

Very confidentially for the Director

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KOPTSIK, V.A.

Method of superposition of symmetry groups used in crystallophysics.
Kristallografiia 2 no.1:99-107 '57. (MLRA 1C:7)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Crystallography, Mathematical)

24 (2)

AUTHORS:

~~Koptsik, Y. A.~~, Minayeva, K. A., SOV/55-58-6-12/31
Voronkov, A. A., Solov'yev, A. F., Izrailenko, A. N.,
Popkova, Ye. G., Kozlova, G. I.

TITLE:

Investigation of New Piezoelectric Crystals on Small-dimensioned Samples (Issledovaniye p'yezoelektricheskikh kristallov na malykh obraztsakh)

PERIODICAL:

Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1958, Nr 6, pp 91-98 (USSR)

ABSTRACT:

In 1955 one of the authors succeeded in developing a simple method of investigating crystalline dielectrics with respect to their piezoelectricity (Ref 1) by the mechanical excitation of piezoelectric oscillations at low frequency near crystal resonance. The strength of the piezoelectric effect was determined from the ratio to a quartz standard. Part of the results of investigations carried out with 1200 crystalline dielectrics are given by two tables (Table 1: 186 crystals with smaller piezoelectric effect than quartz; table 2: 111 crystals with a greater effect). It was further found in the course of the investigations that a fact of great

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dimensioned Samples

importance for the theory of piezoelectrics is the rule governing the distribution of piezoelectric crystals according to space groups of symmetry which are favorable to the piezoelectric effect. This fact may be of use for the detection of new piezoelectrics among the dielectrics with known space symmetry. It was further found that the symmetry assumed in the case of many substances was too high. The authors thank A. V. Shubnikov for supervising work, and A. N. Kost, V. M. Belikov and a number of other comrades for placing the crystal samples at their disposal. There are 2 tables and 9 references, 8 of which are Soviet.

ASSOCIATION: Kafedra kristalofiziki (Chair for Crystal Physics)

SUBMITTED: June 11, 1958

Card 2/2

24(3)

AUTHORS:

~~Kaptsik, V. A.~~, Minayeva, K. A.,
Strukov, B. A.

SOV/48-22-12.33/33

TITLE:

Dielectric Investigations of Small Samples of Piezoelectric Crystals (Dielektricheskiye issledovaniya kristallov segnetoelektrikov na malykh obraztsakh)

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 12, pp 1537-1540 (USSR)

ABSTRACT:

In the present paper a device is described by means of which the temperature dependence of the dielectric constant $\epsilon(T)$ can be plotted and the dependence of polarization on the electric field $P(E)$ measured with small monocrystal samples within the temperature range -190 to $+250^\circ$. The device can be used for the investigation of dielectric anomalies in piezoelectrics and for the determination of phase transitions in crystalline dielectrics, the phase transitions being accompanied by the variation of ϵ of the substance. The method of the RC-chain described in publications (Refs 1, 2) was used for the device. The principal radiotechnical scheme of the device (without generator and potentiometer) is given in figure 1. Apart from plotting the dependence $\epsilon(T)$, this device permits also the

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determination of the occurrence of spontaneous polarization in the sample by means of an ordinary oscillographic scheme (no figure). The $\epsilon(T)$ -curves of 24 dielectrics were plotted to check the device, whereby it was shown that the dependence $\epsilon(T)$ can be plotted with sufficient accuracy. The discontinuity of ϵ at 120° was determined for polarized BaTiO_3 ceramics with a very small sample ($0.1 \times 0.1 \times 0.1$ cm). In $(\text{NH}_4)_2\text{SO}_4$ -monocrystals dielectric anomalies were determined at -51° . The temperature dependence of the polarization and the coercive field are given in figures 2 and 3. The temperature dependence of ϵ of $(\text{NH}_4)_2\text{SO}_4$ in the range of high temperatures is characterized by rapid increase of active crystal conductivity near the melting-point (130°). This method makes it possible to observe other processes related to the change of ϵ . The authors carried out experiments to investigate piezoelectric anomalies in tablet-shaped Salignette-salt and BaTiO_3 samples, yet without success. This effect is, however, completely concealed by the presence of air layers, binding agents and a chaotic arrangement of crystalline

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SOV/48-22-12-33/33

grains in the heterogeneous system. After all, the investigation of small monocrystals seems to be less difficult and more reliable. The device described may be used in the search of new piezoelectrics (rough scheme in Fig 4) and for preliminary measurement of substances which can be obtained without difficulties in the form of small monocrystals. There are 4 figures and 8 references, 4 of which are Soviet.

ASSOCIATION: Fizicheskoy fakul'tet Moskovskogo gos. universiteta im. M. V. Lomonosova (Dept. of Physics of the Moscow State University imeni M. V. Lomonosov)

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USCOMM-DC-60,555

AUTHOR: Koptsik, V.A.

SOV/70-4-2-13/36

TITLE: Dielectric, Piezoelectric and Elastic Properties of Single Crystals of Resorcinol (Dielektricheskiye, p'yezoelektricheskiye i uprugkiye svoystva monokristallov rezortsina)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 2, pp 219-222 (USSR)

ABSTRACT: Crystals of resorcinol, $C_6H_4(OH)_2$, were prepared from aqueous solution out of contact with air. The morphological features of the crystal faces as well as the data of goniometric measurements showed that the crystals are of the rhombo-pyramid form of the class $2m$. From 12 crystals about 50 plates were cut for examination. At room temperature and 1 kc/s the dielectric constants were found to be:

$$\epsilon_{11} = 3.51 \pm 0.07, \quad \epsilon_{22} = 4.14 \pm 0.07, \quad \epsilon_{33} = 3.54 \pm 0.05 .$$

The static values were some 20% greater than these.

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of Resorcinol

The pyroelectric coefficient $P_3^{T,E}$ was found by Ackerman's method (Ref 6) to be 56 ± 12 c.g.s.u./°C. The piezoelectric coefficients were found to be:

$$d_{15} = 53.9 \times 10^{-8}; \quad d_{24} = 55.3 \times 10^{-8}; \quad d_{31} = -12.4 \times 10^{-8}$$
$$d_{32} = -12.8 \times 10^{-8}; \quad d_{33} = 16.8 \times 10^{-8} \text{ c.g.s.u.}$$

The accuracy was about 10-15%. The dynamic values were less than these static values by 20%. The coupling coefficients were about 5-15%. The elastic coefficients were measured by the resonance-antiresonance method. The density value used was 1.28 g/cm^3 . Results are to 10% from measurements of 28 specimens.

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$s_{11} = 19.0 \times 10^{-12} \text{ cm}^2/\text{dyne}$	$c_{11} = 10.3 \times 10^{10} \text{ dynes/cm}^2$
$s_{22} = 10.6$	$c_{22} = 14.4$
$s_{33} = 15.0$	$c_{33} = 12.9$
$s_{44} = 30.7$	$c_{44} = 3.3$
$s_{55} = 23.0$	$c_{55} = 4.4$
$s_{66} = 25.0$	$c_{66} = 4.0$
$s_{12} = - 4.0$	$c_{12} = 6.2$
$s_{13} = - 3.4$	$c_{13} = 7.4$
$s_{23} = - 8.8$	$c_{23} = 6.9$

This is the first time the resonance method has been used for the determination of all the compliances s_{ij} of a crystal of symmetry $2m$ and it can be recommended for cases

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of Resorcinol

where the direct measurements of the c_{ij} by impulse methods are inapplicable. Because of the high pyroelectric coefficient crystals of resorcinol must be thermostatted. The crystals must also be protected from solvents. Acknowledgments are made to A.V. Shubnikov, G.B. Bokiy, I.M. Sil'vestrova and V.F. Parvov. There are 2 figures and 8 references, 4 of which are Soviet and 3 German, 1 English.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni
M.V. Lomonosova (Moscow State University imeni
M.V. Lomonosov)

SUBMITTED: November 11, 1958

Card⁴/₄

AUTHORS: Koptsik, V.A. and Kobayakov, I.B. SOV/70-4-2-14/36

TITLE: The Dielectric, Piezoelectric and Elastic Properties of Cancrinite (Dielektricheskiye, p'yezoelektricheskiye i uprugkiye svoystva kristallov kankrinita)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 2, pp 225-225 (USSR)

ABSTRACT: The mineral cancrinite is closely related to nepheline and has the formula $(\text{Na}_2\text{Ca})_4[\text{AlSiO}_4]_6\text{CO}_3 \cdot (\text{H}_2\text{O})_{0-3}$. Its hardness is 5-5.5 and density 2.42-2.48. The space group appears to be $C_6^2 = C6_3$ but the piezoelectric properties agree better with the group 6m. Crystal plates were cut correctly oriented to $\pm 5'$. Dielectric susceptibilities were measured as $\epsilon_{11} = \epsilon_{22} = 9.5 \pm 0.1$ and $\epsilon_{33} = 11.2 \pm 0.3$ at room temperature with a bridge circuit working at 50 c.p.s. The loss at 20 kc/s was $\tan \delta \sim 0.01$ and the dielectric strength was about 30 kV/mm. The piezoelectric and elastic constants were measured dynamically by conventional resonance methods.

