NEPORENT, B. S.

FD-3257

USSR/Physics - Infrared absorption anisotropy

Card 1/1 Pub. 146 - 16/44

Author : Zaytsev, G. A.; Neporent, B. S.

Title : Anisotropy of absorption of gypsum crystals in the infrared region

Periodical : Zhur. eksp. i teor. fiz., 29, No 6(12), Dec 1955, 857-863

Abstract : Designs of a polarizational method for and microscope adjunct to infrared spectrometry. The authors investigate the anisotropy of absorption and reflection of gypsum crystals in the region 2-11 microns. For a number of bands corresponding to the oscillations of water molecules and SO_4^{-} groups they discover pleochronism and extension to variously polarized components. They make more precise the origin of certain bands and give conclusions concerning the nature of the oscillations bonds in the lattice. Fourteen references: e.g. On Matsumura, Mem. Faculty Sci. Kyushu Univ., 1 B, 1-3, 1951 (Chem. Abstr., 43651, 1952).

Institution : --

Submitted : August 12, 1954

NEPORENT, B. S.

Anisotropy of the absorption of gypsum crystals in the infrared. G. A. Zaitsev and B. S. Neporent. *Soviet Phys. JETP* 2, 733-6(1956)(English translation).—See C.A. 50, 5404b. D. M. R.

Phys 3

Neporent, B. S

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

Abs Jour : Referat Zhur - Khimiya, No 3, 1957, 7191

Author : Neporent, B.S. and Borisevich, N.A.
Title : Spectra and Yield of Anti-Stokes and Stokes Fluorescence of Vapors of Aromatic Compounds

Orig Pub : Optika i spektroskopiya, 1956, Vol 1, No 2, 143-154

Abstract : The spectrum and the absolute value of the fluorescence quantum yield have beer determined for vapors and solutions of the derivatives of phthalimide: 3-amino- ,3, 6-diamino-, 3,6-tetramethyldiamino-, 3-methylamino-, 3-acetamido-6-dimethylamino-., and 3-dimethylamino-6-amino as a function of the wavelength of the exciting light, the temperature, and the vapor pressure. In the case of vapors a decrease in quantum yield is observed for shifts both in the Stokes and in the anti-Stokes region. The first of these phenomena is explained by

Card 1/2

USSR / Optics Neporent, B.S. K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10403

Author : Borisevich, N.A., Neporent, B.S.
Inst : Not Given
Title : Effect of Extraneous Gases on Spectra and Fluorescence Yield of Vapors of Aromatic Compounds.

Orig Pub: Optika i spektroskopiya, 1956, 1, No 4, 536-545

Abstract: A study was made of the dependence of spectra of fluorescence yield of vapors of 3.6-tetramethyldiaminophtalimide, 3-dimethylamino-6-aminophtalimide, 3-aminophtalimide, and 3.6-diaminophtalimide on the pressure of extraneous gases at various temperatures. It is established that the effect of extraneous gases is not restricted to reinforcement of the fluorescence as a result of stabilization of the excited molecules, which takes place only upon excitation by large quanta. During excitation by small quanta one observes the reverse phenomenon, weakening of fluorescence.

Card : 1/2

USSR / Optics K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10403

It is shown that the excitation frequency, at which no changes occur in the fluorescence yield in the presence of extraneous gases (called the inversion frequency) coincides with the frequency of the electron transition. The observed phenomena of the reinforcement and weakening of the fluorescence are explained by the transfer of energy from the excited molecule to the molecule of the extraneous gas or vice versa. An estimate is made of the average amount of energy, transferred upon collision. Comparison of the values of the fluorescence yield of solutions and vapors shows that the action of the solvent on the fluorescing ability of the dissolved substance is not restricted to a rapid establishment of thermal equilibrium in the system, which is of universal character, but exerts also a specific influence.

A method is proposed for separate investigation of the specific and universal action of the solvent.

Card : 2/2

USSR/Physical Chemistry. Molecule. Chemical bond. B-4

NEPORENT, B.S.

Abs Jour : Ref Zhur - Khimiya No 7, 1957, 21978

Author : Neporent B. S. and Solodovnikov A. A.
Inst : None
Title : Effect of Helium on the intensity of spectra of vapors of complex aromatic compounds.

Orig Pub : Optika i spektroskopiya, 1956, 1, No 7, 951-952

Abstract : Continuing the investigation of the effect of light gases on absorption coefficient of vapors of complex aromatic substances (Neporent B. S. Dokl. AN SSSR, 1950, 72, 35; Zh. eksperim. i teor. fiziki, 1951, 21, 172), the effect of He on the intensity of absorption and fluorescence of vapors of 3-dimethylamino-6-aminophthalimide (I) was studied. Addition of He decreases absorption coefficient of rarified gases of I, and at each pressure of I (0.15, 0.05 and 0.008 mm Hg) there is a "saturation" of the decrease in intensity of fluorescence (absorption coefficient), whereby the magnitude of the limiting weakening is increased and the pressure of He, at which this weakening is reached, is decreased as the elasticity of the vapors of substance under investigation is de-

Card 1/2

NEPORENT, B.S.

Regular patterns in fluorescence and adsorption spectra and the surface structure of complex molecules. Izv.AN SSSR Ser.fiz.20 no.4:455-457 Ap '56. (MIRA 10:1)
(Luminescence) (Fluorescence)

NEPORENT, B.S.; BORISEVICH, N.A.

Spectra and emission of Stokes and anti-Stokes fluorescence of aromatic compounds. Izv. AN SSSR Ser.fiz. 20 no.4:476 Ap'56. (MIRA 10:1)
(Luminescence) (Fluorescence)

BORISEVICH, N.A.; NEPORENT, B.S.

Influence of gaseous impurities on the spectra and emission of fruorescence of vapors of aromatic compaunds. Izv.AN SSSR Ser.fiz.20 no.4:477 Ap '56. (MIRA 10:1)

(Luminescence) (Fluorescence)

NEPORENT, B.S.

K

USSR/Optics

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10516

Author : Neporent B.S., Klochkov, V.P.
Inst : Not Given
Title : High Transmission Spectrometric Setup for the Investigation of Luminescence.

Orig Pub: Izv. AN SSSR, ser. fiz. 1956, 20, No 5, 601-604

Abstract: Description of a high transmission spectrometric setup for the investigation of spectra of luminescence, based on a monochromator employing a diffraction grating of 600 lines/mm measuring 150 x 120 mm. The monochromator is constructed according to the Ebert-Fasty scheme. The focal distance of the collimator mirror is 500 mm. The radiation receivers are two photomultipliers: FEU-18 (λ_{max} = 360 millimicrons) and FEU-22 (λ_{max} = 750 millimicrons). Various diffraction orders are used (the lattice reflects approximately 55% of the incident radiation near 1000 millimicrons

Card : 1/2

USSR/Optics K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10516

in the first order, 500 millimicrons in the second order, and 300 millimicrons in the third), and it is possible to measure with the setup spectra in the region of 250 to 1100 millimicrons. The calibration of the instrument for spectral sensitivity is carried out with the aid of a tungsten ribbon lamp with known ribbon temperature.

Card : 2/2

NEPORENT, B.S.

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, Korniiskiy, 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

Chulanovskiy, V.M., M.P. Burgova, G.S. Denisov, and Ye. L. Zhukova. Characteristics of Molecular Bonding in Nonelectrolyte Solutions Studied by Means of Infrared Absorption Spectra 42

Neporent, B.S., and V.P. Klochkov. Dependence of the Absorption Spectra of Organic Vapors on the Concentration 51

Neporent, B.S., and M.G. Bakhshiyev. Effect of the Solvent on the Value of the Absorption Integral for Complex Organic Compounds 52

Glauberman, A. Ye. Theory of Electron Spectra of Condensed Systems 53

Aleksanyan, V.T., and Kh. Ye. Sterin. Raman Spectra of Bicyclo-2,2,1-heptane, Bicyclo-2,2,1-heptene-5, Bicyclo-2,2,1-heptadiene-2,5, and of Their Homologs 59

Neporent, B.S., K.P. Vasilevskiy, and N.A. Lapina. Qualitative Absorption by Means of Water Vapor in Near Infrared Region

NEPORENT, B. S., and V. P. KLOCHKOV

"The Effect of Light Gases on the Absorption Spectra of Vapors of Aromatic Compounds," a paper submitted at the International Meeting of European Molecular Spectorscopists, Freiburg, Breisgau, West Germany. 7 July 1957

NEPORENT, B. S.

49-4-21/23

AUTHORS: B. S. Neporent, V. F. Belov, O. D. Dmitriyevskiy, G. A. Zaytsev, V. G. Kastrov, M. S. Kiseleva, L. A. Kudryavtseva and I. V. Patalakhin.

TITLE: Experience gained in direct measurement of the distribution of the humidity of the atmosphere by means of the spectral method. (Opyt pryamogo izmereniya vysotnogo raspredeleniya vlazhnosti atmosfery spektral'nym metodom).

PERIODICAL: Izvestiya Akademii Nauk, Seriya Geofizicheskaya, 1957, No.4, pp. 552-555 (USSR).

ABSTRACT: Some recent American communications (Refs.5-7) refer to investigating the spectrum of the Sun in the infrared range during flights in the upper layers of the atmosphere, in which observation of absorption bands of water vapours are mentioned and views are expressed on the possible concentrations of these vapours. In this paper the results are described of the first attempts to determine directly the content of water vapour in the atmosphere by means of specially designed spectral apparatus. The operation of the instrument was described in detail by Neporent, B.S. et alii (Ref.8); it consists of a step-wise vacuum monochromator with a diffraction lattice of 300 lines/mm of the size 50 x 70 mm which subdivides the infrared range

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49-4-21/23

Experience gained in direct measurement of the distribution of the humidity of the atmosphere by means of the spectral method.

into five sections (1.24, 1.40, 1.50, 1.88, 2.2 μ), the wave-lengths 1.40 and 1.88μ belong to the absorption bands of water vapour; utilisation of two bands is provided for extending the range of the measured water concentrations. The wave-lengths 1.24, 1.50 and 2.2μ fall between individual bands and serve for determining the initial intensities in the bands 1.40 and 1.88μ by means of interpolation. The linear dispersion of the instrument equals 100 a/mm; the entry and exit slots are 1.5 mm wide. Illumination of the input slot is effected by means of a source with a circular emanating surface fitted with a dispersion plate of magnesium oxide. Experiments carried out at ground level showed that,in the operating range of the spectrum, the role of radiation scattered by the sky is insignificant. The measured radiation is modulated with a frequency of 850 c.p.s. using as a receiver of the radiation a cooled PbS photo resistance. After amplification, the signals are transmitted by radio to the ground. In addition to the basic signals transmitted in the operating position of the diffraction lattice (which is turned by means of a cam), calibrating signals are

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49-4-21/23

Experience gained in direct measurement of the distribution of the humidity of the atmosphere by means of the spectral method.

transmitted and also signals from the pressure gauge, etc. The respective switching is effected by means of a commutator which is coupled with the cam for scanning of the spectrum. The full cycle of the instrument is 2.5 secs and, therefore, the slow changes of the location of the scattering plate of the light source relative to the Sun's rays caused by random oscillations of the instrument during free flight should not affect the results of determination of the relative intensities of the adjacent parts of the spectrum. The results are plotted in graphs. Fig.1 shows the calibration curve obtained on the basis of the exponential law; Fig.2 shows the graduation curve obtained on the basis of the square root; Fig.3 shows a part of the absorption band of water vapour (1.4μ) measured on the spectrometer with altitude scanning, whereby the spectral width of the slot is shown at the bottom part of this Figure. Fig.4 shows the dependence of the absorption function A on the altitude (up to 17 km) for the band 1.4μ; Fig.5 shows the dependence of the quantity of water precipitating along the vertical on the height reached by the instrument; Fig.6 shows the dependence of

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Experience gained in direct measurement of the distribution of the humidity of the atmosphere by means of the spectral method.

water concentration in the atmosphere on altitude, in mm of water precipitated per 1 km of the layer. Although the obtained data require further checking, they do indicate the usefulness of the described method and apparatus for such measurements. Increased accuracy and sensitivity of the instrument for measuring low water concentrations could be achieved by using more intensive absorption bands.
There are six figures and 12 references, 4 of which are Slavic.

