser intensity around the serial lines. All lines become increasingly diffuse toward the ultraviolet end. The spectrum has a continuous background, more intense around the serial lines. All series of the crystal can be divided into 2 categories. The 1st category comprises series showing a distinct analogy with the spectrum of the vapor: the lines are only weakly polarized, i.e. they appear in both the *b* and the *a* component. One such series begins with $\nu_{\mathrm{I}}' = 31965$, combining with 455, 718, 902, 1143, 1191, 1393, 1431, and 1577 cm.$^{-1}$, of which only 718 possibly appears as the harmonic 1431; $\nu_{\mathrm{II}}' = 33730$ combines with the mol. vibrations 518 and 1380, identical with the Raman frequencies 518 and 1384, and with intense combination lines. As compared with the vapor, ν_{I}' in the crystal is shifted to the red by 500, ν_{II}' by 2100 cm.$^{-1}$. The 3 series of the 2nd category have no analogy in the spectrum of the vapor, and are specific for the crystal. The 1st series of this category begins with the pure electronic-transition line $\nu_3' = 33441$, and combines with 212, 408, 518, 658, 909, and 1383 cm.$^{-1}$. A 2nd series is built on $\nu_{\mathrm{I}}' = 29941$, appearing in fluorescence as a weak double line 29941 and 29930, and in absorption as a double line 29944 and 29931, of which the 1st is *b*, the 2nd *a*; only the former

Inst. Physics AS UkrSSR

combines with mol. vibration frequencies, 400, 724, 1282, and 1383. The 3rd series, based on the electronic transition $\nu_1' = 31062$, is the main series in the fluorescence spectrum, where it combines with several mol. and lattice vibration frequencies. In absorption, the corresponding lines are 31063 (*b*) and 31050 (*a*). In thicker crystals (1.0–1.5 mm.) these lines are split into doublets of $\Delta\nu$ = 22 cm.$^{-1}$. Two weaker lines, 31044 and 31000, appear in fluorescence only. All lines of this category are, in contrast to the 1st category, strongly polarized, i.e. they appear preferentially as either *a* or *b* components. The same character of very strong polarization is proper to two further groups, which, however, are unconnected with any known vibrational frequencies, and must be attributed to electronic states of the crystal. One such group consists of two *A* lines 31474 and 32227; another is formed by two *B* bands, 31603–31638 and 32241–32270 cm.$^{-1}$. The polarization of the series of the 1st category is evidently detd. by the symmetry of the mol., that of the 2nd category by the symmetry of the crystal. Almost all fluorescence of the crystal corresponds to transitions from states proper to the crystal and built on ν' = 31062. The only transition from a state characteristic of the mol., ν' = 31060, gives rise only to very weak fluorescence.

N. Thon

CA

Absorption spectrum of naphthalene vapor. A. F. Prikhot'ko (Acad. Sci. Ukr. S.S.R., Kiev). *Zhur. Ekspll. Teoret. Fiz.* 19, 187-92(1949).—The spectrum was detd. at temps. varying by 10° between 15 and 200°, with 3 thicknesses of the absorbing layer, 9, 17, and 100 cm. It consists of 3 series, corresponding to 3 different electronic transitions. The 3rd series reaches into the Schumann region, and only its 1st members were photographed; it appears to be a series of strong absorption, beginning at about 44000 cm.$^{-1}$. Bands of the 2nd series are more intense than those of the 1st. Rotational structure is too fine (0.1-0.3 cm.$^{-1}$) to be resolvable in either series. All bands are degraded to the red, and the extension to the red increases with the temp. owing to the appearance of new lines. All bands have 2 rotational structure branches. The band edges are sharper in the 1st, more diffuse in the 2nd series. In the 1st series, electron transition ν_I = 32455 cm.$^{-1}$, the positions of the blue edges of the short or long branch of the bands, vibration frequencies (and intensities) are: 31511 (short), −944; 31962 (short), −493; 32396 (long), —, 90; 32455 (short), 0-0, 100; 32872 (long), —, 45; 32928 (short), + 473, 85; 33104 (long), —; 33158 (short), + 703, 70; 33398 (long), —, 50; 33457 (short), + 1002, 75; 33579 (long), —; 33636 (short), + 1181, 85; 33814 (long) —; 33870 (short), + 1415, 60; 34016 (long), —; 34058 (short), + 1603, 100. Two very much weaker bands, 31511 and 31962 (short), appear in a 100-cm. layer at 50°, and disappear rapidly with rising temp. The vibration frequencies, 473, 703, 1002, 1181, 1415, 1440, and 1603 cm.$^{-1}$ (200 above 50°, doubtful), compare with the Raman frequencies 493, 724, 1215, 1442, and 1624, and with the frequencies of the crystal. The 2nd series is built around the electronic transition ν_{II} = 35905 cm.$^{-1}$. The following are the positions of both edges and maxima of bands (intensities estd. visually), and vibration frequencies $\Delta\nu$. 35724 (beginning of 1st band), 0; 35761 (6); 35796 (6), 35823 (6); 35856 (blue edge, long branch) (6); 35898 (short) (10); 35905 (10), $\Delta\nu$ = 0-0; 35925 (3); 35941 (3); 35958 (4); 35986 (blue edge of weak band) (1); 36067 (0); 36204 (1); 36269 (3); 36298 (3); 36319 (blue edge, long) (4); 36343 (4); 36357 (8); 36376 (8); 36398 (blue, short) (8), $\Delta\nu$ = +493; 36417 (0); 36435 (0); 36457 (1); 36500 (1); 36653 (0); 36829 (5); 36905 (blue, short) (5), $\Delta\nu$ = +1000, interpreted as 2 × 493; 36929 (1); 36989 (blue edge of weak band); 37048 (11); 37133 (1); 37179 (8); 37203 (8); 37229 (8); 37243 (blue, long) (8); 37257 (8); 37273 (10); 37302 (blue, short) (10), $\Delta\nu$ = 1397; 37412 (blue edge of weak band) (3); 37494 (1); 37550 (1); 37687 (8); 37713 (8); 37723 (8); 37747 (blue, long) (8); 37798 (blue, short) (8), $\Delta\nu$ = +1893, interpreted as 1397 + 493; 37845 (blue edge of weak band) (3); 38005 (2); 38195 (4); 38232 (4); 38284 (blue, short) (5), $\Delta\nu$ = +2379, interpreted as 1397 + (2 × 493); 38561 (5); 38619 (5); 38628 (5); 38665 (6); 38687 (red edge of broad band) (6), 38736 (blue edge of broad band) (6), $\Delta\nu$ = 2 × 1397. The 2 vibration frequencies, 493 and 1397, compare with the Raman 512 and 1384, and the fluorescence frequencies 520 and 1370 cm.$^{-1}$, and with the spectrum of the crystal.