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Of the three piezoelectric moduli d_{31} , d_{33} and d_{15} , the last could be determined directly and was (averaged from 10 specimens):

$$d_{15} = -(27 \pm 4) \times 10^{-8} \text{ c.g.s.u.}$$

with an electromechanical coupling coefficient k of about 15%. From indirect measurements d_{33} was found to be $(13 \pm 5) \times 10^{-8}$ and d_{31} $(\pm 2 \pm 3) \times 10^{-8}$ c.g.s.u. The coefficient of electromechanical coupling corresponding to $d'_{32} = (14.9 \pm 0.3) \times 10^{-8}$ was 15%. The elastic compliances were found to be $s_{44} = (4.2 \pm 0.1) \times 10^{-12}$ cm²/dyne; $s_{44} = 1/c_{44} = (4.3 \pm 0.2) \times 10^{-12}$; $s_{66} = 1/c_{66} = (3.5 \pm 0.1) \times 10^{-12}$ directly from principal cuts. The other values were derived from 3 groups of

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crystals cut with $\theta = 45, 60$ and 75° and were:

$$s_{11} = (2 \pm 0.3) \times 10^{-12}; \quad s_{33} = (1.3 \pm 0.1) \times 10^{-12} \quad \text{and}$$

$$s_{13} = (0.3 \pm 0.2) \times 10^{-12} \quad \text{cm}^2/\text{dyne.} \quad \text{As } s_{66} = 2(s_{11} - s_{12})$$

$$s_{12} = (0.2 \pm 0.3) \times 10^{-12} \quad \approx 0 \quad \text{as } s_{12} \text{ cannot be}$$

positive. The crystals were rather imperfect and considerable variations between specimens were found. It is concluded that cancrinite does not come up to quartz as regards elastic properties but exceeds it in piezoelectric activity and in effectiveness of radiating and picking up u/s vibrations both in longitudinal and in torsional modes. It is therefore important to produce artificial crystals.

Acknowledgments are made to G.P. Barsanov and D.P. Grigor'yev. There are 1 figure, 1 table and 10 references, 8 of which are Soviet and 2 German.

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The Dielectric, Piezoelectric and Elastic Properties of Cancrinite ^{SOV/70-4-2-14/36}

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni
M.V. Lomonosova (Moscow State University imeni
M.V. Lomonosov)

SUBMITTED: November 15, 1958

Card 4/4

SOV/70-4-2-16/36

AUTHORS: Chumakov, A.A. and Koptsik, V.A.

TITLE: Experiments on the Crystallisation of New Piezoelectric Substances (Opyt kristallizatsii novykh p'yezoelektricheskikh veshchestv)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 2, pp 235-238 (USSR)

ABSTRACT: Full piezoelectric measurements have been made (by others) on only some 30 substances. The authors of this paper have carried out work on the crystallisation from solution of materials selected from 120 dielectric compounds available commercially. Tests for activity were made on powders. About half the materials tried could be grown as large crystals from suitable solvents. 7 standard solvents were tried for each. Seeds were prepared by lowering the temperature of saturated solutions and were later used in growing big crystals in the dynamic regime (by crystalliser). A table of 49 materials is given with certain physico-chemical data and the recommended solvent. Solubilities are available in standard tables (ex. A. Seidell). Measurements of the coefficients of electromechanical coupling of the following

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materials indicated that full determinations of electrical and mechanical parameters would be worthwhile: sodium salt of β -anthraquinone monosulphonic acid; arabinose; acetoxime; barium nitrite; benzophenone; dimethyl glyoxime; cadmium bromide ($\text{CdBr}_2 \cdot 4\text{H}_2\text{O}$); potassium phthalate; calcium iodate; $\text{LiHCO}_2 \cdot \text{H}_2\text{O}$ lithium formate; acetophenone oxime; ramnose; sulphanilic acid; terpene hydrate; dl-treonine; uratropine; formaldehyde sodium bisulphite; quinine hydrochloride; amber anhydride ($\text{C}_4\text{H}_4\text{O}_3$).

Acknowledgments are made to A.V. Shubnikov, A.N. Izrailenko and G.I. Kozlova.
There are 1 table and 12 references, 11 of which are Soviet and 1 English.

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SOV/70-4-2-16/36
Experiments on the Crystallisation of New Piezoelectric Substances

ASSOCIATION: Institut kristallografii AN SSSR (Institute of
Crystallography of the Ac.Sc.USSR)

SUBMITTED: April 8, 1958

Card 3/3

KOPTSIK, V. A.

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AUTHORS:

Koptsik, V. A., Yermakova, L. A.

TITLE:

Investigation of the Temperature Dependence of Electric and Elastic Parameters of Cancrinite

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 4, pp. 697-700

TEXT: In an earlier paper (Ref. 2), the dielectric constant ϵ , as well as the piezoelectric and elastic moduli of cancrinite had been determined at room temperature. In the present paper, the authors determine its behavior between $+20^{\circ}\text{C}$ and -140°C . The temperature was measured with an accuracy of 0.2°C , the dielectric, piezoelectric, and elastic coefficients with an accuracy of 4, 9, and 3%, respectively. The same samples were used, that had served for earlier published determinations. To be true, there occurred deviations which are explained by the aging in one year. Three different sections were examined (Figs. 2, 3, and 4). At low temperatures, anomalies occur in ϵ and the piezoelectric moduli; the precise position is dependent on the orientation of the cut. The anomalous dielectric behavior of cancrinite can be explained by the structure (Fig. 1): According to

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V. A. Ioffe and I. S. Yanchevskaya, this anomaly corresponds to a resonance absorption at 180 kilocycles; it is possibly the consequence of an electron transition in the aluminum oxygen tetrahedron from one oxygen atom to another. The piezoelectric anomalies are apparently related to the dielectric ones. These conclusions are only provisional, an accurate investigation requires a better structural determination and an investigation on synthetic material. There are 4 figures and 6 references: 5 Soviet and 1 French.

ASSOCIATION: MGU, fizicheskij fakul'tet
(Moscow State University, Department of Physics)

SUBMITTED: May 22, 1959

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24.7800 (1142, 1144, 1162)

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B013/B063

AUTHORS: Koptsik, V. A., Strukov, B. A., Sklyankin, A. A., and
Levina, M. Ye.

TITLE: Dielectric and Calorimetric Study of Ammonium Sulfate- and
Ammonium Fluoroberyllate Crystals

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,
Vol. 24, No. 10, pp. 1228-1230

TEXT: Large ammonium sulfate monocrystals were obtained from an aqueous solution of the chemically pure reagent by applying the cooling method. Ammonium fluoroberyllate was synthesized by Lebeau's method (Ref. 5). The crystals were bred from its aqueous solution by evaporating at a constant temperature. Studied dielectrically were c-cuts of $(\text{NH}_4)_2\text{SO}_4$ crystals and b-cuts of $(\text{NH}_4)_2\text{BeF}_4$ crystals. The crystalline powder used for the crystal breeding was studied calorimetrically. ϵ and $\tan \delta$ were measured after all stabilization processes were over. Temperature dependences of ϵ and $\tan \delta$ are shown in Fig. 1 for the c-cut of $(\text{NH}_4)_2\text{SO}_4$ crystals,

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and in Fig. 2 for the b-cut of $(\text{NH}_4)_2\text{BeF}_4$ crystals. The dependences $\tan \delta(T)$ have the same character in both crystal types. $\epsilon(T)$, on the contrary, exhibit considerable differences. The authors also considered temperature dependences of polarization for different field strengths in the region of phase transformations of the mentioned crystals. The respective results are published in a separate article. Fig. 3 shows the temperature dependence of specific heat c_p for $(\text{NH}_4)_2\text{SO}_4$. It was found that the cooling of the specimens at $T > T_K$ is not always accompanied by their transition into the piezoelectric phase. The undercooling was determined as being about $0.4 + 0.5^\circ$, which corresponds to dielectric measurement results. The mean value of integral temperature of transition was 490 cal/mole. The temperature dependence of c_p on $(\text{NH}_4)_2\text{BeF}_4$ is given in Fig. 4. The curve shows a characteristic λ -peak. No undercooling effect was observed. The discrepancy between the transition temperatures determined calorimetrically (-49.9 and -98.6°C) and those determined dielectrically (-47.6 and -93.4°C) is probably to be explained by an inaccurate graduation of the

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Dielectric and Calorimetric Study of Ammonium Sulfate- and Ammonium Fluoroberyllate Crystals

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thermocouples used in dielectric measurements. The authors thank A. N. Izrailenko and A. F. Solov'yev for their assistance. The present paper was read at the Third Conference on Piezoelectricity, which took place in Moscow from January 25 to 30, 1960. There are 4 figures and 7 references: 3 Soviet.