SUBMITTED: November 13, 1956.

AVAILABLE: Library of Congress.

Card 4/4

NEPOR[illegible] B. S.

51-2-10/15

AUTHORS: Dmitriyevskiy, O.D., Neporent, B.S. and Nikitin, V.A.

TITLE: A high-speed infrared spectrometer for the 0.8-3.0μ region. (Skorostnoy infrakrasnyy spektrometr dlya oblasti 0.8-3.0 μ).

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy) 1957, Vol.3, No.2, pp.180-181 (U.S.S.R.)

ABSTRACT: Complete translation. The usual methods of measurement of the infrared (i.r.) spectra require considerable time and can therefore be used to study only sufficiently stationary objects. There exists a number of problems where rapid measurement of the i.r. spectra would yield important theoretical and practical results. We constructed a laboratory model of a high-speed spectrometer with a PbS receiver for the region 0.8-3.0μ. In the monochromator interchangeable dispersing elements were used: a lithium fluoride prism and an echelette reflection diffraction grating. Rapid scanning of the spectrum was achieved by means of an oscillating plane mirror. A wide-band amplifier (with a time constant $\tau \approx 5 \times 10^{-6}$ sec) and vibration (string) and electron (cathode-ray) oscillographs were used for recording the spectra. The vibration-oscillograph record represents a succession of "mirror" pairs of spectra of a selected portion of an object, as shown in Fig.1. Pulses from an additional source /Ref.1/ are used for wavelength calibration (as in oscillogram 2 in Fig.1); the time scale is given by a 2000 c/s sinusoidal trace (shown in Fig.1, 1 and 2). The

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51-2-10/15

A high-speed infrared spectrometer for the 0.8-3.0μ region (Cont.)

vibration oscillograph has the greatest inertia ($\tau \approx 5 \times 10^{-5}$ sec) in the system employed. At higher recording speeds this causes "smoothing" of the spectra. When a cathode-ray oscillograph (c.r.o.) is used, the apparatus is limited only by the inertia of the receiver ($\tau \approx 2 \times 10^{-5}$ sec) which makes it possible either to increase the recording speed or to improve the resolution at the same speed. Spectra obtained with a c.r.o. are shown in Fig.2. This figure shows that on recording spectral intervals of $\Delta\lambda \approx 0.1\mu$ in time $\Delta t \approx 0.001$ sec the spectrometer has a resolving power $P \approx 250$ (in the region 2.0-2.5μ) and is therefore an improvement on the instruments described in the literature. Figure Captions. Fig.1: Benzene absorption band at 2.2μ(1) and chloroform spectrum at 0.8-2.5μ (2) recorded with a vibration oscillograph (the 2000 c/s sinusoid gives the time scale). A and B are the two "mirror" spectra, the distance between them being roughly equal to the half-period of the scanning mirror. The recording speeds are: 60 spectra/sec (1) and 110 spectra/sec (2). Fig.2: The c.r.o.-recorded spectra. 1, 2, 3 represent respectively benzene absorption at 1.7 and 2.2μ and atmospheric water vapour absorption at 2.6μ. Recording times (in sec) are shown in the figure. References: /1/ B.W.Bullock and S. Silverman. J.Opt.Soc.Am., 40, 608 (1950).

Card 2/2

SUBMITTED: February 26, 1957.
AVAILABLE: Library of Congress

NEPORENT, B. S.

51-3-13/14

AUTHORS: Neporent, B. S., Vasilevskiy, K. P., Lapina, N. A. and Fursenkov, V. A.

TITLE: A Vacuum Spectrometer with a Diffraction Grating for the 0.7-3 μ Spectral Region. (Vakuumnyy spektrometr s difraktsionnoy reshetkoy dlya oblasti spektra 0.7-3 μ)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr.3, pp.289-293. (USSR)

ABSTRACT: This paper described apparatus of high resolving power for obtaining spectra in the region 0.7-3 μ. It consists of a recording vacuum spectrometer with a diffraction grating and a cell which light is made to traverse many times so that its path length in the vessel can be 180 m. This apparatus is suitable for recording of spectra of rarefied or weakly absorbing gases at temperatures from room temperature to 100°C. The optical part of the apparatus is shown in Fig.1. Fig.2 shows the general view of the apparatus with the control panel. The cell used in this apparatus follows in its construction Ref. 14 and 15. The diffraction grating used is of echelette type, 150 x 150 mm, with 300 lines per millimetre. This

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51-3-13/14

A Vacuum Spectrometer with a Diffraction Grating for the 0.7-3 μ Spectral Region.

grating reflects 75% of the incident light at 2 μ, 55% at 1.5 μ and 60% at 2.3 μ. The monochromater used follows Ref.16. The spectrometer is placed in a vacuum chamber (0.1 mm Hg). The signal falls on a PbS photoresistance and is amplified. For this purpose the incident light is modulated by a perforated disc at 550 c/s frequency. This apparatus makes it possible to resolve spectra down to 0.1 cm^{-1}. Fig.4 shows radiational lines of water vapours near 3900 cm^{-1} obtained using the apparatus described. The slit width was 0.06 cm^{-1} and lines approximately 0.1 cm^{-1} distant from each other are resolved. This means that the resolving power of the instrument reaches 40 000, and this corresponds to 45 000 resolving power of the diffraction grating. Fig.5 shows absorption spectra of water vapours near 2.7 μ obtained using path lengths of 8.8 (broken curve) and 120.8 (continuous curve) metres respectively. When the container used was of quartz, absorption and emission of carbon dioxide could be measured with this apparatus.

Card 2/3

NEPORENT, B.S.

51-5-10/11

AUTHORS: Neporent, B.S. and Klochkov, V.P.

TITLE: On the Mechanism of the Effect of Light Gases on the Absorption of Vapours of Aromatic Compounds (K voprosu o mekhanizme deystviya legkikh gazov na pogloshcheniye parov aromaticheskikh soyedineniy)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr 5, pp.529-535 (USSR)

ABSTRACT: The first of the authors has shown (Ref.1) that light gases and, in particular, helium, have an effect on the intensity of the electron absorption spectrum of β-naphthylamine vapours. In a subsequent work (Ref.2) it was shown that the phenomenon occurs in vapours of 3-dimethylamino-6-aminophthalamide and therefore is of a quite general nature. The phenomenon takes the form of a considerable decrease in the absorption coefficient of the vapours when light gases are added to them but is not accompanied by a change in the form of the spectra. The absorption coefficient ε of the vapours under investigation gradually decreases as the vapour pressure of the added gas increases, or, as the number of collisions, z, between the molecules of the vapour and those of the added

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51-5-10/11

On the Mechanism of the Effect of Light Gases on the Absorption of Vapours of Aromatic Compounds.

gas increases. The reduction in the value of the absorption coefficient ceases at a certain value of z and remains constant thereafter (Fig.2). It was established that the limiting value of the ratio ε_∞ to ε_0 reached under the action of helium decreases when the vapour pressure, P_N, decreases or the temperature increases. Results support the hypothesis of the existence in the vapours of intermolecular interactions at "large" distances. From the energy dependence of the limiting absorption an estimate is made of the energy necessary for the formation of an excited state of a 3-aminophthalamide molecule on collision with a helium atom. Using the example of acetone and benzophenone, it is shown that the phenomenon under investigation is characteristic for most aromatic compounds. There are 4 figures, 1 table and 7 references, 6 of which are Slavic.

SUBMITTED: March 11, 1957.

AVAILABLE: Library of Congress.

Card 2/2

20-114-3-20/60

AUTHORS: Neporent, B. S., Klochkov, V. P.

TITLE: The Dependence of the Absorption Spectra of the Vapors of Organic Compounds on Concentration (Zavisimost' spektrov pogloshcheniya parov organicheskikh soyedineniy ot kontsentratsii)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 3, pp. 524-527 (USSR)

ABSTRACT: Anthracene (I), 3-acetylaminophthalimide (II), 3-aminophthalimide (III) and 3-dimethylamino-6-aminophthalimide (IV) were used as test objects. The molecules of substance I which has spectra with partially permitted structure belong to simple monatomic molecules. In substances II, III and IV continuous spectra were found which belong to complicated multiatomic spectra. On transition form II to III and IV a transition from modulation spectra to fading spectra takes place. The device used in the measurements was already described in an earlier paper. The results of the most important investigations are compiled in a diagram. The values of concentrations belonging to these curves and the intensities of the bands are compiled in a table. When the concentration changes within a certain

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20-114 -20/60

The Dependence of the Absorption Spectra of the Vapors of Organic Compounds on Concentration

interval the form of the absorption spectra also changes. The
character of the changes and above all the domain of the
concentrations in which these changes occur depend on the
type of molecules to be investigated. The authors here examine
the character of these changes taking the vapors of 3-amino-
phthalimide as example. The reduction of the concentration
from $6\cdot 10^{15}$ to $2,5\cdot 10^{15}$ molecules/cm^3 does not cause any
change in the form of the spectrum. Upon further reduction
of the concentration to $0,1\cdot 10^{15}$ molecules/cm^3 the band
slightly narrows and besides it is displaced toward the side
of higher frequencies. Thereafter traces of an oscillation
structure of the spectrum also occur. Upon transition from
anthracene of 3-amino-phthalimide the lower limit concentra-
tion, at which the form of the spectra begins to change, de-
creases. The intermolecular interaction increases with in-
creasing innermolecular interaction. Finally some provisional
remarks are made on the nature of the intermolecular inter-
actions to be investigated. There are 1 figure, 1 table, and
13 references, 8 of which are Slavic.

Card 2/3

20-114 3-20/60

The Dependence of the Absorption Spectra of the Vapors of Organic Compounds on Concentration

PRESENTED: January 14, 1957, by A. N. Terenin, Member of the Academy

SUBMITTED: January 9, 1957

Card 3/3

NEPORENT, B. S.

"The Status of Molecular Spectroscopy in Soviet Countries: Theory of Characteristics of vibration spectra, Systematic studies of Raman Spectra, Study of water-vapor spectrum in the regions 50-150 and 1 to 3 ."

paper presented at the Joint Commission on Spectroscopy and 10th General Assembly of Intl. Astronomical Union, Mosbow, Aug 1958.
12-15

Neporent B. S.