N. Thon

PRIKHOD'KO, A. F.

Broude, V. A., Medvedev, V. S., Nechaeva, N. E., Prikhod'ko, A. ~~E.~~ F., and Kharitonova, O. P. Experience during a wide investigation of spectra of crystals or organic substances at low temperatures. Pages 488 - 492.

Inst. of Physics
Acad. of Sci. Ukr. SSR.

SO: Bulletin of the Academy of Sciences, Izvestia, (USSR) Vol. 14, No. 4. (1950) Series on Physics.

CA

1

Interferometer for low-temperature work. I. V. Obreimov and A. F. Prikhot'ko. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 14, 550-3(1950).—A microinterferometer of the Jamin type was constructed and the n of anthracene was measured both in the direction of the b and the a axis at liquid-N temp. The complete μ curve shows 4 absorption regions between 3000 and 8000 A. From the curves the oscillator force is calcd. for the electronic transitions at λ 3800 A. and λ 2500 A. The second transition is 10 times stronger than the first and both are polarized along the central axis of the mol. It is presumed that one or more other electronic transitions should exist. S. Pakswer

Inst. Org. Chem – AS USSR
Inst. Phys. ~~AS USSR~~ Ukr. SSR

1. PRIKHOT'KO, A. F.

2. USSR (600)

4. Luminescence

7. Luminescence and light absorption in crystals of organic compounds. Izv AN SSSR Ser fiz.,15, No. 5 1951.

9. <u>Monthly</u> <u>List</u> <u>of</u> <u>Russian</u> <u>Accessions</u>, Library of Congress, April 1953, Uncl.

PRIKHOT'KO, A. F.

Broude, V. L., Medvedev, V. S., Prikhot'ko, A. F. Electronic and vibrating levels of the molecule and of the benzole crystal. P. 665.

Institute of Physics
Academy of Sciences, Ukrainian SSR
July 20, 1950

SO: Journal of Experimental and Theoretic Physics, Vol. 21, No. 6, June 1951

6

7300 TT-541 CH

LUMINESCENCE AND ABSORPTION OF CRYSTALS OF POLYCYCLIC HYDROCARBONS. (Svechenie i Tsvet Kristallov Politsiklicheskikh Uglevodorodov). I. V. Obreimov and A. F. Prikhot'ko. Translated by G. Belkov from Akad. Nauk S.S.S.R., Pamyati S. I. Vavilova, 197-209(1952). 23p.

The spectra in luminescence and absorption and the refractive indices were investigated for a series of linear condensed hydrocarbons (benzene, naphthalene, anthracene, and naphthacene) at low temperatures. The results of this investigation are discussed in detail. From a comparison of the spectra of vapors and crystals, the spectral bands of a crystal can be classified. All the crystals observed were brightly luminescent. (B.J.H.)

BB

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USSR/Physics - Spectrography, Crystals May 52

"Absorption Spectra of Benzene Monocrystals in Polarized Light," V. L. Broude, A. F. Prikhot'ko, Phys Inst, Sci Ukrainian SSR

"Zhur Eksper i Teoret Fiz" Vol XXII, No 5, pp 605-609

Investigates light absorption spectra in benzene crystals in the case of oscillation of the vector of light parallel to 3 symmetry axes of the crystal. Observes series of weakly polarized absorption bands in all cases. Series of sharply polarized bands are

215T94

seen only in spectra in a and c directions and are absent in b direction. From comparison of obtained results with theoretical computation, determines the symmetry of forbidden transition in benzene as $A_{1g} \rightarrow B_{2u}$. Indebted to A. S. Davydov. Received 14 Jun 51.

215T94

PRIKHOT'KO, A.F.

PRIKHOT'KO, A.F.