ASSOCIATION: Moskovskiy gos. universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov).
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85005

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AUTHORS: Koptsik, V. A., Strukov, B. A., and Nevedomskaya, I. K.

TITLE: Study of Optical Properties of Some Piezoelectric Crystals

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,
Vol. 24, No. 10, pp. 1231-1233

TEXT: The authors studied the temperature dependences of birefringence in piezoelectric ammonium sulfate- $(NH_4)_2SO_4$ and ammonium fluoroberyllate crystals $(NH_4)_2BeF_4$. The scheme of a complete apparatus for crystallographic measurements is given in Fig. 1. The apparatus was constructed after blueprints supplied by the designers of the universal microscope stage (Ref. 6). In the practice, it permits an arbitrarily rapid heating or cooling of the specimen and a stabilization of temperature. The temperature course of birefringence for the c-cut of the $(NH_4)_2SO_4$ crystal is shown in Fig. 2. The marked change of the quantity Δn in the transition point makes it possible to observe optically the course of the phase

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Study of Optical Properties of Some
Piezoelectric Crystals

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transition in ammonium sulfate crystals. The authors believe that the coloration of specimens, which proceeds from the corners toward the center, reflects the transformation process from the paramagnetic phase into a piezoelectric one. Below the transition point the crystal is cleft on the plane of cleavage. The authors succeeded in following the dynamics of this process. At the interface between two phases considerable inner stresses appear in crystals, the consequence of which is a crystal cleavage. Fig. 3 shows the temperature dependence of birefringence Δn for the b-cut of $(\text{NH}_4)_2\text{BeF}_4$ crystals in the temperature range from $+20^\circ$ to -130°C . At -90°C birefringence was found to attain a marked maximum. This can also not be brought in connection with the change of the geometrical dimensions of the specimens due to thermal expansion. The domain structure remains invisible even when strong transversal electric fields are applied. Optical observations confirm the results of dielectric and calorimetric measurements, according to which there occurs a transition of first order in ammonium sulfate, and a transition of second order in ammonium fluoroberyllate, or thereabouts. The present paper was read at the Third Conference on Piezoelectricity, which took place in Moscow

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Study of Optical Properties of Some
Piezoelectric Crystals

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from January 25 to 30, 1960. There are 3 figures and 7 references: 3
Soviet. ✓

ASSOCIATION: Moskovskiy gos. universitet im. M. V. Lomonosova (Moscow
State University imeni M. V. Lomonosov) VNIIFTRI

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PAISI : BOOK REF: 24, 1928 307/4379

Physicists' conference on dielectricity, 24, 1928
Prilozheniya k zhurnal'u fizicheskoy akademii (Physics of Dielectrics;
Transactions of the 24 All-Union Conference on the Physics of Dielectrics)
Moscow, Izdat. AN SSSR, 1928. 528 p. Extra slip inserted. 5,000 copies
printed.

Sponsoring Agency: Academy and USSR. Patents Institute Issued P.N. Lodevsky.

M. of Publishing House: Iss. Sverdlovskaya, Tech. Ed. I.B. Porokhin; Editorial Board: (Rasp. Ed.) G.I. Svanaya, Doctor of Physics and Mathematics (Deceased), and K.Y. Mil'pova, Candidate of Physics and Mathematics.

Purpose: This collection of reports is intended for scientists investigating the physics of dielectrics.

CONTENTS: The Second All-Union Conference on the Physics of Dielectrics held in Moscow at the Physics Institute of the USSR Academy of Sciences (Physics Institute Issued P.N. Lodevsky) in November 1928 was attended by researchers from various scientific institutions of the USSR and of several other countries. The principal section contains most of the reports presented at the conference and summaries of the discussions which followed. The reports in this collection deal with dielectric properties, losses, and polarization, and also specific inductive capacitance of various crystals, chemical compounds, and of various dielectric, ferroelectric crystals, and various radiation and irradiation effects on dielectrics as investigated. The volume contains a list of other reports presented at the conference dealing with polarization, losses, and dielectric strength characteristics, and 2, 1928. So personal files are analyzed. References accompany each report.

Editor: I.M. Zolotarev and Investigation of Certain Dielectric Possessing a High Piezoelectric Sensitivity [Institute of Crystallography, AS SSSR, Moscow]

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Yoffe, V.A., and I.A. Tsvetkovskaya. Dielectric Properties of Certain Crystal Aluminosilicates (Institut Khimii Silikatov AN SSSR (Institute of Silicate Chemistry, AS SSSR)) 327

KOPTSIK, V.A.; YERMAKOVA, L.A.

Investigating the effect of temperature on the electric and elastic parameters of cancrinite. Fiz. tver. tela 2 no.4:697-700 Ap '60.
(MIRA 13:10)

1. Moskovskiy gosudarstvennyy universitet, fizicheskiy fakul'tet.
(Cancrinite)

KOPTSIK, V.A.

Polymorphic phase transformations and the symmetry of crystals.
Kristallografiia 5 no.6:932-943 M-D '60. (MIRA 13:12)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Crystallography, Mathematical)

KOPTSIK, V.A.; STRUKOV, B.A.; SKLYANKIN, A.A.; LEVINA, M.Ye.

Dielectric and calorimetric investigation of crystals ammonium sulphate and ammonium fluoberyllate. Izv. AN SSSR Ser. fiz. 24 no.10:1228-1230 0 '60. (MIRA 13:10)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova i Vsesoyuznyy nauchno-issledovatel'skiy institut fizikotekhnicheskikh i radiotekhnicheskikh izmereniy, Moskva.
(Ammonium sulphate crystals)
(Ammonium fluoberyllate crystals)

9.5110 (also 1055, 1072)

5.4800

1043, 1137, 1273

20714

S/120/61/000/001/057/062
E194/E184

AUTHORS:

Koptsik, V.A., Strukov, B.A., and Yermakova, L.A.

TITLE:

A Precision Laboratory Cryostat for Investigating the Electrical and Elastic Properties of Crystals

PERIODICAL:

Pribory i tekhnika eksperimenta, 1961, No.1, pp.184-188

TEXT:

Progress in the development of laboratory cryostats is briefly reviewed. A circuit developed by B.N. Vasil'yev which was a further development of one used by Wilson and Stone (Ref.9) was used in constructing a precision laboratory cryostat for investigating the electrical and elastic properties of crystals in the region of polymorphous phase conversions. The apparatus was required to produce stable temperature points every 0.1-0.2 °C; the stabilisation of the temperature should be within ± 0.005 °C for a time of 30 minutes to one hour; the specimens should be maintained in vacuum or in an atmosphere of dry gas; electrical terminals in the thermostat chamber should be so designed as to ensure the complete absence of temperature gradients. The equipment consists of a cryostat, a temperature stabilising circuit, a vacuum system and a potentiometer circuit for

X

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20714

S/120/61/000/001/057/062
E194/E184

A Precision Laboratory Cryostat for Investigating the Electrical and Elastic Properties of Crystals

temperature measurement. The thermostat chamber of the cryostat consists of a copper block (9 in Fig.1), 180 mm high and 45 mm in diameter. In the cylinder are drilled two cylindrical ducts over three quarters of its length. One duct is used for thermocouples and the other for ampoules with specimens. The outer surface of the cylinder is threaded with a four start thread; two of the grooves contain nichrome wire heaters and the other two platinum resistance thermometers. The heater resistance is 1 kilohm and the thermometer resistance is 300 ohms. Under conditions of automatic control the surface of the copper block is maintained at a constant temperature. Because of the good thermal conductivity of the copper, after an interval of 10-15 minutes the same temperature is established in the volume for the test specimen. The copper block 9 covered with an aluminium screen 10 is placed in a cylindrical glass vessel with double walls. The inner space is connected to a vacuum flask containing liquid nitrogen. The temperature sensitive element is the platinum resistance