51-4-2-28/28

AUTHORS: Kaliteyevskiy, N., Neporent, B. and Feofilov, P.

TITLE: XI-th Conference on Spectroscopy. (XI soveshchaniye po spektroskopii.)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.2, pp.282-284 (USSR)

ABSTRACT: XI-th Conference on Spectroscopy, organized by the Spectroscopy Commission of the Academy of Sciences of the USSR, was held in Moscow on 2-10 December, 1957. This Conference was limited to the problems of physics of atomic and molecular spectra and to spectroscopy of solid bodies including luminescence methods. 600 delegates from 36 Soviet towns took part in the Conference, as well as 12 foreign visitors from 8 countries. The Conference was opened by S.L. Mandel'shtam and a review lecture of S.E. Frish, "Soviet Spectroscopy in the Last 40 Years" was heard. In 7 plenary and 12 sectional sessions about 130 papers were read. Over 30 papers were on atomic spectroscopy, about 60 dealt with molecular spectra and the remainder were concerned with the spectroscopy of solid bodies. A more detailed report of this Conference will be

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51- 4-2-28/28

XI-th Conference on Spectroscopy.

published in "Uspekhi Fizicheskikh Nauk". In atomic spectroscopy the papers dealt with four main problems: (1) calculation of energy levels of atoms and determination of atomic constants, (2) interaction of the nucleus with the electron envelope, (3) spectroscopy of gaseous discharges, (4) spectroscopic methods of determination of temperature. The largest number of papers presented at the Conference dealt with molecular spectra. The subjects reported on included electron and vibrational spectra, Raman spectra, rotational spectra and Rayleigh scattering of light as well as dispersion in organic substances. Papers on crystal spectroscopy dealt with the following problems: (1) spectroscopy of molecular crystals, (2) spectroscopic detection of excitons, (3) spectroscopy of ionic crystals containing activating centres, (4) spectroscopy of colour centres in ionic crystals. Papers on spectroscopic instruments were also read at the Conference. In spite of limitation of the subjects dealt with at the Conference, the sessions were overloaded and further limitation of the subject is suggested for the next conference. The

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51-4-2-28/29

XI-th Conference on Spectroscopy.

general conclusions are that the spectroscopic theory has reached a higher stage of development. Further advances were made in the infrared spectroscopy as well as in radio-spectroscopy. Spectroscopic investigations of gaseous discharges and the work on Raman scattering were well represented. The number of papers on spectroscopy of solids had increased and the technique of spectroscopic studies has improved.

1. **Conferences-Spectroscopy-Moscow** 2. **Spectroscopy-USSR**

Card 3/3

Sov/51-4-4-7/24

AUTHORS: Vasilevskiy, K.P. and Neporent, B.S.

TITLE: Dependence of the Infra-red Absorption by Water Vapour on its Concentration and on Path Length for the Case of a Separate Line and for a Group of Lines in the 2.7 μ Band (Zavisimost' pogloshcheniya infrakrasnoy radiatsii parami vody ot kontsentratsii i dliny puti v sluchayakh otdel'noy linii i gruppy liniy polosy 2.7 μ)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol IV, Nr 4, pp 474-480 (USSR).

ABSTRACT: A preliminary communication on the subject of the present paper was given at the Tenth Conference on Spectroscopy on July 12, 1956. The paper gives the results of measurements of the infra-red absorption by a single line at 4 025.38 cm^{-1} and by a group of 9 lines in the region 3 970-3 978 cm^{-1} which belong to the ν_3 and ν_1 bands of water vapour. Concentration of water vapour C was varied from 123×10^{-7} to 45.5×10^{-7} mol/cm^3 and absorption path lengths were from 8.8 to 160.8 m. The part of the spectrum containing the 4025.38 cm^{-1} line is shown in Fig. 1. The group of 9 lines in the region 3 970 - 3 978 cm^{-1} is given by arrows in Figure 2, which represents the spectrum

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Sov/51-4-4-7/24

Dependence of the Infra-red Absorption by Water Vapour on its Concentration and on Path Length for the Case of a Separate Line and for a Group of Lines in the 2.7 µ Band

obtained at a water vapour concentration of 7.37×10^{-7} mol/cm^3 and absorption path lengths of 8.8 and 120.8 m. The equivalent width A was determined by integration of the spectral curves by means of a planimeter. Dispersion of the spectrograph was 2.5 cm^{-1}/mm in the region of interest and the best resolution was about 0.1 cm^{-1}. A lead sulphide photo-resistance was used as the receiver. A multiple-passage cell had a construction similar to that described in Refs 17, 18. The cell temperature was 60 °C in all experiments. The results of measurements for the 4 025 cm^{-1} lines are given in Figure 3 in the form of dependence of the equivalent width A on $\sqrt{Cl}$. Figure 3 shows that, for A from 0.1 to 0.9 cm^{-1}, A is in fact proportional to $\sqrt{Cl}$. A linear dependence of A/C on $\sqrt{l}$ for the 4 025 cm^{-1} line is shown in Figure 4 for the range of values of A from 0.1 to 0.9 cm^{-1}. Departures from straight lines in Figures 3 and 4 are observed at low concentrations (Curves 1

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Dependence of the Infra-red Absorption by Water Vapour on its Concentration and on Path Length for the Case of a Separate Line and for a Group of Lines in the 2.7 μ Band

and 2 in Figure 3) and at high concentrations (Curves 7 and 6 in Figure 3). In Figure 4, Curves 1, 2 and 7 show departures from the general trend. The departures at higher concentrations (at values of A greater than 0.9 cm^{-1}) are due to overlapping of the studied line (4 025 cm^{1-}) with its neighbours as shown in Figure 1. Departures at low concentrations are due to a decrease in the line width when the Doppler width can no longer be neglected as compared with the collision width. The results of measurements of the equivalent width A for the 3 970-3 978 cm^{-1} group are shown in Figure 5 in the form of a dependence of A on $\sqrt{Cl}$. The square-root law is observed up to values of about 2-2.5 cm^{-1}. In the region of applicability of the square-root law, the angle of slope of the rectilinear portions of curves of Figure 5 is proportional to the square root of the concentration of water vapour C. This is confirmed by Figure 6 which shows dependence of A/C on $\sqrt{l}$. The black

Dependence of the Infra-red Absorption by Water Vapour on its Concentration and on Path Length for the Case of a Separate Line and for a Group of Lines in the 2.7 μ Band SOV/51-4-4-7/24

circles and the continuous curve in Figure 6 correspond to the rectilinear portions of the Curves 2-5 of Figure 5. Figure 7 repeats the results of Figure 5 in the form of a dependence of A on log(Cl). In this case, the points for values of A greater than 2.5 cm^{-1} are found to lie on a family of parallel lines. Such a logarithmic dependence for absoprticn due to a vibrational-rotational band was first suggested by Elder and Strong (Ref 10). A more precise expression, in which dependence of the line-width on concentration was taken into account, was obtained for "strong" absorption bands of water vapour by Howard, Burch and Williams (Ref 9). The rectilinear portions of the curves in Figure 7 follow the equation obtained by Howard et al. for dependence of A on C and l.

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Dependence of the Infra-red Absorption by Water Vapour on its Concentration and on Path Length for the Case of a Separate Line and for a Group of Lines in the 2.7 μ Band

There are 7 figures and 20 references, 16 of which are in English, 3 Soviet and 1 German.

ASSOCIATION: Gosudarstvennyy opticheskiy institut im. S.I. Vavilova (State Optical Institute imeni S.I. Vavilov)

SUBMITTED: June 19, 1957

Card 5/5 1. Water vapor--Spectra

51-4-5-28/29

AUTHOR: Neporent, B.S.

TITLE: Kinetics of the Effect of Light Gases on the Intensity of Absorption Spectra of Aromatic Compound Vapours (Kinetika deystviya legkikh gazov na intensivnost' spektrov pogloshcheniya parov aromaticheskikh soyedineniy)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol IV, Nr 5, pp 703-705 (USSR)

ABSTRACT: This effect, discovered by the present author in 1945 (Ref 1), consists of a decrease of the absorption by vapours of aromatic compounds on addition of light gases (He, H_2, Ne, N_2). The effect is ascribed to collisions with light-gas molecules which cause changes in the structure of aromatic molecules accompanied by a perturbation of the π-electron system which is responsible for the appropriate absorption band. The author gives a brief theoretical discussion of these collisions.

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51-4-5-28/29

Kinetics of the Effect of Light Gases on the Intensity of Absorption Spectra of Aromatic Compound Vapours

A fuller account is to be published elsewhere (Ref 5). There are 5 Soviet references.

ASSOCIATION: Gosudarstvennyy opticheskiy institut im. S.I. Vavilova (State Optical Institute imeni S.I. Vavilov)

SUBMITTED: November 18, 1957

1. Aromatic compounds - Absorption 2. Molecules - Collision - Theory

Card 2/2

NEPORENT, B.S.; FEOFILOV, P.P.

Sixth conference on luminescence. Opt. i spektr. 4 no. 6:810-811 Je '58. (MIRA 11:8)

(Luminescence--Congresses)

SOV/51-5-6-2/19

AUTHORS: Neporent, B.S. and Bakhshiyev, N.G.

TITLE: Intensities in the Spectra of Polyatomic Molecules (Intensivnosti v spektrakh mnogoatomnykh molekul)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol 5, Nr 6, pp 634-645 (USSR)

ABSTRACT: The authors discuss the effect of a solvent on the magnitude of the absorption integral and the excited-state lifetime, and on their relationship in polyatomic molecules. It is shown that the concept of the integral intensity of electron transitions may be applied unreservedly only to complex polyatomic molecules. For simple polyatomic molecules the authors find conditions and limits within which this integral intensity still retains its physical sense. It is also shown that a solvent may be regarded as an external dielectric medium in the case of complex and some simple molecules. Various models of the system consisting of an absorbing molecule and a solvent are considered and it is found that the model in which a solvent is regarded as an isotropic medium which "impregnates" a molecule is untenable. Corrections are found necessary for the effect of the internal field in a solution; the correction applied

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may be that of Kravets (Ref 1) which is based on Lorentz's theory or it may include the reactive field. The authors discuss their own experimental values (Ref 19) of the absorption integral and the excited-state lifetime of vapours and solutions of phthalimide (I) and five of its derivatives: 3-acelylaminophthalimide (II), 3-aminophthalimide (III), 3,6-diaminophthalimide (IV), 3-dimethylamino-6-aminophthalimide (V) and 3,6-tetramethyldiaminophthalimide (VI). Only the last three (IV-VI) were regarded by the authors as complex molecules. The absorption and fluorescence spectra of vapours (thin curves) and ethyl-alcohol solutions (thick curves) of substances I-VI, together with their structural formulae, are given in Fig 1. The absorption and fluorescence spectra were constructed using the data of Ref 19 and are normalized to equal areas. Figs 2 and 3 show theoretical and experimental values of the corrections to the absorption integral, which allow for the effect of solvents. Table 1 gives the oscillator strengths for the six substances discussed (experimental data taken from Ref 19) both as vapours and as solutions. The following solvents were used: methyl alcohol, water, ether, n-heptane, dioxane, benzene, heptane + benzene, ethyl alcohol.