PRIKHOT'KO, A. F.

5

(1)

Structure of the molecule of dimers of anthracene and its homologous substances. V. S. Medvedev, B. M. Mikhailov, A. F. Prikhot'ko, and O. P. Kharitonova. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 17, 715-16(1953).—Pure 9-methylanthracene (m. 79.5-80.5°) was transformed into its dimer (m. 228-228.5°) by irradiation of its acetone soln. by a Hg arc-lamp and recrystn. Absorption spectra of the crystals show 2 electronic transitions. The first series of broad absorption bands begins with a strongly polarized triplet λ = 3990.1; 4004.5; 4030.5 A.; the second series has a long-wave limit of absorption at λ = 2560 A. for one polarization and 2600 A. for the other. This spectrum is entirely different from the monomer spectrum. The photochem. reaction takes place not only in soln. but also by irradiation of monomer crystals; it can be detd. by the loss of birefringence. The transformation is effected by a change in the valence bond which leads to a configuration similar to that of hydrated anthracene derivs. The aromatic structure is lost in the central ring.

S. Pakswer

MF
11-10-54

Inst. Organic Chem, AS USSR

Inst. Physics - Ukr ASSSR

PRIKHOTKO, A.F.

Chemical Abst.
Vol. 48 No. 6
Mar. 25, 1954
Organic Chemistry

The possibility of determination of the number and position of side chains in benzene homologs by the spectral method. V. L. Broude, A. L. Liberman, and A. F. Prikhot'ko. *Doklady Akad. Nauk S.S.S.R.* 89, 475-8(1953). It was shown that within the limits of this study various alkylated benzenes can be identified spectroscopically. The spectra of some of the products are reproduced photographically. The following characteristic purely electronic frequencies were observed at −190° (the state of the specimen given): MePh, cryst. low-temp. form, 37,007 cm.$^{-1}$; EtPh, cryst. high-temp. form, 37,233; PrPh, amorphous, 37,231; cumene, amorphous, 37,340; *n*-C_6H_{11}Ph, cryst. high temp. form, 37,225; *p*-xylene, cryst., 36,315; *p*-EtC_6H_4Me, cryst. high-temp. form, 36,300; *p*-cymene, cryst. 36,667; *o*-xylene, cryst. high-temp. form, 36,878; *o*-EtC_6H_4Me, cryst., 37,060; tetrahydronaphthalene, cryst., 36,370; *m*-xylene, cryst. high temp. form, 36,778. In a given series of a type the spectra are similar and chain-branching does not alter the general type of the spectrum. G. M. Kosolapoff

PRIKHOT'KO, A. F.

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
Davydov, A. S. Prikhot'ko, A. F. Obreimov, I. V.	Research in the field of the spectroscopy of molecular crystals	Academy of Sciences, Ukrainian SSR

SO: W-30604, 7 July 1954

PRIKHOTKO, A.F.

5
21 1-4E4c
1-4E3d

Spectral and optical investigations of molecular crystals. A. F. Prikhot'ko. *Trudy Inst. Fiz., Akad. Nauk S.S.S.R.* 1955, No. 6, 43-69; *Referat. Zhur., Khim.* 1956, Abstr. No. 13124.—A review of the work of the Phys.-Tech. Inst. and of the Institute of Physics, Acad. Sci. Ukr. S.S.R. 60 references. J. Mioszewska

gR

PRIKHOT'KO, A. F.

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

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 91

Author: Broude, V. L., and Prikhot'ko, A. F.

Institution: None

Title: On the Paper by McLure and Schnepp

Original Periodical: Optika i spektroskopiya, 1956, Vol 1, No 1, 102-103

Abstract: The causes for the divergences between the data of McLure and Schnepp (Referat Zhur - Khimiya, 1956, 60739) and A. F. Prikhotko (Zh. eksperim. i teor. fiziki, 1949, Vol 19, 383) concerning the location of the absorption bands for a monocrystal of naphthalene. The authors have conducted analogous investigations on crystals of naphthalene and its deuterium-substituted derivatives and have found a substantial difference in the spectra of freely suspended crystals similar to those used by Prikhot'ko from the spectra of crystals obtained by melting 2 quartz plates. The latter spectra show considerably larger bands with a certain shift relative to the spectrum of free crystals

Card 1/2

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

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 91

Abstract: in the IR region. Microphotographs of the spectrum of such a crystal are in full agreement with those published in the paper by McLure. The authors ascribe the changes in the spectrum to the great stresses produced during the cooling of the crystals by the difference in the coefficients of expansion of the naphthalene ($2 \cdot 10^{-4}$ deg^{-1}) and quartz ($2 \cdot 10^{-7}$ deg^{-1}). The interpretation of the electronic spectra of naphthalene must be carried out according to the spectrum of a free crystal or by making allowances for the distortions in the spectrum due to the action of exterior forces described above.

Card 2/2

PRIKHOT'KO A.F.