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S/120/61/000/001/057/062
E194/E184

A Precision Laboratory Cryostat for Investigating the Electrical and Elastic Properties of Crystals

thermometer would on the copper block and connected in a balanced bridge circuit, the other arms of which are manganese resistances and an inductionless resistance box. When the resistance of the platinum thermometer alters, it alters the phase of the output signal from the bridge and the function of the rest of the circuit is to apply the necessary amount of heat to the heater to maintain the resistance of the platinum thermometer equal to that of the resistance box. A schematic diagram of the control system is given in Fig.2 and the method of operation is explained. The vacuum system consists of two main parts, one of which is used to evacuate the inner cylinder of the cryostat and the other to pump from the glass ampoule with specimen holder. The system includes a rotary vacuum pump, an oil vapour trap and appropriate valves and pressure measuring devices. The required temperature is obtained and maintained as follows. The copper block with the ampoule is placed in the inner vacuum flask of the cryostat. Liquid nitrogen is poured into the outer flask in which the level of nitrogen is

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S/120/61/000/001/057/062
E194/E184

A Precision Laboratory Cryostat for Investigating the Electrical and Elastic Properties of Crystals

automatically maintained. Cooling commences at a rate of about 0.5 °C/min. When within 3 to 4° of the temperature required to stabilise, the inner vacuum flask is evacuated until the pressure in it reaches 10^{-3} mm Hg, then the rate of cooling rapidly diminishes. The bridge is then balanced by means of the resistance blocks. The automatic temperature control circuit is then connected and any further reduction in temperature takes place in steps controlled by the resistance blocks. The accuracy of stabilisation was checked by measuring the e.m.f. of a triple copper constantan thermocouple with a sensitivity of 0.1 mV/°C. During 60 minutes the temperature changed by less than 0.005 °C. The cryostat has been working for two years and temperature characteristics of a number of crystals have been obtained. Gratitude is expressed to B.N. Vasil'yev for useful suggestions and to A.F. Solov'yev for help in setting up the circuit. There are 3 figures and 13 references: 5 Soviet and 8 English.

Card 4/7

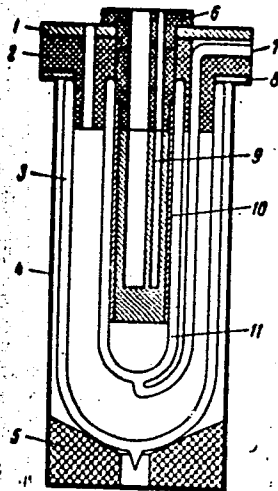
20714

A Precision Laboratory Cryostat ...

S/120/61/000/001/057/062
E194/E184

Legend to Fig. 1:

- 1 - Textolite cover;
- 2 - Porous Plastic Cover;
- 3 - Outer Flask;
- 4 - Protective Tin Casing;
- 5 - Wooden Block;
- 6 - Ebonite Stopper;
- 7 - Glass Connecting Pipe (to Pump);
- 8 - Rubber Ring;
- 9 - Copper Block;
- 10 - Aluminium Screen;
- 11 - Inner Glass Flask;

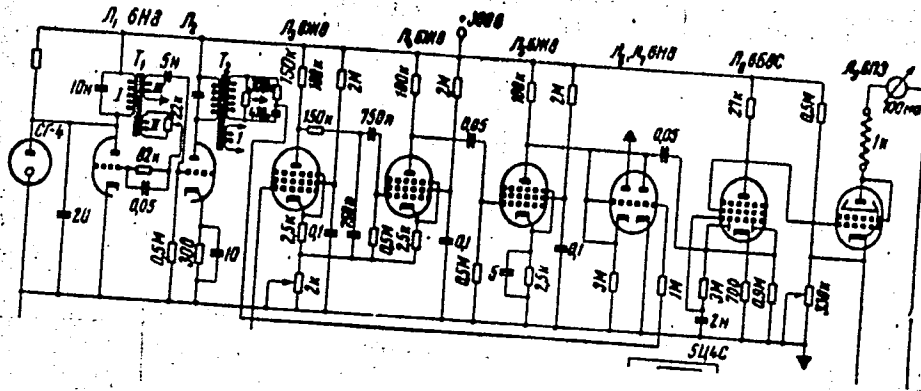


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A Precision Laboratory Cryostat

S/120/61/000/001/057/062
E194/E184



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Fig. 2

20714

A Precision Laboratory Cryostat ... S/120/61/000/001/057/062
E194/E184
ASSOCIATION: Fizicheskiy fakul'tet MGU
(Physics Division of MGU)
SUBMITTED: December 30, 1959

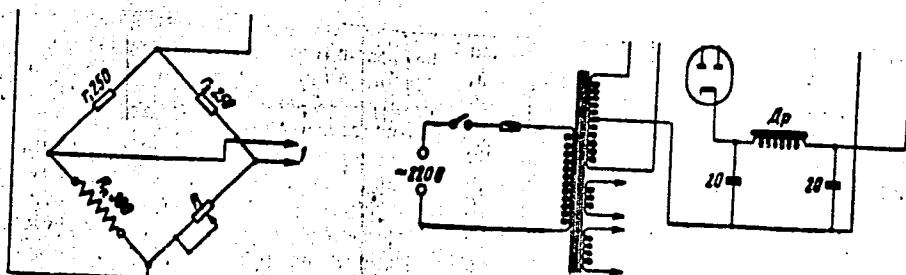


Fig. 2 continued

Card 7/7

KOPTSIK, V.A.; SIROTIN, Yu.I.

Symmetry of piezoelectric and elastic tensors and of the physical properties of crystals. Kristallografiia 6 no.5:766-768 S-0 '61.
(MIRA 14:10)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Calculus of tensors) (Crystallography)

STRUKOV, B.A.; GAVRILOVA, N.D.; KOPTSIK, V.A.

Some characteristics of the ferroelectric phase transition in
(NH₄)₂BeF₄ crystals. Kristallografiia 6 no.5:780-782 S-0 '61.
(MIRA 14:10)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Ammonium fluoberyllate--Electric properties)

24.2000

37943

S/181/62/004/005/038/055
B108/B112

AUTHORS: Strukov, B. A., Koptsik, V. A., and Ligasova, V. D

TITLE: Experimental study of the ferroelectric properties of ammonium acid sulfate in the vicinity of the high-temperature phase transition

PERIODICAL: Fizika tverdogo tela, v. 4, no. 5, 1962, 1334 - 1338

TEXT: An attempt is made to formulate the thermodynamic theory of Ginzburg and Devonshire for the ferroelectric NH_4HSO_4 . The measurements were made in the temperature interval from $+10^\circ$ to -20°C at $5 \cdot 10^{-2}$ mm Hg. In order to find the expansion coefficients A and B of the free energy, which enter into the relations for the displacement of the transition point in an electric field, the authors measured the effect of an electric field upon the phase transition in NH_4HSO_4 . The hysteresis loop observed in the ferroelectric phase vanishes at the point where ϵ reaches its sharp peak (1700 at -2.35°C). Measurements of the spontaneous polarization indicate that only the first two terms in the expansion for the free energy
Card 1/2

Experimental study of ...

S/181/62/004/005/038/055
B108/B112

have to be taken into account. The coefficients at these terms were calculated from the experimental data: $A = 1.36 \cdot 10^{-2}$ and $B = 8.4 \cdot 10^{-8}$ electrical CGSU. The measured displacement of the Curie temperature under the action of an electric field is in good agreement with calculated data ($T - T_c \sim kE^{2/3}$; $k = 0.16$). It is established that the high-temperature phase transition of NE_4HSO_4 is a second-kind transition. There are 7 figures and 1 table. The two most important English-language references are: H. H. Wieder. J. Appl. Phys., 30, 1010, 1959; R. Pepinsky. Phys. Rev., 111, 1508, 1958. †

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: January 16, 1962

Card 2/2

S/070/62/007/001/018/022
E132/E460

AUTHOR: Koptsik, V.A.