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Intensities in the Spectra of Polyatomic Molecules

Figs 4 and 5 show the corrections to the excited-state lifetimes which allow for the effect of solvents. Table 2 lists these lifetimes for substances II-VI (phthalimide does not fluoresce), both as vapours and as solutions (solvents as above). It was found that the theoretical relationships agree with the experimental values when Onsager's reactive field is allowed for. Somewhat poorer agreement is obtained using Lorentz's correction. There are 5 figures, 2 tables and 34 references, 13 of which are Soviet, 9 American, 8 German, 2 English, 1 French and 1 Dutch.

SUBMITTED: January 7, 1958

Card 3/3

AUTHOR: Neporent, B. S. SO7/48-22-9-1o/4o

TITLE: Effect of Light Gases on the Electron Absorption Spectra and the Interaction Between the Molecules of Aromatic Compounds (Deystviye legkikh gazov na elektronnyye spektry pogloshcheniya i vzaimodeystviye mezhdu molekulami aromaticheskikh soyedineniy)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22 , Nr 9, pp 1o51 - 1o59 (USSR)

ABSTRACT: This abstract is a survey on papers dealing with investigations of the effect of light gases upon the absorption of light by the vapors of aromatic compounds (Ref 1); this effect has been discovered by the author. Besides, the relation of this phenomenon with the remote interaction between the aromatic molecules is investigated. Such interactions were observed also in the course of other experiments carried out by the author and Klochkov (Ref 2). As result of the investigation (Refs 1,3,4) a scheme of the observed phenomenon was suggested. The light gases cause a weakening of the absorption in substances that contain chains of conjugate

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Effect of Light Gases on the Electron Absorption Spectra and SOV/48-22-9-10/40
the Interaction Between the Molecules of Aromatic Compounds

bonds (save benzene). The collisions with the particles of light gases cause changes in the structure of the investigated molecules; these changes are accompanied by a violation of their π-electron systems and by a decrease of the absorption. Because of experimental difficulties and the limitations of the spectral range accessible to investigation, which are resulting from these difficulties, the experiments to discover the structural rebuilding of the molecules in the transition from the state N into N' (according to the alteration of the infrared spectra of the vapor) have not brought any definite results as yet. The totality of experimental facts allows to assume that the investigated interactions (Ref 6) are connected with the displacements or other alterations of the π-electron shells of the molecules. It is very difficult to study this phenomenon by using the alteration of the spectra as a vehicle of investigation. The results obtained from the analysis of the effect of light gases upon the absorption by vapor are decisive.

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Effect of Light Gases on the Electron Absorption SOV/48-22-9-10/40
Spectra and the Interaction Between the Molecules of Aromatic Compounds

If the coefficient η is introduced they allow to investigate the interaction between the molecules N-N quantitatively. To a certain degree of probability it can be assumed that these interactions can be described being of a dipole-dipole type; on this occasion the theory developed earlier by Vavilov (Ref 7) and lately by Galanov (Ref 8) can be applied. The investigations probably will help to explain the mechanism of the intermolecular relations N-N as well as preventive measures against the interaction with the atoms of light gases $(N+A \rightarrow N'+A)$. There are 2 figures and 8 references, 8 of which are Soviet.

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SOV/48-22-11-20/33

24(7)

AUTHOR: Neporent, B. S.

TITLE: Relation Between the Absorption- and Luminescence Spectra of Polyatomic Molecules (Svyaz' mezhdu spektrami pogloshcheniya i lyuminestsentsii mnogoatomnykh molekul)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol 22, Nr 11, pp 1372-1376 (USSR)

ABSTRACT: In this paper the author presents a solution of the problem of the relations between the absorption- and luminescence spectra of molecules, which was obtained by a method, logically quite opposed to that used by Stepanov (Ref 9). The author proceeded from the assumption that between the absorption- and emission spectrum of a system which is in thermal equilibrium there must necessarily exist certain relations. The information collected substantiates that the differences in the spectra as demonstrated in references 1, 2, and 14 are always preserved. For this reason they will have to be subjected to further investigation, just as other differences of the molecules which correspond to different relations of the spectra. The considerations advanced in references 12 and 1 concerning the generation of the two

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Relation Between the Absorption- and Luminescence Spectra of Polyatomic Molecules

types of spectrum cannot be considered to offer a final solution of this problem. This was also remarked in reference 1. Nevertheless they permit to draw certain conclusions on the nature of the relations between the spectra and the character of molecular interactions. Among the results thus obtained the solution of the problem seems to be essential, whether it is necessary to take into account the interdependence of the electron states and of the nuclear structure with the electron transition of the molecule skeleton and the electron cloud, respectively. From this the necessity of a relaxation proceeds. If this process is taken into account a system of electron states is derived, which can be represented by a four-level scheme (Fig 2). The degeneration of such a scheme into a two-level scheme (Fig 1) is, within the limitations of this study, a special case for complex molecules, just as is the exact mirror symmetry of the spectra. Real complex molecules possess a system of electron states of the type portrayed in figure 2, which more or less deviates from the idealized scheme (Fig 1) which has hitherto commonly been used. The boundary form of the

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Relation Between the Absorption- and Luminescence Spectra of Polyatomic Molecules

interrelations between the levels in figure 2 is not known. For the boundary case spectra have as yet been found which are described by the relation $\Delta\nu = k\nu_{max}^2$. An analysis of the relations between the widths of the absorption- and fluorescence spectra must serve for a determination of the properties of the level systems. Further investigations must show to what degree the width of the typical damping spectra is dependent upon the relaxation rate of the molecular system after an electron transition. In some cases the scheme presented in figure 2 also applies to molecules with modulation spectra. There are 5 figures, 1 table, and 15 references, 13 of which are Soviet.

24(7)
SOV/48-22-11-22/33

AUTHORS: Alentsev, M. N., Neporent, B. S., Agranovich, V. M.

TITLE: Discussion of the Lectures ~~Held~~ by B. I. Stepanov, B. S. Neporent, M. N. Alentsev, and L. A. Pakhomycheva (Preniya po dokladam B. I. Stepanova, B. S. Neporenta, M. N. Alentseva i L. A. Pakhomychevoy)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol 22, Nr 11, pp 1379-1379 (USSR)

ABSTRACT: M. N. Alentsev comments on the lecture given by Stepanov as follows: The equation specifying the energy of individual frequencies of the emission spectrum is determined only by the distribution of the molecules on the excited levels and by the probability of the corresponding transitions, if a forced emission and an interaction of the excited molecules is practically absent. Hence the luminescence spectrum under these conditions must be similar to the spectrum of thermal emission, and that means $W_\nu^{lum} = \frac{D'}{D}\alpha_\nu u_{\nu,T}$. This conclusion demonstrates that if Stepanov's relation is satisfied, this only indicates that the equilibrium distribution of the molecules with an excited

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SOV/48-22-11-22/33

Discussion of the Lectures Held by B. I. Stepanov, B. S. Neporent, M. N. Alentsev, and L. A. Pakhomycheva

electron state is stabilized with respect to the oscillation energy. If this relation is not satisfied, it can be proved that at the moment of emission the distribution is not an equilibrium one. It then corresponds to a distribution characterized by a temperature $T' \neq T$.

B. S. Neporent comments on the lecture held by M. N. Alentsev: It appears to be difficult to approve of the assumption that the excited molecules in solutions do not reach a thermal equilibrium in due time. This assumption is at variance with the experimental data on the transfer rate of the oscillation energy. Moreover it does not furnish an explanation of the divergencies found in several investigations.

V. M. Agranovich agrees with Stepanov concerning the joint relations between the luminescence- and absorption spectra. He rejects, however, his conception concerning earlier papers (A. S. Davydov, S. I. Pekar, M. A. Krivoglaz, and others) and thinks that the equation found by him should be compared with the results presented by other, earlier theories.

Card 2/2

NEPORENT, B.S., doktor fiziko-matematicheskikh nauk; FEOFILOV, P.P., doktor fiziko-matematicheskikh nauk

Molecular fluorescence and fluorescence analysis; conference in Leningrad. Vest. AN SSSR 28 no. 6:108-110 Je '58. (MIRA 11:7)
(Leningrad--Fluorescence--Congresses)

53-64-3-4/8

AUTHORS: Dmitriyevskiy, O. D., Heporent, B. S., Nikitin, V. A.

TITLE: High-Speed Spectroscopy (Skorostnaya spektrometriya)

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1958, Vol. 64, Nr 3, pp. 447-492 (USSR)

ABSTRACT: The present survey is divided into parts as follows: the main rules for the registration of the spectra in scanning, i.e. of the development of the spectrum with respect to time to be investigated (the general time equation of the spectrometer, the distortions in form of bands by the monochromator, as well as by the receiving- and recording system, of the resolving power of the spectrometer as a whole, the mutual connection of the energy and time characteristics of the spectrometer, the relations for high-speed recording of the spectra in scanning). The apparatus for high-speed spectroscopy (the apparatus for the infrared region with thermal receivers, and with photo-resistances, apparatus with photo-multipliers and photo-cells with external photo-effect, apparatus with electronic scanning, multi-channel spectral

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53-64-3-4/8

High-Speed Spectroscopy

analysers and cinespectrographs, the comparison between the parameters of high-speed spectral apparatus). The highest speed of recording is obtained with the best inertialess PbS-receivers using a circuit breaker. The tendency to develop higher registration speed with given (thermal or semiconductor-)receivers inevitably leads to a decrease of the resolving power, as well as to an increase of temporal distortions, which is tolerable, however, only in exceptional cases. According to the authors' opinion the so-called apparatus Nr 8 is best approximated to optimal operational conditions. For a PbS-receiver this apparatus has a rather high speed ($v \sim 10^5$) and also the resolving power remains sufficiently good. Above all, the distortions in this apparatus are not great. A table gives the published data on high-speed spectral apparatus of various types. There are 29 figures, 2 tables, and 71 references, 18 of which are Soviet.

1. Spectroscopy--USSR 2. Spectrographic analysis--Equipment

Card 2/2

53-65-1-6-/10

AUTHORS: Kaliteyevskiy, N., Neporent, B. S., Feofilov, P.