Category: USSR / Physical Chemistry - Crystals

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 29723

Author : Broude V. L., Prikhot'ko A.F.
Inst : not given
Title : Investigation of Structural Changes in Crystals on the Basis of Their Spectra at Low Temperatures

Orig Pub: Kristallografiya, 1956, 1, No 3, 334-341

Abstract: A study was made, in polarized light and at temperatures of 77° and $20^{\circ}K$, of the absorption spectra of a number of molecular crystals of aromatic compounds (essentially hydrocarbons of benzene and naphthalene series). It is shown that the absorption spectra, the same as many other properties of the crystal (refraction index, coefficient of expansion, etc) fully depict lattice anisotropy. The changes observed in exiton bands of the crystal spectrum make it possible to identify crystalline modifications, and in some instances permit to evaluate lattice symmetry. In the spectra are also reflected the in-

Card : 1/2 -24-

Inst Physics, AS UkrSSR

Category: USSR / Physical Chemistry - Crystals B-5

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 29723

clination of the molecule in relation to the crystallographical axes, the form of distribution of admixture within the crystal, photochemical transformations which take place in the specimen, etc. Investigation of crystals of different thickness, on a quartz base layer, has shown that the spectra are also affected by the effects of external influences. The paper demonstrates that low-temperature spectral investigation of crystals can provide a valuable addition to roentgenographic analyses. It is noted that correct evaluation of the effect of crystalline structure upon the spectrum can be had only in those instances when the investigations are carried out in polarized light, with polarization along the axes of cauchy ellipsoid.

Card : 2/2

PRIKHOT'KO, A.F.

BRODIN, M.S.; MEDVEDEV, V.S.; PRIKHOT'KO, A.F.

Cryostats used in Jamin interferometry at liquid hydrogen temperatures. Prib.i tekh.eksp.no.3:96-98 N-D '56. (MLRA 10:2)

1. Institut fiziki AN USSR.
(Interferometry) (Cryostat)

PRIKHOT'KO, A.F.

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

L'vov. Universytet

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

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

Card 1/~~30~~
3

Papers of the 10th All-Union (Cont.) Sov/1365

PURPOSE: This collection of articles is intended for scientists working in the field of spectroscopy and for engineers and laboratory analysts who use spectroscopic methods in their work.

COVERAGE: This collection of articles is concerned with theoretical, experimental, and technical problems in molecular spectroscopy. The application of molecular spectroscopy to various fields of theoretical research is described in articles covering chemical structure, kinetics, catalysis, theory of the chemical bonding, properties of crystals, effect of radiation on substance, etc. Good coverage is also given to the use of spectroscopy in organic and inorganic technology including the study of petrochemicals, polymers, glass, phosphate, boron compounds, etc. Each article is followed by references. The text includes tables and figures.

Card 2/3
3

Papers of the 10th All-Union (Cont.) SOV/1365

TABLE OF CONTENTS:

Card 3/20

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BRODIN, M.S.; PRIKHOT'KO, A.F.

Absorption and scattering of light by various molecular crystals.
Fiz. sbor. no.3:16-21 '57. (MIRA 11:8)

1. Institut fiziki AN USSR.
(Anthracene--Spectra)

PRIKHOT'KO, A.F.; SHPAK, M.T.

Polarization of impurity absorption bands in crystals. Fiz. sbor. no.3:21-24 '57. (MIRA 11:8)

1. Institut fiziki AN USSR.
(Luminescence) (Absorption spectra)

PRIKHOT'KO, A I

AUTHORS: Broude, V.L., Medvedev, V.S. and Prikhot'ko, A.F. 51-3-6/24

TITLE: Spectral investigation of benzene crystals at 20.4°K.
(Spektral'nye issledovaniya kristallov benzola pri 20.4°K).

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy),
1957, Vol.2, No.3, pp.317-322 (U.S.S.R.)

ABSTRACT: The present authors studied earlier (Zh. Eksper.Teor. Fiz., Vol.21, p.665, 1951 and Vol.22, p.605, 1952) benzene monocrystals in polarized light at the liquid nitrogen temperature. They found then that a purely electronic transition forbidden in the benzene molecule occurred in benzene crystals as a resolved doublet with its components polarized along the a and c axes of the crystals. This doublet was shown by Davydov (Zh. Eksper. Teor. Fiz., Vol.21, p.671, 1951) to be due to formation of free excitons in the crystal. This paper deals with absorption spectra of benzene monocrystals at the liquid hydrogen temperature. The apparatus included a spectrograph with 2.9 Å/mm dispersion at about 2600 Å. An Iceland spar polarizer was used with a special diaphragm to make possible recording of two spectral components simultaneously. Liquid benzene was poured into a special cell and held in a cryostat which permitted rotation of the cell. New samples could be introduced during work.

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Spectral investigation of benzene crystals at 20.4°K. (Cont.)
51-3-6/24

Preliminary cooling was carried out with liquid nitrogen and in the final cooling only 30-40 cm^3 of liquid hydrogen were lost per hour. The absorption spectrum of benzene monocrystals at 20.4 K consists of more than 100 narrow (2-4 cm^{-1}) bands. The spectrum begins at 37800 cm^{-1} and the plates in the paper show bands up to about 41000 cm^{-1}. The spectrum of the benzene crystal consists of two basic series: the K series strongly polarized bands which are related to the fully symmetric vibrations of the benezene molecule and the M series, more intense, whose beginning occurs when a purely electronic transition is combined with vibrations of E_{2g} symmetry (523 cm^{-1}). The K series occurs in crystals only and is called "crystalline", while the M series occurs also in gases and hence is called "molecular". The K series consists of six groups each of which contains 3 or more bands. The M series consists of four groups each of which has 3 main weakly polarized components and less intense satellites. There are also further bands which are strongly polarized but of low intensity, denoted by K^{I} ... K^{VII} whose components are very close together (2 to 10 cm^{-1}). Interpretation of the origin of these bands requires further work.