TITLE: Changes in the symmetry of piezoelectric crystals by the direct and the reverse piezoeffects

PERIODICAL: Kristallografiya, v.7, no.1, 1962, 144-147

TEXT: A table is given of the changes in symmetry which take place in piezoelectric crystals without special polar directions under the action of an electric or mechanical pressures. It follows that if the crystal is studied in its strained state, extra piezoelectric and elastic moduli are required to describe its behaviour. An estimate of the magnitude of the effect is made for ADP (ammonium dihydrogen phosphate) and it is suggested that certain experiments should be carried out to test the relationships calculated. There is 1 table. ✓

ASSOCIATION: Moskovskiy gosudarstvennyy universitet
im. M.V.Lomonosova (Moscow State University imeni
M.V.Lomonosov)

SUBMITTED: April 15, 1961

Card 1/1

36140

S/070/62/007/002/006/022

E132/E160

24,7300

AUTHORS: Strukov, B.A., and Koptsik, V.A.

TITLE: Thermodynamic examination of the ferroelectric phase transition in crystals of $(\text{NH}_4)_2\text{BeF}_4$

PERIODICAL: Kristallografiya, v.7, no.2, 1962, 234-237

TEXT: The experimental data relating to the phase transition in crystals of $(\text{NH}_4)_2\text{BeF}_4$ are examined in the framework of the thermodynamic theory of Ginzburg and Devonshire. The displacement of the Curie point under the action of an electric field has been calculated and measured experimentally. The free energy is calculated as a function of polarisation and temperature. Good thermodynamic data on the compound have been published earlier (Ref.5: B.A. Strukov, N.D. Gavrilova, V.A. Koptsik, Kristallografiya, v.6, 1961, 780) and the crystals were shown to follow the Curie-Weiss law. Theoretically the calculated value of the displacement is 7.4×10^{-5} degrees. volts⁻¹ cm and this agrees closely with the experimental value

Card 1/2

Thermodynamic examination of ...

S/070/62/007/002/006/022
E132/E160

of 6.9×10^{-5} , confirming the applicability of the thermodynamic theory. The authors thank Professor V.K. Semchenko for his comments.

There are 3 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im.
M.V. Lomonosova
(Moscow State University imeni M.V. Lomonosov)

SUBMITTED: May 15, 1961

Card 2/2

STRUKOV, B.A.; KOPTSIK, V.A.; LICASOVA, V.D.

Experimental study of the ferroelectric properties of
ammonium bisulfate near a high-temperature phase transition.
Fiz. tver. tela 4 no.5:1334-1338 My '62. (MIRA 15:5)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Ammonium sulfate--Electric properties)

KOPTSIK, V.A.

Measuring the symmetry of piezoelectric crystals in the direct and inverse piezoeffect. Kristallografiia 7 no.1:144-147 Ja-F '62. (MIRA 15:2)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Piezoelectric substances)
(Crystallography, Mathematical)

KOPTSIK, V. A.; SIROTIN, Yu. I.

"Space magnetic symmetry of tensors."

report submitted for 6th Gen Assembly, Intl Union of Crystallography, Rome,
9 Sep 63.

Moscow State Univ.

KOPTSIK, V. A.

"About polar and non-polar electric and magnetic crystal structures."

report presented at the Symposium on Phase Transitions in Solids, 6th General Assembly, Intl. Union of Crystallography, Rome, Italy, 16-18 Sep 1963

(Karpov Institute of Physical Chemistry, Moscow, USSR)

L 12807-63

EWT(l)/EWP(q)/EWT(m)/BDS AEFTC/ASD/ESD-3 IJP(C)/JD

ACCESSION NR: AP3000763

S/0070/63/008/003/0319/0327

AUTHOR: Koptsik, V. A.

59
58

TITLE: Polar-polar and polar-neutral crystalline structures

SOURCE: Kristallografiya, v. 8, no. 3, 1963, 319-327

TOPIC TAGS: crystalline structure, polar-polar, polar-neutral, ferroelectric, piezoelectric, antiferroelectric, ferromagnetic, piezomagnetic, antiferromagnetic, antiferrimagnetic, Shubnikov groups

ABSTRACT: The author offers a classification of crystalline structures in approximation of point electrical and magnetic moments according to macroscopic properties (ferroelectric - FE, piezoelectric - PE, antiferroelectric - AFE, ferromagnetic - FM, piezomagnetic - PM, antiferromagnetic - AFM, and their combinations) in the Shubnikov magnetic groups and classes. This is an extension of Hippel's work (Z. Phys. 133, 158-173, 1952) and of the author's own earlier work (Dissertation, M., 1952). The classification is shown in Tables 1 and 2. The author concludes that groups termed FM in the classification assume under certain conditions antiferromagnetic and antiferrimagnetic spin configurations, in a manner similar to that in pyroelectric groups. Detailed crystallochemical analysis of the actual magnetic configuration can not be made here, however, because of insufficient data. He

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L 12807-63

ACCESSION NR: AP3000763

remarks merely that consideration from the viewpoint of symmetry always determines only necessary, not sufficient, conditions for realization of the structure. The class of spiral magnetic structures, for example, is not yet described by known Shubnikov groups but requires the introduction of semicontinuous magnetic groups. Superimposed symmetries are the only absolute prohibition. After working out the equivalent positions in magnetic groups, the positions forbidden to magnetic atoms and the positions permitting magnetic moment may be indicated. Orig. art. has: 1 figure, 2 tables, and 5 formulas.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University)

SUBMITTED: 29Oct62

DATE ACQ: 21Jun63

ENCL: 05

SUB CODE: PH

NO REF SOV: 016

OTHER: 002

Card 2/112

SIROTIN, Yu.I.; KOPTSIK, V.A.

Magnetic space symmetry of tensors. Dokl. AN SSSR 151 no.2:328-331
Jl '63. (MIRA 16:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
Predstavleno akademikom A.V.Shabnikovym.
(Calculus of tensors) (Crystallography)

SPIVAK, G.V.; LUK'YANOV, A.Ye.; TOSHEV, S.D.; KOPTSIK, V.A.

Observation of the domain structure of triglycine sulfate by means of an electron mirror. Izv. AN SSSR. Ser. fiz. 27 no.9:1199-1202 S '63. (MIRA 16:9)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta im.M.V.Lomonosova.

(Glycine) (Domain structure)
(Electronic apparatus and appliances)

KOPSIK, V.A.

Polar-polar and polar-neutral crystalline structures. Kristallografiia 8 no.3:319-327 My-Je '63. (MIRA 16 21)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

INT(1)/EPA(s)-2/EWT(m)/EPF(s)/EPP-EM(1)/T/...

ACCESSION NR: AP5016115

UR/0046/65/029/006/0903/0906

Krasnikova, A.Ya.; Koptsik, V.A.

X-ray diffraction study of the superstructure phase transition in barium titanate crystals...

Investiya. Ser. fizicheskaya...

ferroelectric crystal, phase transition, x-ray diffraction...

have investigated...

in ferroelectric materials and various inconsistencies in published data suggest that the superstructure may depend on the manner in which the crystal is grown or on the dimensions of the sample (e.g., on whether it is a thin film). Most of the paper is devoted

Card 1/3

L 57025-65

ACCESSION NR: AF5016115

to a description of the cryostat, in which cooling was accomplished by a stream of nitrogen gas. The temperature was held constant within 0.2°C , and the temperature gradient in the sample was $0.1^{\circ}\text{C}/\text{cm}$. The crystals were grown by evaporating aqueous solutions at room temperature. Two sorts of crystals were obtained: needles oriented along the c -axis, and plates with the a -axis perpendicular to the large faces. X-ray diffraction photographs recorded at room temperature and at -10°C showed that the lattice constant b is doubled in the ferroelectric phase. The lattice constants a and a_0 in the ferroelectric and paraelectric phases as well as the unit cell symmetries in both phases were found to be in agreement with the findings of Y. Ishizawa and R. Pepinsky (Acta crystallogr., 1967, 24, 1087). Investigation of the lattice constants in the paraelectric phase showed that the lattice constant b is doubled in the plates but not in the needles. The authors express their gratitude to M.M. Umenskiy for consultations on the construction of the cryostat and for valuable help. art. has: 2 formulas and 2 figures.

Card 2/3

ACCESSION NR: AP5016115

ASSOCIATION: Fizicheskogo fakul'tet Moskovskogo gosudarstvennogo uni-
versiteta im. M.V.Lomonosova (Physics Department, Moscow State Univ.)