TITLE: Transaction of the XI. Congress on Spectroscopy (XI Soveshchaniye po spektroskopii) I. Atomic Spectroscopy (I. Atomnaya spektroskopiya)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 1, pp. 141-145 (USSR)

ABSTRACT: The XI. Congress on Spectroscopy was held at Moscow from December 2 - 10, 1957. The program was devoted to physical problems of atomic and molecular spectra and to the spectra of solids. The congress was attended by 600 delegates from 36 cities of the USSR, as well as by 12 foreign scientists from Great Britain, Eastern and Western Germany, China, Roumania, the USA, France and Yugoslavia. (The X. Congress on Spectroscopy held at L'vov in 1956 was attended by about 1500 delegates who delivered 300 lectures). The XI. congress was arranged in 7 plenary meetings and 12 sectional meetings, in the course of which more than 125 lectures were held, 30 of them dealing with atomic spectroscopy, about 60 with molecular spectroscopy and the remainder with the spectroscopy

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53-65-1-6/10

Transaction of the XI. Congress on Spectroscopy. I. Atomic Spectroscopy

of solids. S. L. Mandel'shtam opened the congress. S. E. Frish held the opening lecture: "40 years of Soviet Spectroscopy", and the participants honored the memory of the deceased Member of the Academy G. S. Landsberg. The theoretical and the experimental lectures concerning atomic spectroscopy dealt with 4 basic problems: The computation of the energy levels of the atoms and the determination of the atomic constants, the interaction between the nucleus and the shell, gas discharge spectroscopy, and finally to the spectroscopical methods of temperature determination. The following scientists lectured or took part in the discussion: Yu. N. Demkov (computation of the energy of the He-atom in its ground state). M. G. Veselov, I. B. Bersuker, A. P. Yutsis and coworkers, L. A. Vaynshteyn, N. P. Penkin, Yu. I. Ostrovskiy, L. N. Shabanov (spectra of atoms with a filled 3d-shell), A. M. Shukhtin, V. S. Yegorov (application of the "crotch-method" (met. kryukov) by Rozhdestvenskiy for the investigation of fast varying processes, e.g. pulsed discharges), Yu. P. Dontsov (investigation of about 60 lines of Zr I and Zr II) N. G. Morozova, G. P. Startsev, A. R. Striganov (U I, U II spectra), M. S. Frim, N. I. Kaliteyevskiy,

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53-65-1-6/10

Transaction of the XI. Congress on Spectroscopy. I. Atomic Spectroscopy

V. I. Perel', I. M. P. Chayka(magnetic and quadrupole-interaction between nucleus and shell), N. R. Batarchukova, G. F. Drukarev, V. I. Ochkur (determination of the exciting function for H-atoms at low impact energies), G. G. Dolgov, S. E. Frish, I. P. Bogdanova (excitation of spectral lines in the range of the negative glow), V. A. Fabrikant, Yu. M. Kagan, M. A. Mazing, S. L. Mandel'shtam (spectral line broadening), V. I. Kogan, Lokhte-Khol'tgreven (Western Germany), R. Ritchle (Eastern Germany), I. V. Dvornikova, N. N. Sobolev, Bartel's (Western Germany), A. L. Labuda, Ye. G. Martinkov and I. G. Nekrashevich. Finally M. Z. Kho_khlov, L. V. Leskov and L. P. Vasil'yeva reviewed the problem of the determination of the discharge temperature according to molecular spectra.

1. Neutron spectroscopy--USSR

Card 3/3

53-65-1-7/1o

AUTHORS: Kaliteyevskiy, N., Neporent, B. S., Feofilov, P.

TITLE: Transactions of the XI. Congress on Spectroscopy (XI. Soveshchaniye po spektroskopii) II. Molecular Spectroscopy (II Molekulyarnaya spektroskopiya) First Part

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 1, pp. 145-15
(USSR)

ABSTRACT: This congress was held at Moscow from December 2 - 1o, 1957. The lectures on molecular spectroscopy dealt with the application of these spectra to various scientific and technical problems as well as to the suitability of the spectra for special problems. The lectures dealt with the electron spectra, vibration spectra and rotational spectra in the mentioned order. L. A. Borovinskiy and M. N. Adamov, M. G. Veselov and T. K. Rebane spoke about theoretical problems of electron spectra, the latter in particular dealing with the computation of the electric and magnetic properties of molecules according to the metal model. B. I. Stepanov and L. P. Kazachenko spoke about the agreement between the absorption- and lumi-

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53-65-1-7/10

Transactions of the XI. Congress on Spectroscopy. II. Molecular Spectroscopy. First Part

nescence-ranges in compound molecules; B. S. Neporent and H. G. Bakhshiyev, as well as M. D. Galanin and Z. A. Chizhikova dealt with intensity problems. A. I. Nikitina, M. D. Galanin, G. S. Ter-Sarkisyan spoke about the connections between optical characteristics and molecule structure, B. M. Mikhaylov, V. V. Zelinskiy, V. P. Kolobkov and I. I. Reznikova dealt with the fluorescence and the phosphorescence of frozen solutions. L. V. Gurvich and I. V. Veyn dealt with the study of the equilibrium in flames for the determination of the dissociation energy of diatomic oxides of the elements of the III. group and V. I. Dianov-Klokov spoke about the absorption spectrum of liquid oxygen in the temperature range of from 77 - 153°K. V. L. Levshin and Ye. G. Baranova lectured on concentration extinguishing (kontsentratsionnoy tusheniye) in solutions. B. Ya. Sveshnikov, V. I. Shirokov, L. A. Kuznetsova and P. I. Kudryashov spoke about the kinetics of fluorescence extinction, and B. S. Neporent about new investigations of the effect of light gases on the absorption spectra of vapors and V. P. Klochkov about the long-distance interaction of aromatic molecules in gases. A. V. Karyakin

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Transactions of the XI. Congress on Spectroscopy. II. Molecular Spectroscopy. First Part

and A. V. Shablya dealt with the fluorescence extinction of adsorbates. V. M. Gryaznov, V. D. Yagodovskiy and V. I. Shimulis gave a report on the spectroscopical investigation of the catalytic transformation on metal films sublimated in a vacuum. V. I. Danilova, V. D. Gol'tsev and N. A. Prilezhayeva lectured on the spectral investigation of internal- and intramolecular interaction in simple benzene derivatives, and M. U. Belyy and K. F. Gudymenko spoke about the influence of various anions and cations on the luminescence of lead salts. A. A. Kalyubin lectured on the emission spectra of carbon and of the alcohols of the aliphatic series in an electrodeless discharge. I. V. Obreimov and I. Ya. Kachkurova reported on possibilities for the representation of electron spectra of molecules. Among the lectures dealing with vibration spectra, that delivered by I. I. Sobel'man was about the quantum mechanical theory of line intensity; M. M. Sushchinskiy spoke about the results obtained by the experimental and theoretical investigation

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Transactions of the XI. Congress on Spectroscopy. II. Molecular Spectroscopy. First Part

of vibration spectra within the range of valence oscillations of CH for some hydrocarbons. M. M. Sushchinskiy and V. D. Bogdanov reported on the computation of the resonance interaction of totally symmetric valence- and deformation oscillations of the CH-group for normal hydrocarbons.

1. Molecular spectroscopy--USSR

Card 4/4

S 53-65-1-9/10

AUTHORS: Kaliteyevskiy, N., Neporent, B., Feofilov, P.

TITLE: Transactions of the XI. Congress on Spectroscopy (XI Soveshchaniye po spektroskopii) III. Spectroscopy of Solids (III. Spektroskopiya tverdogo tela)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 1, pp. 151-155 (USSR)

ABSTRACT: This congress was held in Moscow from December 2 to December 10, 1957. The lectures on the spectroscopy of solids dealt with the following basic problems. 1) Spectroscopy of molecule crystals, 2) Problems of the spectroscopical electron determination. 3) Spectroscopy of ionic crystals with activated centers and 4) Spectroscopy of color centers in ionic crystals. The first lecture of this series was held by A. F. Prikhot'ko (Kiyev) on the absorption and the luminescence of crystals of organic compounds and on the influence of structural factors and of external actions on the electron spectra of such crystals. V. S. Medvedev reviewed the methods and the equipment serving for the optical and spectroscopical

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53-65-1-9/10

Transactions of the XI. Congress on Spectroscopy. III. Spectroscopy of Solids

investigation of crystals at low temperatures. A. F. Prikhot'ko, I. Ya. Fugol' and S. Z. Shul'gi investigated the luminescence of anthracene crystals in polarized light at 20°K, and V. L. Broude lectured on the influence of deformations on the electron spectrum of crystals. A lecture prepared and held by a group of authors of the Institute of Physics AS USSR and from the Physical-Chemical Institute imeni Karpov (V. L. Broude, Ye. A. Izrailevich, A. L. Liberman, M. I. Onopriyenko, O. S. Pakhomova, A. F. Prikhot'ko and A. I. Shatenshteyn) concerned the investigation of electron spectra of aromatic hydrocarbons and of their deutero-derivatives at 20°K. M. S. Brodin and M. S. Soskin reported on anomaly investigations in benzanthrene crystals. E. V. Shpol'skiy communicated new results of spectral investigations of aromatic hydrocarbons in frozen solutions. With the theory of molecule crystals dealt the lectures by A. F. Lubchenko and E. I. Rashba, as well as by N. D. Zhevandrov. A. F. Yatsenko reported on the investigation of infrared absorption spectra of barium titanate crystals and of some seignette-electric substances of Perovskite type. Ye. F. Gross and his coworkers devoted their attention to the spectroscopical electron determination in

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semiconductor crystals, as well as B. S. Razbirin, V. V. Sobolev and M. A. Yakobson, E. and M. Griyo (France) reported on structural analyses of luminescence spectra in CdS-crystals at low temperatures; a similar subject was dealt with by V. L. Broude, V. V. Yeremenko and E. I. Rashba, I. S. Gorban' spoke about investigations of the temperature dependence of "exciton" absorption spectra in cuprous oxide. B. I. Zakharchenya reviewed investigations of the Zeeman effect in cuprous oxide. I. Z. Fisher gave a theoretical discourse on the existence-conditions and the spectroscopical determination of the exciton. Great interest was aroused by the lecture by S. I. Pekar on the propagation of electromagnetic waves in a medium. V. S. Mashkevich, Ye. L. Feynberg spoke about their propagation in crystals, and I. I. Sobel'man reported on collective oscillations of electrons in crystals and Yu. Ye. Perlin spoke about theoretical investigations of light dispersion in crystals. The following lectures dealt with the activating impurities in crystals: by M. I. Petrashen' and T. L. Gutman, Ch. B. Lushchik and N. Ye. Lushchik (lumi-

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nescence spectra in alkali-halogen crystals) and M. L. Kats. Lectures by V. A. Arkhangel'skaya, as well as by G. Dike (USA) dealt with the Zeeman effect in crystals. V. T. Aleksanyan reported on investigations of absorption spectra of compounds of quadrivalent uranium and A. N. Sevchenko gave a survey of spectral investigations of uranyl compounds. I. V. Abarenkov reviewed quantum mechanical computations of some properties of the F-centers, V. M. Buymistrov and A. A. Shatalov reported on similar problems. V. K. Prokof'yev and I. A. Shoshin finally lectured on new designs of spectral apparatus.

1. Spectroscopy--USSR

Card 4/4

AUTHORS: Nalimov, V. V., Neporent, B. S. SOV/53-65-3-8/11

TITLE: Systems of Documentation of Molecular Spectra (Sistemy dokumentatsii molekulyarnykh spektrov)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 3, pp. 521-540 (USSR)

ABSTRACT: On the basis of numerous photocopies the authors discuss the various systems used in Western countries (especially in the USA) for tabulating the spectra of individual compounds including all known data. The codes in use as well as punched-card systems are discussed and compared (for instance the DMS and NBS systems). Photocopies are reproduced of all systems discussed. There are 16 figures, 2 tables, and 15 references, 1 of which is Soviet.