Card 2/3

Spectral investigation of benzene crystals at 20.4 K (Cont.) 51-3-6/24

There are 2 line figures, 1 plate with spectra and 11 references, 6 of which are Slavic.

SUBMITTED: August 23, 1956.

ASSOCIATION: Institute of Physics, A.C. of Ukrainian SSR, Kiev. (Institut Fiziki Akademii Nauk USSR g. Kiev).

AVAILABLE:

Card 3/3

Prikhot'ko, A F

AUTHORS: Broude, V.L., Pakhomova, O.S. and Prikhot'ko, A.F.

51-3-7/24

TITLE: Effect of deformations on the spectra of crystals. (Vliyaniye deformatsiy na spektry kristallov).

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy), 1957, Vol.2, No.3, pp.323-329 (U.S.S.R.)

ABSTRACT: Deals with the effect of planar tension on the absorption spectra of benzene, naphthalene, anthracene and CdS at the liquid hydrogen temperature (20.4 K). The sample were thin films held in a crystal holder. The assembly had a quartz lens for photographing spectra of various parts of the sample. The whole assembly was rotatable and was placed in a cryostat with quartz windows. The spectra were obtained with a quartz spectrograph whose dispersion was 2.9 Å/mm at about 2600 Å. To study the CdS spectra glass optical parts were used. An Iceland spar polarizer made it possible to obtain simultaneously spectra for two mutually perpendicular directions of the electric vector vibrations. A krypton lamp was used as a source and the iron spectrum for calibration. Naphthalene crystalline films rigidly fixed between two quartz plates behaved differently for different thicknesses of the film. Above 2-3 μ thickness these films cracked on cooling to 20.4 K. Thinner films exhibited

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Effect of deformations on the spectra of crystals. (Cont.)

51-3-7/24

spectral displacement towards ultraviolet when compared with freely supported samples. This spectral displacement was accompanied by widening and weakening of bands and strong polarization of the originally weakly polarized "molecular" M bands (see the preceding paper). If the films were very thin (0.01 μ) only the spectral displacement occurred. Similar behaviour with strongly developed polarization effects was observed for anthracene films. Benzene films also behaved essentially in the same way as naphthalene but both the spectral displacement and polarization effects occurred only in thin (0.2 - 0.5 μ) films. In CdS displacement and intensity redistribution of absorption lines occurred for crystals under tension. The explanation of these effects lies in the large difference of linear thermal expansion coefficients of the quartz holders (2 x 10^{-7} deg^{-1}) and of the organic crystals (1-2 x 10^{-4} deg^{-1}). Cooling to 20.4 K from room temperature produced an extension of 5% in the rigidly held crystal films. In thicker films the extension is non-uniform across the sample thickness being largest at the planes of contact with the quartz plates. This non-uniformity which produces lattice distortions, accounts for the displacement, weakening and widening of

Card 2/3

Effect of deformations on the spectra of crystals. (Cont.) 51-3-7/24

spectra of the thicker films. The thinnest films are thin enough to be extended practically uniformly throughout their volume; in this case only the spectral displacement occurs. Polarization of the "molecular" M bands (whose excitation is normally localized in the molecules) is due to formation of free excitons in non-uniformly stressed samples. The actual mechanism is not clear and needs further study. The peculiarities of benzene are attributed to its transitions to a doubly degenerate level (absorption bands). There are 2 plates with spectra of naphthalene and anthracene, 2 line figures and 12 references, 11 of which are Slavic.

Card 3/3

SUBMITTED: August 23, 1956.

ASSOCIATION: Institute of Physics, Ac.Sc. of the Ukrainian SSR, Kiev. (Institut Fiziki Akademii Nauk USSR g. Kiev).

AVAILABLE:

PRIKHOT'KO, A.F.

51-4-7/25

AUTHORS: Brodin, M.S. and Prikhot'ko, A.F.

TITLE: Dispersion and absorption of light in anthracene crystals at 20.4°K. (Dispersiya i pogloshcheniye sveta v kristallakh antratsena pri 20.4°K).

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy) 1957, Vol.2, No.4, pp.448-453 (U.S.S.R.)

ABSTRACT: Colourless anthracene crystals strongly absorb in the near ultraviolet at 24500-29000 cm^{-1} (first electron-vibration transition in the crystal) and also at 37000-42500 cm^{-1} (second transition). This paper reports on the refractive index dispersion and the absorption coefficients of anthracene crystals at 20.4°K at 25000-37000 cm^{-1} for two directions of the light vector: parallel and perpendicular to the monoclinic crystal axis. To study the dispersion a small Jamin interferometer was crossed by a spectrograph. The method is due to I.V.Obreimov (Jubilee collection of papers on the 70th birthday of Acad. A.F.Ioffe, p.523, 1950 - in Russian). Spectrograms were obtained with and without a crystal in the light beam. The absorption was measured with the cooperation of S.Z.Shul'ga (see also Zavodskoya laboratoriya, current number in print). A photomultiplier FEY-18 was used. For the dispersion and absorption measurements a quartz spectrograph of medium dispersion