ENCL: 00

CLASS: 00, 00

NO 006

OTHER: 004

Card 3/3

REF ID: A66115
SWT(4)/PWT(1)/EPA(s)-2/EPF(c)/BEC(k)-2/EPF(r)-2/EPF(SEC(t))/T/
Kt-2/1-4/FI-4 I.P. 11/11/65
AP5016128 UR/0048/85/009/006/0956/0961

AUTHOR: Koptsik, V.A.; Toshev, S.D.

TITLE: Observation of domain structure in low temperature ferroelec-
tric materials by the solid dew technique. Report, 1965. 11 pages. References on
the cover.

SOURCE: AN SSSR. Izvestiya. Ser. fizicheskaya, v.29, no.6, 1965, 956-961

TOPIC TAGS: ferroelectricity, domain structure

ABSTRACT: The domain structures of $(NH_4)_2BeF_4$, $(NH_4)_2SO_4$, $SC(NH_2)_2$,
and Bi_2O_3 were observed by the solid dew technique described earlier
by the author and collaborators (Izv. AN SSSR Ser. Fiz. Khim., 1965, 114, 1965;
Ibid. 8, 1965, 1965; Ibid. 9, 1965, 1965). The samples were prepared by
the usual method. The sample of $(NH_4)_2BeF_4$ was polished and
after being cooled in liquid nitrogen it was quickly placed
in a microscope and the crystallization products and domain
structures were observed and photographed. Photographs of the
domain structures are given. The domain structures are discussed at some

Card 1/2

L 57022-65

ACCESSION NR: AP5016128

0

length in relation to the crystal symmetries in the paraelectric and ferroelectric states. The thicknesses of the domains in KH_2PO_4 were measured for samples of different thicknesses between 1 and 4 μm . The domain thickness was found to be proportional to the square root of the sample thickness and to be 2.5 microns for a 1 μm thick sample. The positions and thicknesses of the domain walls were estimated with the aid of the thermodynamic theory of V.Kozlov (Zh. tekhn. fiz. 35, 1965), and W.Kanzig ("Ferroelectricity and Antiferroelectricity" estimates were in good agreement with estimates obtained for the salt by T.Mitsui and Y.Furukoshi (J. Appl. Phys. 33, 1962), and by W.Kanzig and H.Sommerhalder (Helv. phys. Acta 36, 1963), and by W.F.Merz (Phys. Rev. 135, 1964). See also table 1.

ASSOCIATION: none

CLASS: 00

ENCL: 00

SWR CODE: SS

FORM: 50V: 010

OTHER: 005

Card

KOPTSIK, V.A.; GAVRILOVA, N.D.

Experimental study of the pyroelectric effect in ferroelectric crystals. Izv. AN SSSR. Ser. fiz. 29 no.11:1969-1973 N '65.
(MIRA 18:11)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta.

AP5018615

HR/0030/45/000/007/0066/0067

V. I. P. (Doctor of chemical sciences), V. A. Doctor

Symposium on crystallization from solutions and melts

Vestnik, no. 7, 1965, 64-67

TOPIC TAGS: crystallization, synthetic material, garnet, corundum, mica, semi-conductor crystal, titanate, tungstate

ABSTRACT: A symposium on crystallization from solutions and melts was held in Berlin on March 15-17. One hundred members from Bulgaria, East Germany, Poland, Czechoslovakia, and Czechoslovakia participated, and 10 papers were read. The papers fell into six basic groups: general questions on theory and method, synthesis of corundum single crystals, crystallization of mica from solutions and synthesis of garnets, synthesis of semiconducting single crystals, and tungstate and titanate single crystals. Contributions were made by [East Germany], W. Fehling and M. [East Germany], V. A. [USSR], L. A. Sysoyev and [USSR].

L 60969-65

ACCESSION NR: AP5018615

13

W. Kleber (E. Germany), Kaishov (Bulgaria), N. P. Luzhina, Z. S. Medvedova, and
(USSR), N. A. Goryunov and A. S. Borodavina, part
D. Sculita and H. Waligor (East Germany), Armed and J. Novak
and J. Mil (Czechoslovakia). Most of the dispersed was
dispersed seeding or without seeding of from certain
specimens could be obtained with seed, is suggested
sum conditions for such synthesis.

1719

ENCL: 00

DISC: 55, 60

OTHER: 000

I 06305-67

ACC NR: AP6015500

aries of the crystallites of the ceramic. In antiferroelectrics of this type, the absorption anomaly is related to the spatial polarization vector which plays the role of an order-disorder parameter; in the antiferroelectric phase it defines the dipole superstructure and turns to zero above the Curie point. The anomaly of sound absorption is related to increased relaxation time of this parameter near the phase transition temperature of second order. Specimens of the ceramic were made available by V. A. Isupov. L. A. Shuvalov assisted in the investigation of sound absorption at low frequencies of the order of 50 to 100 kilocycles per second. Orig. art. has: 2 figures.

2

SUB CODE: 20/

SUBM DATE: 08Dec65/

ORIG REF: 019/

OTH REF: 001

Card 2/2 *gd*

ACC NR: AP/005332

SOURCE CODE: UR/0181/67/009/001/0116/0121

AUTHOR: Krasnikova, A. Ya.; Koptsik, V. A.; Strukov, B. A.; Van Min

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Dielectric and optical investigations of the irreversible ferroelectric phase transition in crystals of potassium

SOURCE: Fizika tverdogo tela, v. 9, no. 1, 1967, 116-121

TOPIC TAGS: potassium compound, ferroelectricity, phase transition, dielectric constant, electric polarization, double refraction

ABSTRACT: The authors carried out precision measurements of the dielectric constant, polarization, and the coercive field, and also investigations of birefringence of tetragonal potassium ferrocyanide crystals in the temperature interval -10 - -70°C . The apparatus used for the investigations is described elsewhere (PTE no. 1, 183, 1961 and earlier). All the electric and optical properties exhibited anomalies near the ferroelectric phase transition point at -55.6°C . For the tetragonal crystals tested, the irreversible transition is accompanied by spontaneous polarization along the $[10\bar{1}]$ and $[101]$ directions, with values 1 and 0.75 microcoulomb/cm² respectively. It was also observed that in crystals with small angles between the optical axes irreversible transitions are observed at temperatures that increase with increasing angle between the optical axes. Comparison of the results with nuclear magnetic res-

Card 1/2

ACC NR: AP7005332

onance and other tests made on these crystals leads to the conclusion that a probable connection exists between the physical properties and the fact that as a rule a potassium ferrocyanide crystal does not crystallize with any one distinct structure, but all its structural types crystallize simultaneously so that it is difficult to establish the limits governing the crystallization conditions of any particular modification. The authors thank G. S. Zhdanov and M. M. Umanskiy for a discussion of the results. Orig. art. has: 7 figures.

SUB CODE: 20/ SUBM DATE: 26May66/ ORIG REF: 006/ OTH REF: 003

Card 2/2

ACC NR: AP7006229

(A, N)

SOURCE CODE: UR/0078/67/012/001/0062/0067

AUTHOR: Rashkovich, L. N.; Koptsik, V. A.; Volkova, Ye. N.; Izrailenko, A. N.;
Plaks, E. M.

ORG: Physics Department, Moscow State University (Fizicheskii fakul'tet, Moskovskiy
gosudarstvennyy universitet)

TITLE: Some properties of aqueous solutions of $\text{NH}_4\text{H}_2\text{PO}_4$ and $\text{ND}_4\text{D}_2\text{PO}_4$

SOURCE: Zhurnal neorganicheskoy khimii, v. 12, no. 1, 1967, 62-67

TOPIC TAGS: ammonium phosphate, deuterium compound, deuterium oxide

ABSTRACT: The solubility of $\text{NH}_4\text{H}_2\text{PO}_4$ (ADP) and $\text{ND}_4\text{D}_2\text{PO}_4$ (D-ADP) and the density, refractive index and conductance of their aqueous solutions were studied in order to make use of the corresponding concentration and temperature relationships for the control of the crystallization process. The deuterated compound was prepared by successive crystallizations of ADP from heavy water. The solubility of ADP and D-ADP was found to be linearly related to the temperature: $\sigma = 26.21 + 0.4463 t$, and the solubility of D-ADP in D_2O surpasses that of ADP in H_2O by about 8%. A plot of the density of the ADP and D-ADP solutions versus their concentration gave a linear dependence. The refractive index data are described by the linear relationships

$$n_{\text{ADP}} = 1.3309 + 0.00138c,$$

$$n_{\text{D-ADP}} = 1.3285 + 0.00138c.$$

Card 1/2

UDC: 546.39*185--384.1.04+549.39*11.2*185--384.1.04

KOPTSIOVSKAYA, L.S.; PETROPAVLOVSKAYA, I.S.