1. Molecular spectroscopy 2. Data--Analysis

Card 1/1

AUTHOR: Neporent, B. S. 20-119-4-15/60

TITLE: General Relations Between Absorption and Emission for the Modulation Spectra of Polyatomic Molecules (Obshchiye sootnosheniya mezhdu pogloshcheniyem i izlucheniyem dlya modulyatsionnykh spektrov mnogoatomnykh molekul)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 119, Nr 4, pp. 682 - 685 (USSR)

ABSTRACT: According to the author's opinion the problem of mutual relations between absobption spectra and emission spectra of polyatomic molecules of all types can be solved in the same manner as in the case of systems with narrow levels: the equilibrium of molecules with equilibrium radiation is examined, and in this way the characteristics of the individual molecules are obtained. These characteristics are then used for the investigation of the luminescence induced in stationary conditions. The author here studies molecules which can be characterized by modulation spectra. In such molecules the electron states can be considered to be independent of the oscillation states. The conditions for the equilibrium of a system consisting of

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General Relations Between Absorption and Emission for the Modulation Spectra of Polyatomic Molecules 20-119-4-15/60

such luminescent molecules with equilibrium radiation are apparently the following: A) The molecules must be distributed over normal and induced states according to the laws of statistical equilibrium. B) According to the existing amount of oscillation energy the molecules must be distributed over both electron states. C) The radiating power of the system investigated must be a product of the absorption capacity and the spectral density of equilibrium radiation, i.e. the luminescence spectrum must agree with the spectrum of the thermal radiation of the system. A formula for the condition of equilibrium is written down. The author then introduces the experimentally determined quantities into the calculation: the molecular absorption coefficient, the spectral density of the quantum yield of fluorescence, and the measured life of the induced state. The general expressions obtained here describe all relations existing between the spectral absorption and emission of polyatomic molecules with modulation spectra. These expressions apply in the same manner to simple polyatomic molecules (in which the structure of the spectrum is conserved) and also to complicated molecules. The results obtained here seem,

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General Relations Between Absorption and Emission for the Modulation Spectra of Polyatomic Molecules 20-119-4-15/60

by the way, to indicate the impossibility of describing the spectra of attenuation by means of the scheme discussed. There are 1 figure and 14 references, 12 of which are Soviet.

PRESENTED: December 9, 1957, by A. N. Terenin, Member, Academy of Sciences, USSR

SUBMITTED: December 6, 1957

Card 3/3

NEPORENT, B.S.

21(9),24(0) PHASE I BOOK EXPLOITATIO SOV/32 ?

Akademiya nauk SSSR. Fizicheskiy institut

Issledovaniya po eksperimental'noy i teoreticheskoy fizike; [sbornik]
(Studies on Experimental and Theoretical Physics; Collection of
Articles) Moscow, Izd-vo AN SSSR, 1959. 304 p. Errata slip
inserted. 2,300 copies printed.

Ed.: I. L. Fabelinskiy, Doctor of Physical and Mathematical Sci-
ences; Eds. of Publishing House: A. L. Chernyak and V. G. Berkgaut;
Tech. Ed.: Yu. V. Rylina; Commission for Publishing the Collection
in Memory of Grigoriya Samuilovich Landsberg: I. Ye. Tamm
(Chairman), Academician; M. A. Leontovich, Academician;
P. A. Bazhulin, Doctor of Physical and Mathematical Sciences;
S. L. Mandel'shtam, Doctor of Physical and Mathematical Sciences;
I. L. Fabelinskiy, Doctor of Physical and Mathematical Sciences;
F. S. Landsberg-Baryshanskaya, Candidate of Physical and Math-
ematical Sciences; and O. P. Motulevich (Secretary), Candidate of
Physical and Mathematical Sciences.

PURPOSE: This book is intended for physicists and researchers
engaged in the study of electromagnetic radiations and their role
in investigating the structure and composition of materials.

COVERAGE: The collection contains 30 articles which review
investigations in spectroscopy, sonics, molecular optics, semi-
conductor physics, nuclear physics, and other branches of
physics. The introductory chapter gives a biographical profile
of G. S. Landsberg, Professor and Head of the Department of
Optics of the Division of Physical Technology at Moscow Uni-
versity, and reviews his work in Rayleigh scattering, combat
gases, spectral analysis of metals, etc. No personalities are
mentioned. References accompany each article.

2/

B.S. NEPORENT

24(8) PHASE I BOOK EXPLOITATION SOV/2117

Soveshchaniya po eksperimental'noy tekhnike i metodam vysokotemperaturnykh issledovaniy, 1956

Eksperimental'naya tekhnika i metody issledovaniy pri vysokikh temperaturakh; trudy soveshchaniya (Experimental Techniques and Methods of Investigation at High Temperatures; Transactions of the Conference on Experimental Techniques and Methods of Investigation at High Temperatures) Moscow, AN SSSR, 1959. 789 p. (Series: Akademiya nauk SSSR. Institut metallurgii. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali) 2,200 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: A.L. Bankvitser.

PURPOSE: This book is intended for metallurgists and metallurgical engineers.

COVERAGE: This collection of scientific papers is divided into six parts: 1) thermodynamic activity and kinetics of high-temperature processes 2) constitution diagram studies 3) physical properties of liquid metals and slags 4) new analytical methods and production of pure metals 5) pyrometry, and 6) general questions. For more specific coverage, see Table of Contents.

Samarin, A.M., and D.Ya. Svet. Photoelectric Pyrometry of Liquid Metal 636

Investigations were made of the spectral radiating power of the surface of metal baths of various chemical compositions using various methods. Results were in agreement. The regularities established determined the connection between color temperature and actual temperature of clean and oxidized metal-bath surfaces. On the basis of a large number of investigations it was established that the value of the coefficient of transition from color temperature to actual temperature has practically no relationship to the presence of alloying elements and is unvarying in the presence of carbon between the limits of 0.01 and 3.5 percent. A comparison of various methods of radiation pyrometry showed that the optical spectral-ratio method is the most effective for continuous temperature control and thermography of liquid metal.

Svet, D.Ya. A Simplified System of Spectral Ratio Optical Pyrometry 645

Andreyev, I.A., and M.Z. Rozenberg. Application of the Optical Pyrometer for Measuring the Temperature of Liquid Steel 655

Mikhalevskiy, V.D., B.S. Neporent, V.K. Prokof'yev, and I.A. Tel'tevskiy. Equipment for Determining High Temperatures of Gases by the Optical Method 665

NEPORENT, B. S.

"The Influence of a Solvent upon the Electronic Spectra of Polyatomic Molecules."

report presented at the 4th International Meeting of Molecular Spectroscopy, Bologna, Italy, 7-12 Sept 1959.

University of Leningrad.

KRAVETS, Torichan Pavlovich [deceased]; SMIRNOV, V.I., akademik, red.; TERENIN, A.N., akademik, red.; GOROKHOVSKIY, Yu.N., red.; NEPORENT, B.S., red.; SAVOST'YANOVA, M.V., red.; TOPORETS, A.S., red.; FAYERMAN, G.P., red.; SAZONOV, L.S., red.izd-va; ZENDEL', M.Ye., tekhn.red.

[Works in physics] Trudy po fizike. Moskva, Izd-vo Akad.nauk SSSR, 1959. 339 p. (MIRA 12:11)

1. Chlen-korrespondent AN SSSR (for Kravets).
(Physics)

24(7), 3(7) SOV/51-6-6-16/34

AUTHORS: Kiseleva, M.S., Neporent, B.S. and Fursenkov, V.A.

TITLE: Spectral Determination of the Humidity of Air in the Upper Layers of the Atmosphere (Spektral'noye opredeleniye vlazhnosti vozdukha v verkhnikh sloyakh atmosfery)

PERIODICAL: Optika i spektroskopiya, 1959, Vol 6, Nr 6, pp 801-803 (USSR)

ABSTRACT: Diffraction-grating spectrometers were used to determine humidity of air at various heights of the atmosphere from attenuation of solar radiation in the regions of absorption by water at 1.4, 1.9 and 2.6 μ. The spectral regions around 1.2, 1.5 and 2.2 μ were used for control purposes. The various wavelengths were presented successively to the spectrometer slit by means of a device which uses a cam. The optical signal was modulated at 100 c/s and photoresistors of PbS were used as receivers (they were supplied by S.P. Tibilov and I.G. Kopilevich). The instrument used is shown schematically in Fig 1 where D is a matt aluminized plate used as the source. The instrument was calibrated by means of a special cell in which the optical path could be varied from 8 to 100 m, pressure of water vapour from 0.9 to 10 mm Hg and pressure of nitrogen which imitated atmosphere, from 50 to 500 mm Hg. A calibration curve for the 1.4 μ region is shown in Fig 2; it gives the

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Spectral Determination of the Humidity of Air in the Upper Layers of the Atmosphere SOV/51-6-6-16/34

reduced absorption as a function of the square root of the amount of water. The instrument was made as light as possible and was sent up in a balloon from Central Aerological Laboratories near Khar'kov and Moscow. After reaching its maximum height and drifting for a while, the balloon released the spectrometer and the latter fell to the ground attached to a parachute. From the absorption spectrograms obtained at various heights the amount of water vapour in the atmosphere was calculated and it is given in Fig 3. Humidity of air could be measured at heights up to 11 km using the band at 1.4 μ; for higher heights the stronger bands at 1.9 and 2.6 μ were used. Curves I, II and III in Fig 3 give the amount of water vapour as a function of height determined from measurements carried out in 1957, 1956 and 1955 respectively. The 1957 data for heights of 11-14 km (curve I) are not regarded as reliable. Acknowledgments are made to G.I. Golyshev, V.G. Kastrov, A.S. Masenkis and I.V. Patalakhin for their help. There are 3 figures and 13 references, 8 of which are English, 3 Soviet and 2 German.

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24 (7)

AUTHOR: Neporent, B. S. SOV/53-68-1-3/17

TITLE: The Development of Molecular Spectroscopy in the USSR in the Last Years (Razvitiye molekulyarnoy spektroskopii v SSSR za posledniye gody)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 68, Nr 1, pp 13-29 (USSR)

ABSTRACT: The author gives a survey of the most important articles on molecular spectroscopy published in the USSR in the last five to ten years. This article is based on a lecture delivered by the author at the Joint International Committee for Spectroscopy in Moscow on August 13, 1958. In the field of the spectroscopy of molecular oscillations papers were published by M. V. Vol'kenshteyn, M. A. Yel'yashevich, B. I. Stepanov, L. S. Mayants, M. A. Kovner, L. M. Sverdlov, M. M. Sushchinskiy, et al on the theory of oscillation spectra, by L. I Mandel'shtam, G. S. Landsberg, Ye. F. Gross, L. N. Ovander, B. I. Stepanov, P. A. Apanasevich, P. A. Bazhulin, Kh. Ye. Sterin, I. I. Sobel'man, M. M. Sushchinskiy, Ya. S. Bobovich, M. V. Vol'kenshteyn, V. T. Aleksanyan, B. A. Kazanskiy, V. I. Malyshev, Sh. Sh. Raskin, M. I. Batuyev, N. D. Sokolov, V. M. Chulanovskiy, V. A. Kolesova, M. F. Vuks, V. A. Ioffe, et al