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51-4-7/25

Dispersion and absorption of light in anthracene crystals at 20.4°K. (Cont.)

was used. Low-pressure hydrogen lamps were used as light sources. Glan-Thompson prisms were used as polarizers. The iron arc spectrum was used as wavelength standard. The accuracy of measurement of the refractive index was about 2% and of the absorption coefficient 8-10%. The results are given in four graphs. The refractive index at 20.4°K oscillates strongly (from 1 to 6) at 25000-28000 cm^{-1}; its value outside this region is 1.5-2. The absorption coefficients (values up to 0.60) are shown for both 293°K and 20.4°K; oscillations here occur at 25 000 - 29 000 cm^{-1}. From the absorption coefficients and the refractive index the reflectivity curves (values up to 0.50) are constructed; again oscillations occur at 25 000 - 29 000 cm^{-1}. In all graphs the largest maxima occur at about 25 000 cm^{-1}. The oscillator strengths of electron-vibration transitions were calculated to be for the three directions:(a) parallel to the monoclinic axis, (b) perpendicular to that axis and (c) at right angles

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51-4-7/25

Dispersion and absorption of light in anthracene crystals at 20.4°K. (Cont.)

to (a) and (b). Their values were found to be: (a) 0.12, (b) 0.05 and (c) 0.13. There are six figures (including one half-tone plate), and nine references, seven of which are Slavic.

ASSOCIATION: Institute of Physics, Academy of Sciences of the Ukrainian S.S.R., Kiev. (Institut Fiziki AN USSR, Kiev).

SUBMITTED: August 18, 1956.

AVAILABLE: Library of Congress

Card 3/3

ko, A.F.

AUTHOR: Prikhotko, A.F.

TITLE: A Study of Spectra of Molecular Crystals at Low Tempe
(Issledovaniya spektrov molekulyarnykh kristallov pri
nizkikh temperaturakh)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr 5, pp.434-
452 (USSR)

ABSTRACT: Systematic work on the spectroscopy of molecular crystals was begun in the USSR by I.V.Obreimov in the late twenties. He showed that at liquid helium temperatures the absorption spectrum of azobenzene is of the line type. It can be represented by a series of electron-vibrational transitions from a normal state to an excited state. Results of studies of spectra of molecular crystals, which are a continuation of the work of Obreimov at the Physico-Technical Institute of the Ac.Sc. of the Ukrainian SSR are reported in this paper.

1. Experimental. The majority of organic compounds crystallise into molecular lattices and most of the work at the above Institute was done on such crystals. The method of obtaining such crystals has been described in Refs.(33), (38) and (23). The crystals are often in the form of thin

Card 1/

PRIKHOTKO, A.F

51-5-

AUTHOR: Prikhotko, A.F.

TITLE: A Study of Spectra of Molecular Crystals at Low Temperatures (Issledovaniya spektrov molekulyarnykh kristallov pri nizkikh temperaturakh)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr 5, pp.434-452 (USSR)

ABSTRACT: Systematic work on the spectroscopy of molecular crystals was begun in the USSR by I.V.Obreimov in the late twenties. He showed that at liquid helium temperatures the absorption spectrum of azobenzene is of the line type. It can be represented by a series of electron-vibrational transitions from a normal state to an excited state. Results of studies of spectra of molecular crystals, which are a continuation of the work of Obreimov at the Physico-Technical Institute of the Ac.Sc. of the Ukrainian SSR are reported in this paper.

1. Experimental. The majority of organic compounds crystallise into molecular lattices and most of the work at the above Institute was done on such crystals. The method of obtaining such crystals has been described in Refs.(33), (38) and (23). The crystals are often in the form of thin

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51-5-3/11

Study of Spectra of Molecular Crystals at Low Temperatures.

plates (a few hundredths of a micron to a few microns thick). Larger specimens are obtained by cleaving large monocrystals. Substances which are liquid at room temperatures are crystallised directly in a cryostat by slow cooling of the container in which the substance is placed, by liquid nitrogen or its vapour (Ref.21). Substances which are gaseous at room temperatures are first compressed into quartz containers and then crystalised by slow cooling with liquid nitrogen or hydrogen (Refs.41, 43-45 and 54). In this way more or less perfect monocrystals are obtained and their spectra are studied at liquid helium and liquid hydrogen temperatures. Metallic cryostats are used (Refs.130-132), one of which is shown in Fig.1. The cryostat has three pairs of windows so that it is possible to photograph absorption and luminescence spectra of any given crystal without moving it. Full details of the various auxiliary apparata are given in Refs.(19) and (130) to (136).

2. Absorption of light by molecular crystals. When the temperature of crystals is lowered various changes in the absorption spectra are observed. Changes of this type have been subjected to detailed study at the above Institute. For example, E.I.Rashba has worked on the theory of strong

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51-5-3/11

Study of Spectra of Molecular Crystals at Low Temperatures.

interactions between electron excitations and lattice vibrations in molecular crystals (Refs.1-5), and the interaction of excitons with molecular lattices (Refs.127). Radical changes in absorption spectra in going from the gaseous to the crystal phases have been observed by M.D.Borisov (Ref.2), M.S.Brodin (Ref.5) and A.F.Prikhot'ko (Refs.1,4,5). A considerable amount of other work has also been done in this field and a complete list of references is given.