Treatment of peritonitis by intra-peritoneal administration of penicillin. Sovet. med. 16 no. 7:8-9 July 1952. (CLML 22:4)

1. Candidate Medical Sciences for Koptsinovskaya. 2. Of Moscow Municipal Scientific-Research Institute for First Aid imeni N. V. Sklifosovskiy (Director -- B. V. Nifontov; Head Physician -- Prof. B. A. Petrov).

KOPTSIOWSKAYA, L.S., kand.med.nauk; CHERTKOV, I.L.

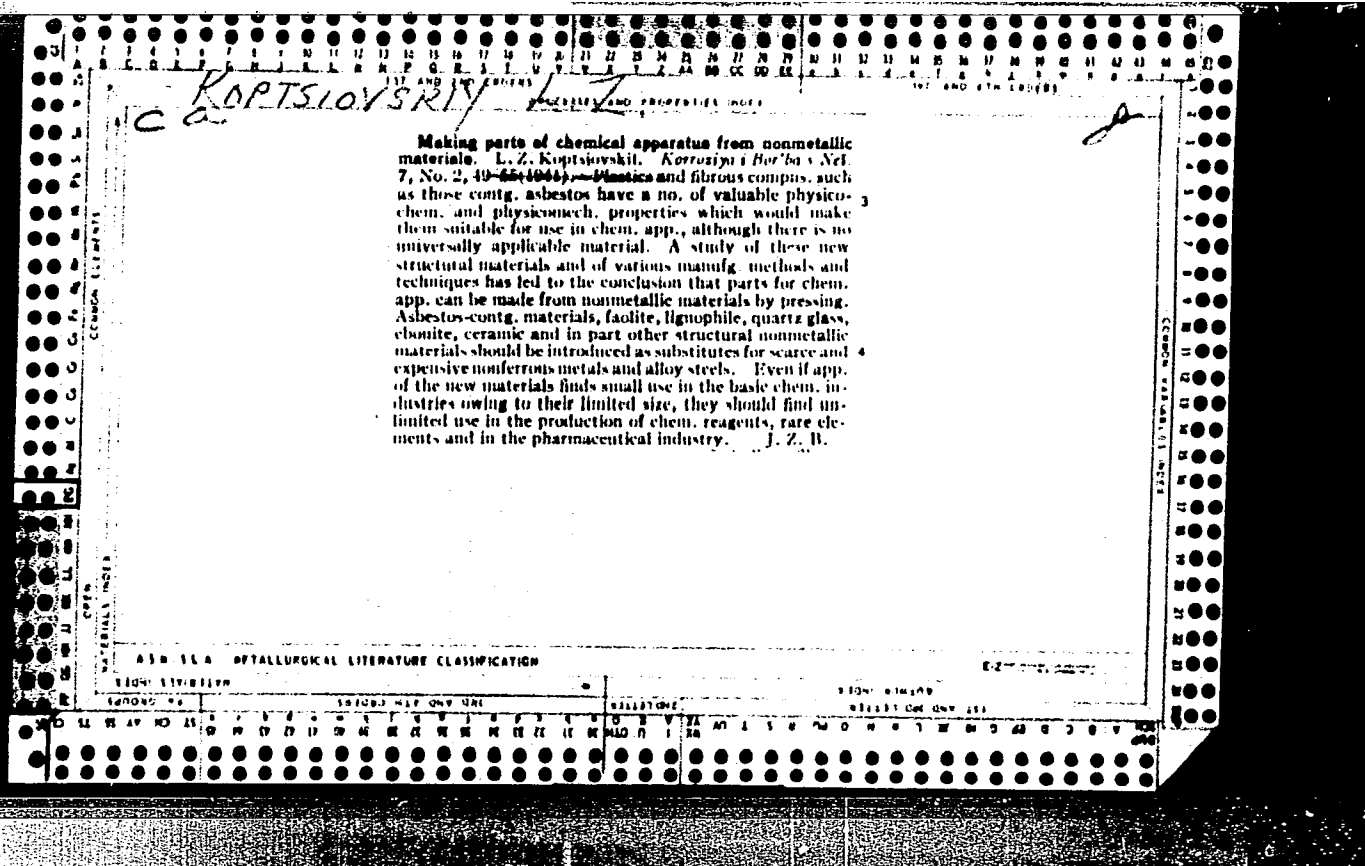
Activity of the properdin system in surgery on the abdominal
organs. Khirurgiia no.10:124-128 '61. (MIRA 14:10)

1. Iz 4-y khirurgicheskoy kliniki (zav. - prof. P.I. Androsov)
Moskovskogo gorodskogo nauchno-issledovatel'skogo instituta skoroy
pomoshchi imeni N.V. Sklifosovskogo (dir. - zasluzhennyy vrach
USSR M.M. Tarasov, glavnyy khirurg - chlen-korrespondent AMN SSSR
zasluzhennyy deyatel' nauki prof. B.A. Petrov) i Tsentral'nogo
ordena Lenina instituta gematologii i perelivaniya krovi (dir. -
deystvitel'nyy chlen AMN SSSR prof. A.A. Bagdasarov [deceased]).
(ABDOMEN—SURGERY) (PROPERDIN)

KOPESIOVSKAYA, R.S.

**Role of diathermoceagulation of the sclera in diascleral
extraction of foreign bodies. Vest. oft., Moskva 33 no.1:
27-29 Jan-Feb 1954. (CML 25:5)**

**1. Candidate Medical Sciences. 2. Of the State Scientific-
Research Institute of Eye Diseases imeni Gel'ngol'ts.**



SAKSONOVA, Ye.O.; PETROPAVLOVSKAYA, G.A.; KOPTSIOVSKAYA, R.S.

Use of andaxin in cataract extraction. Uch. zap. GNII glaz.
bol. no.8:109-112'63. (MIRA 16:9)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut glaznykh
bolezney imeni Gel'mgol'tsa.
(MEPROBAMATE) (CATARACT)

KOPTSOV, A.N. (s. Rogozikha, Altayskiy kray)

Taking brief notes of the conditions of certain problems. Mat. v
shkole no. 4:54-55 J1-Ag '58. (MIRA 11:7)
(Arithmetic--Problems, exercises, etc.)

KOPTSOV, G.P.

In the "Cotton" pavillion. Tekst.prom. 16 no.7:53-54 J1 '56.

(MLRA 9:8)

1. Glavnyy inzhener pavil8ona "Khlopok" Vsesoyusnoy promyshlen-
noy vestavki.

(Cotton manufacture--Exhibitions)

KOPTSOV, G.P., inzh.

"Shuttle trains" used in textile mills. Izobr.v SSSR 3
no.1:11 Ja '58. (MIRA 11:1)

(Spinning machinery)

KOPESOV, G.P.; SHCHEGOLEV, A.V.

The KhDV-type cotton fiber-extracting machine. Biul. tekhn.-ekon.
inform. no.3:49-50 '58. (MIRA 11:6)

(Cotton machinery)

KOPTSOV, G.P.; SHCHEGOLEV, A.F.

The SKE-3 automatic silk-fiber reeling machine. *Biul.tekh.-ekon.*
inform. no.5:40-41 '58. (MIRA 11:7)
(Reels (Textile machinery))

KOPTSOV, G.P.

Good book about carding machines ("Cotton carding machines" by
N.I.Zolotarev, G.A.Ermilov. Reviewed by K.P.Koptsov). Tekst.
prom. 21 no.3;81 Mr '61. (MIRA 14:3)
(Carding machines) (Zolotarev,N.I.) (Ermilov,G.A.)

KOPTSOV, G.P., inzh.

Seen at the British Commercial and Industrial Exhibition. Tekst.
prom. 21 no.9:78-79 S '61. (MIRA 14:10)
(Moscow--Exhibitions) (Great Britain--Textile machines)

AUTHOR: Kalabukha, N.D. and Koptsov, I.A., Engineers SOV/28-58-5-22/37

TITLE: Some Requirements for Technical Blueprints (Nekotoryye trebovan'ya k tekhnicheskoy dokumentatsii)

PERIODICAL: Standartizatsiya, 1958, Nr 5, pp 65 - 68 (USSR)

ABSTRACT: The author discusses the confusion which at present exists in the drawing up of technical blueprints, due to a lack of proper and unified standards. He advocates the standardization of requirements relating to technical blueprints and discusses methods of designating components and products, reproducing blueprints, etc.