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The Development of Molecular Spectroscopy in the USSR in the Last Years SOV/53-68-1-3/17

on Raman spectra, and by P. V. Slobodskaya, M. L. Veyngerov, V. M. Chulanovskiy, V. M. Tatevskiy, Yu. P. Pentin, V. M. Tatevskiy, Yu. N. Sheynker, A. V. Iogansen, N. G. Yaroslavskiy, G. S. Landsberg, A. A. Shubin, V. I. Malyshev, V. M. Chulanovskiy, V. A. Florinskaya, and many other authors on infrared spectroscopy. In the field of electron spectroscopy papers were published by V. F. Kondrat'yev, A. N. Terenin, N. A. Prilezhayeva, V. I. Danilova, I. V. Veyts, V. L. Gurvich, A. V. Yakovleva, I. I. Gromova, M. Z. Khokhlov, A. V. Leskov, A. V. Kleynberg, A. A. Shishlovskiy, and many other authors on the spectra of monatomic, diatomic, and triatomic molecules, by A. N. Terenin, S. I. Vavilov, P. P. Feofilov, D. N. Lyuis, M. G. Veselov, T. N. Rekasheva, M. V. Vol'kenshteyn, L. A. Borovinskiy, S. M. Yazykova, M. V. Adamov, B. S. Neporent, B. I. Stepanov, S. I. Pekar, A. S. Davydov, V. M. Agranovich, A. F. Lubchenko, M. V. Fok, N. A. Borisevich, A. N. Terenin, B. Ya. Sveshnikov, V. L. Levshin, M. D. Galanin, V. M. Chulanovskiy, and many other authors on the spectra of complex multi-atomic molecules, and by I. V. Obreimov, A. F. Prikhot'ko, K. G. Shabaldas, A. S. Davydov, Ye. F. Gross, V. A. Arkhangel'skaya,

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The Development of Molecular Spectroscopy in the USSR in the Last Years SOV/53-68-1-3/17

P. P. Feofilov, S. I. Vavilov, A. N. Sevchenko, L. V. Volod'ko, et al on electron spectra of crystals. Among other scientists, A. V. Iogansen, M. M. Sushchinskiy, I. V. Peysakhson, S. G. Rautian, G. G. Petrash, I. S. Abramson, A. I. Mogilevskiy, O. D. Dmitriyevskiy, B. S. Neporent, V. A. Nikitin, B. I. Stepanov, A. P. Ivanov, Yu. I. Chekalinskaya, A. S. Toporets, Z. V. Zhidkova, L. D. Kislovskiy, F. M. Gerasimov, M. M. Sushchinskiy, Ya. S. Bobovich, D. B. Gurevich, V. K. Prokof'yev (survey of spectral apparatus constructed in the USSR), I. V. Obreimov, V. I. Dianov-Klokov, L. A. Tumerman, and many other scientists performed methodical investigations. There are 153 Soviet references.

Card 3/3

SOV/51-7-4-27/32

AUTHORS: Vasilevskiy, K.P. and Neporent, B.S.

TITLE: The Effect of Foreign Gases on Absorption of Infrared Radiation by Water Vapour in the Region of a Single Line in the 2.7 μ Band

PERIODICAL: Optika i spektroskopiya, Vol 7, Nr 4, pp 572-574 (USSR)

ABSTRACT: The authors studied the effect of foreign gases on the integral absorption by a single water-vapour line at 4025.4 cm^{-1} (transition $v_3'' = 0, J_\tau'' = 5_{-5} \rightarrow v_3' = 1, J_\tau' = 6_{-2}$). Absorption of the $H_2O + A$, $H_2O + N_2$ and $H_2O + CO_2$ mixtures was measured at water-vapour pressure $p_1 = 0.00895$ atm (6.8 mm Hg), total pressures up to 0.83 atm and light-beam path-lengths ℓ from 8.8 to 160.8 m. These measurements were made using a spectrometer with high resolving power and a multiple-passage cell, described earlier (Ref 2). The experimental technique was the same as that given in an earlier paper ([illegible]f 1). Fig 1 shows the integral absorption A (in cm^{-1}) of the 4025.4 cm^{-1} line plotted against $(p_1\ell)$ at $p_1 = 0.00895$ atm and CO_2 pressures $p_2 = 0, 0.057, 0.188, 0.386, 0.596$ and 0.832 atm (curves 1-6 respectively). These data show that the integral absorption between 0.07 and 0.9 cm^{-1} can be given in the form:

$$A = 2\sqrt{S^o \gamma}\sqrt{p_1 \ell}, \qquad (3)$$

SOV/51-7-4-27/32

The Effect of Foreign Gases on Absorption of Infrared Radiation by Water Vapour in the Region of a Single Line in the 2.7 µ Band

where S^0 is the integral intensity of the line at $p_1 = 1$ atm and γ is the line half-width. Because of the linear dependence of γ on $(p_1 + \sigma_{12}p_2)$, the slope of the curves 1-6 in Fig 1 is proportional to $(p_1 + \sigma_{12}p_2)^{\frac{1}{2}}$, where σ_{12} is the relative efficiency of optical collisions between molecules of water and of foreign gas. Similar dependences were observed when nitrogen and argon were used as the foreign gases. The authors determined the values of σ_{12} as well as the optical diameters (d) of collisions between water and foreign molecules. All these values are given in a table on p 574. There are 2 figures, 1 table and 6 references, 2 of which are Soviet, 3 English and 1 translation.

SUBMITTED: April 23, 1959

Card 2/2

S/081/62/000/015/001/038
B168/B101

AUTHORS: Neporent, B. S., Bakhshiyev, N. G.

TITLE: Influence of the internal field on the spectral characteristics of polyatomic organic molecules in solutions

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 15, 1962, 8-9, abstract 15B24 (Sb. "Molekulyarn. spektroskopiya", L., Leningr. un-t, 1960, 35 - 51)

TEXT: This article gives results from a number of investigations, conducted by the authors during the past few years, into the universal influence of the internal field on various spectral characteristics of polyatomic molecules in solutions, such as intensity of absorption bands and of fluorescence, position of spectra, etc. New expressions were found showing how the value of the absorption integral, the duration of the excited state, and the displacement of the bands on transition from gases to solutions, are related both to the generalized physical characteristics of the solvent (dielectric constant, refraction index) and to various microcharacteristics of the dissolved substance (dipole moments, polarizability, etc.). Exten-

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S/081/62/000/015/001/038
B168/B101

Influence of the internal field ...

sive experimental verification of these expressions, taking several dozens of organic molecules of different types as examples, showed that quantitatively they agree well enough with experimental findings. It was concluded from these data that with fair approximation, as regards the complex polyatomic molecules and many simple ones, the action of the solvent on the various properties of the electron spectra can be identified, with the influence of the physical dielectric medium, which alters the size of the internal field acting in the solution on the particle under examination. [Abstracter's note: Complete translation.]

30102
S/058/61/000/009/014/050
A001/A101

3,5120

AUTHORS: Vasilevskiy, K.P., Kiseleva, M.S., Neporent, B.S.,

TITLE: Investigating absorption laws of infrared radiation by water vapors and determining humidity of atmosphere upper layers by the spectral method

PERIODICAL: Referativnyy zhurnal. Fizika, no. 9, 1961, 91, abstract 9V111 ("Dokl. Mezhvuz. nauchn. konferentsii po spektroskopii i spektr. analizu", Tomsk, Tomskiy un-t, 1960, 82 - 84)

TEXT: The authors investigated dependence of infrared radiation absorption by water vapors on partial pressure of vapors, length of path and pressure of other gases (argon, N_2, air and CO_2). The relationships obtained are used for determining concentration of water vapors in the atmosphere from attenuation of radiation in absorption bands 1.4; 1.9 and 2.7 microns, measured at various altitudes with an automatic spectrohygrometer during the flight of the instrument in a stratosphere balloon.

K. Vasilevskiy

[Abstracter's note: Complete translation]

Card 1/1

SOV/51-8-1-31/40

AUTHOR: Neporent, B.S.

TITLE: Discussion of Some of the Papers Presented at the Conference on the Theory of Spectroscopic Instruments

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 1, p 127 (USSR)

ABSTRACT: The problem of simultaneous allowance for systematic and random errors should be dealt with in a sufficiently general form. Determination of the minimum total error (when the errors themselves are small) is only of importance under frequently employed but limited experimental conditions. Representation of the square of the total error as the sum of the squares of systematic and random errors, and determination of the conditions which define strictly the optimum values of the parameters such as the scanning rate, v, the time constant τ and the slit width s is not the only possible approach. Since under experimental conditions the ratio of the slit width to the width of a measured band, and the ratio of the scanning rate, v, to the time constant, τ, may vary within wide limits, the author et al. (Ref 1) did not consider it necessary to analyse the optimum relationship between systematic and random errors especially as in many cases only one type of error needs to be minimized. I.V. Peysakhson and D.I. Shchepkin showed that

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SOV/51-8-1-31/40

Discussion of Some of the Papers Presented at the Conference on the Theory of Spectroscopic Instruments

even considerable errors due to the apparatus function may be easily allowed for by an appropriate treatment of the records. If such treatment was carried out it would not be necessary to include the apparatus-function contribution to the total error (the term as^2 in Eq (81) in Rautian's work, Ref 2). One must remember also that in some cases the contour of the band is required, in others - its area and in still others - the intensity at the band maximum and its width. All these are special cases as far as errors are concerned and this is also true of rapid methods of recording. The method of recording should be selected bearing in mind all these factors. Consequently a general formulation of the relationships between s, v and τ would be more useful than the suggested "universal" conditions of recording. There are 2 Soviet references.

Note. This is a complete translation. ✓

Card 2/2

S/051/60/008/005/007/027
E201/E491

AUTHORS: Neporent, B.S. and Mirumyants, S.O.

TITLE: A Spectroscopic Investigation of the Processes of Transformation of the Vibrational Energy of Complex Molecules During Collisions. I. Determination of the Amount of Energy Transfer and the Collision Efficiency

PERIODICAL: Optika i spektroskopiya, 1960, Vol.8, No.5, pp.635-642

TEXT: Stabilization of excited complex molecules, i.e. decrease of the probability of radiationless transitions by transfer of the excess vibrational energy during collisions with foreign particles, was used by Neporent to explain the intensification of fluorescence of aromatic vapours on addition of such foreign gases which have no quenching effect (Ref.1). In later work Neporent (Ref.2) suggested that the intensification of fluorescence by foreign gases can be used in studies of energy transfer in molecular collisions. The results reported in these two papers and in other work (Ref.3 to 9) are reviewed in some detail (Fig.1 to 3). It is shown that in studies of the processes of vibrational energy transformations during collisions of complex excited molecules with foreign molecules, it is necessary to allow for the energy exchange both

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Card 1/2

S/051/60/008/005/007/027
E201/E491

A Spectroscopic Investigation of the Processes of Transformation of the Vibrational Energy of Complex Molecules During Collisions. I. Determination of the Amount of Energy Transfer and the Collision Efficiency

with the foreign molecules and with the translational and rotational degrees of freedom of the excited molecules themselves. An improved expression was obtained for the accommodation coefficient and it was applied to the reported data (Ref.1 to 9); the results are given in Tables 1 to 3. The paper ends with a short discussion of the equations and numerical results reported here. There are 3 figures, 4 tables and 20 references: 8 Soviet, 10 English and 2 German.

VB

SUBMITTED: July 22, 1959

Card 2/2

80545

S/051/60/008/06/006/024
E201/E691

5.4130

AUTHORS: Neporent, B.S. and Bakhshiyev, N.G.