3. Luminescence of molecular crystals. Luminescence spectra of napthalene, anthracene and other crystals have been investigated at liquid hydrogen temperatures (Refs.37, 39 and 40). Strong luminescence of these molecules is observed when they are introduced as an impurity into other lattices. They have a practically line luminescence spectrum (Refs.3, 56-58 and 128). The number of levels, their symmetry, polarisation and the selection rules have been obtained using group theory (Refs.67, 77, 98, 101 and 103). "Energy migration" was studied by A.N.Faydysh and others (Refs.63, 80, 92-100).

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51-5-3/11

Study of Spectra of Molecular Crystals at Low Temperatures.

4. Dispersion of light in crystals. Determination of oscillator strengths. The optical behaviour of crystals is determined by 3 quantities: coefficients of absorption, reflection and refraction and their dependence on wave length. Two of these are independent and if they are known the third may be found from the well-known formulae of crystal optics. The absorption and dispersion curves and the crystal spectra change when the crystals are cooled. Wide absorption maxima split into series of narrower maxima. The rise of absorption curves towards the absorption bands becomes much steeper and the coefficients of refraction increase rapidly in this region. Small maxima in these curves become more pronounced, as can be seen in Fig.12, where the dispersion curves of diphenyl crystals are given at 20°K (Refs.1, 2, 6, 8, 9, 36-38, 61, 65 and 66). Fig.13 shows dispersion curves for anthracene crystals at the same temperature. The rapid rise in the dispersion curve of the b-component is due to a strongly polarised band which begins the absorption series (Refs.1, 2, 6, 8, 9, 36-38, 61, 65 and 66). The theory of dispersion is developed in Refs.73-76, 81, 86 and 144. Integral formulae have been obtained for the calculation of dispersion curves of crystals which give

Study of Spectra of Molecular Crystals at Low Temperatures.

good agreement with experimental data (Refs.9 and 144). Values for the oscillator strengths have been obtained for a number of aromatic hydrocarbons (Table 1; Refs.1, 2, 5-9, 61, 65, 66, 138 and 14). It was shown that the first transitions in all condensed aromatic compounds are polarised along the mean axis of molecules. Oscillator strengths increase with the number of π-electrons. A similar situation occurs in the case of crystals of other polycyclic hydrocarbons.

5. Conclusion. Studies of spectral and optical properties of molecular crystals at low temperatures (both experimental and theoretical) have led to information on the energy levels, optical characteristics and the mechanism of the various phenomena occurring at low temperatures. From a knowledge of the main regularities in the spectra, it was possible to establish a connection between structural changes in crystals and their electron spectra,and between changes in these spectra and the elastic deformations of crystals. The role of lattice defects,particularly important in luminescence spectra, has been elucidated. Studies of solid

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Study of Spectra of Molecular Crystals at Low Temperatures.

solutions of aromatic hydrocarbons have expanded the knowledge of spectra of complex molecules. There are 16 figures, 1 table and a comprehensive list of 147 Slavic references (including full titles) is given under the title "Work on the Spectroscopy and Crystal Optics carried out at the Academy of Sciences of the Ukrainian SSR". The reference list is subdivided into the following sections:

1. Experimental papers - Refs.1 - 66.
2. Theoretical papers - Refs.67 - 129.
3. Apparatus - Refs.130 - 136.
4. Dissertations - Refs.137- 147.

ASSOCIATION: Physics Institute of the Ac.Sc. of the Ukrainian SSR, Kiev (Institut Fiziki AN USSR, Kiyev)

SUBMITTED: June 28, 1957.

AVAILABLE: Library of Congress.

Card 6/6

Prikhot'ko, A.F.

BRODIN, M.S.; PRIKHOT'KO, A.F. [Prykhot'ko, A.F.]

Absorption and dispersion of light in certain crystals of the polycyclic series [In Ukrainian with summary in English]. Ukr. fiz. zhur. 3 no.1:79-87 Ja-F '58. (MIRA 11:4)

1. Institut fiziki URSR.
(Stilbene--Optical properties)
(Acetylene--Optical)

BROUDE, V.L.; YEREMENKO, V.V. [IEremenko, V.V.]; MEDVEDEV, V.S.; PAKHOMOVA, O.S.; PRIKHOT'KO, A.F.

Effect of deformations on the electron spectra of crystals [in Ukrainian with summary in English]. Ukr. fiz. zhur. 3 no.2:232-238 Mr-Ap '58. (MIRA 11:6)

1. Institut fiziki URSR.
(Crystals--Spectra) (High pressure research)

Prikhot'ko, A. F.

51-4-1-3/26

AUTHORS: Prikhot'ko, A. F., and Shpak, M. T.