TITLE: The Role of Universal and Specific Intermolecular Interactions in the Effect of a Solvent on the Electronic Spectra of Molecules

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 6, pp 777-786 (USSR)

ABSTRACT: Intermolecular interactions in solutions are divided by the authors into two main types: universal, due to collective effect on the solute molecule of all the surrounding solvent molecules, and specific, due to individual interactions of the solute molecule with one or more of the surrounding solvent molecules. The universal interactions are "macroscopic" effects of the solvents described by properties such as permittivity, refractive index, dispersion, etc. The specific interactions are affected by the structure of the solvent molecules and are called "microscopic" effects. Internal fields in a solution are used to seperate the universal from specific interactions. Numerous and varied experimental data are employed to show the applications of these ideas (Figs 1-7) and a short discussion is given of the published work which does not allow for the collective

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S/051/60/008/06/006/024
E201/E691

The Role of Universal and Specific Intermolecular Interactions in the Effect of a Solvent on the Electronic Spectra of Molecules

effect of the surrounding medium on the absorption or emission centres. In conclusion the authors point out that only in the ideal case can we separate entirely the universal from specific interactions. In real systems we find continuous transition from pair interactions to collective effects of the surrounding medium on a solute molecule. Nevertheless the basic idea of two types of interaction can be used as a foundation of spectroscopic studies of solutions. There are 7 figures, 1 table and 21 references, of which 10 are Soviet, 6 English, 1 French, 2 German and 2 Japanese.

SUBMITTED: October 17, 1959

Card 2/2

5.4100
24.3500

82546
S/051/60/008/06/007/024
E201/E691

AUTHORS: Mirumyants, S.O. and Neporent, B.S.

TITLE: A Spectroscopic Investigation of the Processes of the Vibrational Energy Transformations During Collisions of Complex Molecules. II. The Effect of Foreign Gases on the Fluorescence Yield of 3-Dimethylamine-6-aminophthalimide

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 6, pp 787-798 (USSR)

ABSTRACT: A large number of foreign gases (He, Ne, A, Kr, Xe, H_2, D_2, N_2, CO, H_2O, D_2O, NH_3, C_6H_{12}) was used to study their effect on the fluorescence yield of 3-dimethylamine-6-aminophthalimide vapour excited at four wavelengths (492, 436, 405, 365 mμ) from an SVDSh mercury lamp. The measurements were carried out with a photoelectric set-up, similar to that described earlier (Ref 2). The total intensity of fluorescence was measured, since special experiments showed that the fluorescence spectrum of 3-dimethylamine-6-aminophthalimide (Fig 1) is not affected even at isopentane pressures of 300 mm Hg. The vapour pressure of the foreign gases was kept at 5.4×10^{-3} mm Hg. The temperature in all tests was kept constant at 528°K. The results are shown in Figs 2-11 and in a table on p793. From the experimental

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S/051/60/008/06/007/024
E201/E691

A Spectroscopic Investigation of the Processes of the Vibrational Energy Transformations During Collisions of Complex Molecules. II. The Effect of Foreign Gases on the Fluorescence Yield of 3-Dimethylamino-6-aminophthalimide.

values of intensification or weakening of fluorescence the authors deduced for each foreign-gas molecule the amount of vibrational energy exchanged in a single collision with an excited molecule of 3-dimethylamino-6-aminophthalimide. For all cases the authors found the accommodation coefficient which gives the efficiency of collisions in the sense of the amount of energy exchanged. It was found that such collision efficiency depends mainly on the Van der Waals interaction constants, i.e. on the durations of collisions. It was also found that transformation of energy of foreign-gas molecules into the vibrational energy of 3-dimethylamino-6-aminophthalimide molecules is much less efficient than the reverse process. There are 11 figures, 1 table and 36 references, of which 19 are Soviet, 13 English, 2 German and 2 translations into Russian.

SUBMITTED: July 22, 1959

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MIRUMYANTS, S.O.; NEPORENT, B.S.

Effect of contaminant gases on the intensity of the electron absorption of 3-dimethylamino-6-aminophthalimide vapors. Opt.i spektr. 9 no.1:7-15 Jl '60. (MIRA 13:7)

(Phthalimide—Spectra)

81278

S/048/60/024/05/04/009
B006/B017

24.3500

AUTHORS: Mirumyants, S. O., Neporent, B. S.

TITLE: Spectroscopic Investigation of Vibrational Energy Transfer in Interactions of Complex Molecules 21

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 5, pp. 514-515

TEXT: The present article is an abridged reproduction of a lecture delivered on the occasion of the Eighth Conference on Luminescence (Minsk, October 19-24, 1959). The authors investigated the transfer of vibrational energy in both directions (absorption and release by excited molecules) by means of a method which is based on the investigation of the dependence of the fluorescence yield of vapors of aromatic compounds on the pressure of foreign gases. An intensification of fluorescence 21 corresponds to a stabilization and a weakening to a labilization of the excited molecules due to absorption or release of vibrational energy in collisions. The stabilization of excited molecules of 3-dimethylamino-6-aminophthalimide in collisions with molecules of foreign gases was studied

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81278

Spectroscopic Investigation of Vibrational Energy Transfer in Interactions of Complex Molecules

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B006/B017

with regard to its effect on the fluorescence yield of the vapors of the matter investigated on excitation of various wavelengths in a large range of the spectrum. The investigations were made for the following foreign gases: He, Ne, Ar, Kr, Xe; H_2, D_2, N_2, CO, and H_2O, D_2O, NH_3, and C_5H_{12}. The mean vibrational energy transferred to or from the complex molecule per collision event with a foreign-gas molecule was determined. It was observed that the mean vibrational energy released by an excited 3-dimethylamino-6-aminophthalimide molecule increases with the mass and the complex structure of the foreign gas. However, this dependence cannot be formulated uniformly. A monotonic dependence could be observed only in monatomic gases; however, also in this case a considerable deviation from the theoretical dependence was observed, which had been computed according to a conception of elastic collisions of balls. This shows the inadequateness of this model. It is assumed that these deviations can be explained by the fact that an energy exchange takes place not only among the molecules but also between the internal and external degrees of

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Spectroscopic Investigation of Vibrational Energy Transfer in Interactions of Complex Molecules

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freedom of the excited molecule of the matter investigated. To study this phenomenon, the accomodation coefficient was computed by employing a formula deduced by the authors in Ref. 4 and all degrees of freedom were taken into account for the energy transfer. It was found that the efficiency of collisions with respect to energy transfer depends monotonically on the van der Waals' interaction constants of the molecules of foreign gases. An estimate of the part played by rotational and vibrational degrees of freedom of diatomic and polyatomic molecules of the foreign gas in energy transformation was given. It was experimentally found that the reverse process (energy transformation of the foreign gases into oscillation energy of the molecules investigated) is much less probable than the direct process. There are 4 Soviet references.

Card 3/3

NEPORENT, B.S.; STOLBOVA, O.V.

Orientation photodichroism of viscous solutions. Opt. i spektr. 10 no.2:287-288 F '61. (MIRA 14:2)

(Dichroism)

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~~Shestkov, Yu.A.~~

NEPORENT, B.S.

PHASE I BOOK EXPLOITATION SOV/6181

Ural'skoye soveshchaniye po spektroskopii. 3d, Sverdlovsk, 1960. Materialy (Materials of the Third Ural Conference on Spectroscopy) Sverdlovsk, Metallurgizdat, 1962. 197 p. Errata slip inserted. 3000 copies printed.

Sponsoring Agencies: Institut fiziki metallov Akademii nauk SSSR. Komissiya po spektroskopii; and Ural'skiy dom tekhniki VSNTO.

Eds. (Title page): G. P. Skornyakov, A. B. Shayevich, and S. G. Bogomolov; Ed.: Gennadiy Pavlovich Skornyakov; Ed. of Publishing House: M. L. Kryzhova; Tech. Ed.: N. T. Mal'kova.

PURPOSE: The book, a collection of articles, is intended for staff members of spectral analysis laboratories in industry and scientific research organizations, as well as for students of related disciplines and for technologists utilizing analytical results.

COVERAGE: The collection presents theoretical and practical problems of the application of atomic and molecular spectral analysis in controlling the chemical composition of various materials in ferrous and nonferrous metallurgy, geology, chemical industry, and medicine. The authors express their thanks to G. V. Chentsova for help in preparing the materials for the press. References follow the individual articles.

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Materials of the Third Ural Conference (Cont.) SOV/6181

PART II

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NEPORENT B.S.

[redacted]

STRUCTURE AND PHYSICAL PROPERTIES OF MATTER IN A LIQUID STATE
reports read at the 4th Conference convened in KIYEV from 1 to 5 June 1959, published by the publishein House of KIYEV University, KIYEV, USSR, 1962

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S/051/62/012/002/008/020
E202/E192

AUTHORS: Klochkov, V.P., and Neporent, B.S.

TITLE: Fluorescence polarisation and the spectral classification of complex molecules

PERIODICAL: Optika i spektroskopiya, v.12, no.2, 1962, 233-238

TEXT: The object of this work was to determine the degree of polarisation in fluorescence in the fluorescence and absorption spectra of compounds characterised by wide and structureless bands in their spectra. The authors disagreed with views expressed by G.P. Gurinovich, A.N. Sevchenko and A.M. Sarzhevskiy, who claimed that with a constant frequency of the exciting light ν_e the degree of fluorescence polarisation P of complex molecules in solutions depends on the frequency ν_f of the portions of fluorescence spectrum in which the measurements were carried out. The same apparatus and substances were used as in the previous works. In the apparatus the light from the source prior to the falling on the sample was passed over the diffraction grating monochromator and a polarising Glan prism, and the emerging beam was passed through another polarising

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Fluorescence polarisation and the ... S/051/62/012/002/008/020
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prism, a filter separating the orders, and another diffraction grating monochromator from which it was passed to the photomultiplier with its amplifying and registering circuit. The parallel and perpendicular components of the luminescent light were measured with respect to the plane of polarisation of the exciting light. The measurements included 3-monomethylaminophthalamide in glycerol, 3-dimethylamino-6-aminophthalamide in glycerol and also solutions of fluorescein in glycerol. The fluorescence spectra of the first two substances did not show the claimed relation between P and ν_f, while the last substance showed the dependence of P on ν_f. The fourth substance tried, 3-monomethylaminophthalamide in polymethylmethacrylate, gave S-shaped curves and the detailed studies showed that the dependence of P on ν_f is due to the presence of various types of luminescence centres. Hence it was shown that the change in the degree of polarisation along the fluorescence spectrum is due to the presence of at least two luminescence centres with different degrees of fluorescence polarisation. There are 6 figures.

Card 2/2 SUBMITTED: February 20, 1961

S/051/62/012/005/005/021
E039/E120

AUTHORS: Mazurenko, Yu.T., and Neporent, B.S.

TITLE: On the question of the relation between electron absorption and luminescence spectra for complex molecules

PERIODICAL: Optika i spektroskopiya, v.12, no.5, 1962, 571-575

TEXT: One of the present authors, B.S. Neporent, has shown previously that the relation between absorption and luminescence spectra can be described by the expression:

$$\frac{J_\nu}{\nu^2 \varepsilon_\nu} = e^{\frac{h}{kT}(\nu_i - \nu)} \qquad (1)$$

where: J_ν is the spectral quantum intensity; ε_ν is the molecular absorption coefficient; and ν_i is a frequency corresponding to the distance between normal and excited electron levels in which the stored oscillatory energy is zero. This expression is verified

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