TITLE: Absorption and Luminescence of Stilbene Impurity in Dibenzyl Crystals at 20.4°K. (Pogloshcheniye i lyuminestsentsiya stil'bena kak primesi v kristallakh dibenzila pri 20.4°K.)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.1, pp.17-29. (USSR)

ABSTRACT: The absorption bands of strongly absorbing crystals (e.g. stilbene and tolane) are still comparatively wide at liquid-hydrogen temperatures. When the absorbing molecules are separated by molecules of a foreign lattice (e.g. stilbene as an impurity in a dibenzyl crystal) the absorption bands of the impurity are sufficiently narrow to be called lines. Crystals with such impurities usually luminesce. The present paper deals with absorption and luminescence of stilbene in dibenzyl crystals. The results were obtained using a

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Hilger quartz spectrograph of high dispersive power. The absorption spectra were photographed in polarized light. The cell with the crystal was cooled to the temperature of liquid hydrogen. A hydrogen or a krypton lamp was used as a source, and an arc spectrum between iron electrodes was used for calibration. The crystal thicknesses in absorption studies were from several hundredths of a micron to 160 μ. The stilbene content was from about 0.001% to 3-5% by weight. To study luminescent spectra crystalline plates of 1 mm thickness were used. These spectra were obtained from the same surface of the crystal onto which the exciting light fell. Luminescence was excited by means of a mercury lamp. Crystals of dibenzyl possess intrinsic

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absorption in the region of 37000 cm^{-1} which consists of a large number of narrow bands and lines, some of which are strongly polarized. The stilbene impurity begins to absorb light from about 29500 cm^{-1}. Fig.1 shows the absorption spectra of dibenzyl monocrystals 160 μ thick with 0.04% of stilbene (Fig.1a), 5 μ thick with 5% of stilbene (Fig.1b) and 2 μ thick with 5% stilbene (Fig.1v). All results in this figure and subsequentfigures and tables are quoted in cm^{-1}. Table 1 shows the results of measurements on a 160 μ thick dibenzyl crystal with about 0.04% of stilbene (Fig.1a). The first column gives relative intensities obtained visually. The second column

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gives frequencies in cm^{-1} measured with 1-2 cm^{-1} precision for narrow lines, 3-5 cm^{-1} for narrow bands and 10-15 cm^{-1} for wide bands. The third column gives the wave-number differences with respect to the 29904 cm^{-1} line and similar information. The fourth column contains remarks. Fig.2 shows the luminescence spectrum of dibenzyl with 3-4% of stilbene (5% according to the caption under Fig.2). All measured luminescence lines of a crystal with 0.015% of stilbene (Fig.3a) are given in Table 2. The first column gives the relative intensities, the second - the frequencies in cm^{-1}, the third - the frequency differences with respect to the 29902 cm^{-1} line, the fourth - similar frequency differences calculated with

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respect to other lines. The fifth column contains remarks. Fig.3 gives the luminescence spectra for dibenzyl crystals with 0.015% of stilbene (Fig.3a) and 5% of stilbene (Fig.3b). Analysis of the spectra yields the main absorption series due to intra-molecular vibrations with frequencies: 208, 297, 402, 590, 745, 847, 978, 1249, 1333, 1427, 1538 and 1593 cm^{-1}. Each of these frequencies, except 402 and 590 cm^{-1}, is itself a beginning of a further series. In addition to the series of strong lines beginning at 29904 cm^{-1}, there is a second, weaker, series, which begins at 29840 cm^{-1} (Fig.1b). Fig.1v gives the absorption spectrum of dibenzyl 2 μ thick with 5% stilbene. Compared with Fig.1b, the absorption bands

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in Fig.1v are slightly displaced, broadened, weakened and immersed in a strong background. The reason for such a change may lie in disorder in the orientation of stilbene molecules and formation of disordered aggregates on rapid crystallization. Comparison of the absorption and luminescence spectra shows that certain lines are either identical or very close to one another in both spectra. Table 3 shows that in a frequency interval of 200 cm^{-1} no less than nine lines coincide. It is suggested that these lines and the short series occurring with them are due to molecules of stilbene which are deformed in the dibenzyl lattice. There are 3 figures, 3 tables and 6 references, of which 5 are Russian and 1 German.

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1. Stilbene crystals-Impurities 2. Stilbene crystals-Absorption

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TITLE: Absorption and Luminescence of Stilbene Impurity in Tolane Crystals at 20.4°K. (Pogloshcheniye i lyuminestsentsiya stil'bena kak primesi v kristallakh tolana pri 20.4°K.)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.1, pp.30-39. (USSR).

ABSTRACT: Absorption by stilbene molecules in the tolane crystal lattice differs in certain respects from absorption by the same molecules in the dibenzyl lattice (see the preceding paper). The most important difference is in the polarization of certain absorption bands of stilbene in tolane which are rather similar to the absorption bands of tolane itself (Ref.2). Theory of this effect was developed by E.I. Rashba (Ref.3). To study this effect in detail, the technique used in Ref.2 was followed. A Hilger quartz spectrograph of

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high dispersion was used. Fig.1 shows the absorption spectra of 160 μ thick tolane monocrystals with 0.4% of stilbene. Table 1 gives the absorption bands and lines of stilbene in tolane at 20.4°K. The first four columns give the intensities of strong and weak lines shown in Fig.1. The fifth column gives the frequency in cm^{-1}, the sixth column gives the various frequency differences and the seventh column contains remarks. Table 2 gives some frequencies and intensities of the absorption spectra of tolane crystals with various amounts of stilbene. The impurity lines are found to be strongly polarized; each new transition to a

Card 2/5 deformed or differently oriented molecule could depress