1. Drafting--Standards

Card 1/1

KOPTSOV, L.N.

High frequency R-C oscillator using transistors. Radiotekh. i
elektron. 1 no.11:1413-1418 N '56. (MIRA 10:1)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta.
(Oscillators, Transistor)

KOPTSOV, N.; ZHURIN, S.

Who is responsible for the output of defective pipes? KFO
no.9:59 S '59. (MIRA 13:1)

1. Predsedatel' soveta Nauchno-tehnicheskogo obshchestva 2-go Gosudarstvennogo podshipnikovogo zavoda (for Koptsov). 2. Uchenyy sekretar' soveta Nauchno-tehnicheskogo obshchestva 2-go Gosudarstvennogo podshipnikovogo zavoda (for Zhurin).
(Ural Mountain region--Pipe)

ZUB, K.Ya.; BOCHAROV, V.I.; KHASAY, V.P., inzh.; KOPTSOV, N.S.;
KODINTSEV, I.; STANISLAVCHUK, P.E.; POROKHIN, Ye.;
SIDOROV, N.I., inzh. red.; USENKO, L.A., tekhn. red.

[The VL60 electric locomotive] Elektrovoz VL60; instruktsion-
naya kniga. Moskva, Transzheldorizdat, 1963. 250 p.
(MIRA 16:8)

1. Novocherkasskiy elektrovozostroitel'nyy zavod.
(Electric locomotives)

KOZENKO, A.B.; ZONTOV, A.K.; KOPTSOV, V.S.; FROLOV, A.V., red.;
ZAGOSKINA, G.V., red.; SHENDAREVA, L.V., tekhn. red.

[Automated continuous production line for the manufacture of
fiberboards] Avtomatizirovannaiia potochnaia liniia dlia pro-
izvodstva fibrolitovykh plit. Moskva, TSentr. in-t tekhn.
informatsii i ekon. issl. po lesnoi, bumazhnoi i derevoobra-
batyvaiushchei promyshl., 1962. 68 p. (MIRA 16:4)
(Fiberboard) (Assembly-line methods)

BAGAYEV, Boris Fedorovich, dots.; CHUDINOVA, Izida Mikhaylovna;
KOPTSOVA, V., red.

[Siberian Heavy Machinery Plant of the Order of the Red
Banner of Labor] Ordenonosnyi "Sibtiazhmash." Krasno-
iarsk, Krasnoarskoe knizhnoe izd-vo, 1964. 85 p.
(MIRA 18:9)

YE V. KOPTSEVA

84(7) 807/1700

Ucheb. Materialy

Materialy I Vsesoyuznogo sveshchaniya po spektroskopii, 1956. S. 111. Atomnaya spektroskopiya (Materials of the 10th All-Union Conference on Spectroscopy, 1956. Vol. 2: Atomic Spectroscopy) Izdatel'stvo L'vovskogo univ., 1958. 568 p. (Series: Its: Fizicheskii sbornik, vyp. 4(9)) 3,000 copies printed.

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii.

Editorial Board: G.S. Landsberg, Academician, (Moscow, U.S.S.R.); S. I. Bekasov, Doctor of Physical and Mathematical Sciences; V. A. Babitskiy, Doctor of Physical and Mathematical Sciences; V. G. Koritskiy, Candidate of Technical Sciences; S. M. Rayskiy, Candidate of Physical and Technical Sciences; L. K. Klimovskaya, Candidate of Physical and Mathematical Sciences; V. S. Melnyanchuk (deceased), Doctor of Physical and Mathematical Sciences; A. Ye. Alamberman, Doctor of Physical and Mathematical Sciences; M. I. G. Gaser, Tech. Ed.; P. V. Sarayuk.

NOTE: This book is intended for scientists and researchers in the field of spectroscopy, as well as for technical personnel using spectrum analysis in various industries.

CONTENTS: This volume contains 177 scientific and technical studies of atomic spectroscopy presented at the 10th All-Union Conference on Spectroscopy in 1956. The studies were carried out by scientists of technical institutes and include researches of physicists, chemists, biologists of Soviet and other sources. The studies cover many phases of spectroscopy: spectra of rare earths, electromagnetic radiation, physicochemical methods for controlling uranium production, physics and technology of gas discharge, optics and spectroscopy, abnormal dispersion in metal vapors, spectroscopy and the combustion theory, spectrum analysis of ores and minerals, photographic methods for quantitative spectrum analysis of metals and alloys, spectral determination of the hydrogen content of metals by means of isotopes, tables, and atlases of spectral lines, spark spectrographic analysis, statistical study of variation in the parameters of calibration curves, determination of traces of metals, spectroscopy of analysis in metallurgy, thermochemistry in metallurgy, and principles and practice of spectrochemical analysis.

Card 2/31

Materials of the 10th All-Union Conference (Cont.) 807/1700

- Ruzsov, A.A. and M.P. Rukhva. Spectral Method for the Analysis of Gold of High Purity by the Absolute Intensities of the Analytical Lines 421
- Babintsev, B.D. Operating Experience of the Spectral Laboratory of the "Yuzhuralnikel" Combine 422
- Ginsburg, V.L. Spectrum Analysis of Cobalt 423
- Vitushkina, I.M. Spectrum Analysis of Nickel With the Aid of Cast Electrodes Under Spark Conditions of the DO-1 Generator 426
- Yerishin, L.S., and Ye.V. Koptseva. Some Practical Methods for the Spectrum Analysis of Bronze Containing Tin 429
- Asarov, L.O., and T.V. Khagina. Spectrum Analysis of Al - Zn - Al - Cu, and Al - Zn Hardeners 432
- Yarov, S.Ye., Ye.Ya. Zetolokin, and Ye.A. Bushko. Spectral Method for the Determination of Sodium and Calcium Content in BK Mabbitt 434

Card 24/31

YEVLAŠIN, L.S.; KOPTSOVA, Ye.V.

Some practical methods for the spectrum analysis of tin
bronzes. Fiz.sbor. no.4:429-432 '58. (MIRA 12:5)

1. Kirovskiy zavod, gor. Chelyabinsk.
(Bronze--Spectra)

KOPTNIK, V.A.; MINAYEVA, K.A.; VORONKOV, A.A.; SOLOV'YEV, A.F.; IZRAILENKO,
A.N.; POPKOVA, Ye.G.; KOZLOVA, G.I.

Studying new piezoelectric crystals in small samples. Vest.Mosk.un.
Ser.mat.,mekh.,astron.,fiz.,khim. 13 no.6:91-98 '58.

(MIRA 12:4)

1. Kafedra kristallografii Moskovskogo gosudarstvennogo universiteta.
(Piezoelectric substances)

KOPTY, A. D.

23416 AGROGIDROLOGICHESKIY SVOYSTVA OSNOVNYKH POCHVENNYKH TIPOV KAZAKHSTANA.
POCHVOVEDENIYE, 1949, No. 7, c. 394-99.

SO: LETOPIS NO. 31, 1949.

FROLENKO, Yu.G.; KONOVALOV, V.A.; KOPTYAKOV, A.M.

Automatic control of the speed of feeding band saw units. Der.
From. 12 no.3:13-14 Mr '63. (MIRA 16:5)
(Band saws) (Automatic control)

KOPTYAYEV, D.A.

MEFLA, S.A., inshener; KOPTYAYEV, B.A., inshener.

Wooden span construction in building logging roads and railroads.
Les.prom.14 no.4:10-11 Ap '54. (MYRA 7:4)
(Bridges, Wooden)

KOPTYAYEV, Boris Panteleymonovich; STRONGIN, V.L., red.; BABICHEVA, V.V.,
tekhn.red.

[Consumer's guide on electrical appliances] Pokupateliu o elektro-
tovarskh i domashnikh mashinakh. Moskva, Gos.izd-vo torg.lit-ry,
1960. 79 p. (MIRA 13:11)
(Household appliances, Electric)

REVEBTSOV, V.P.; LEDNEV, M.P.; SHILOV, V.I.; OSMINKIN, A.A.; LUPYKO, V.M.;
KOPTYAYEVA, M.V.

Investigating the quality of carbon steels made from pig irons
containing boron. Izv.Sib.otd.AN SSSR no.11:49-58.

(MIRA 12:2)

1. Ural'skiy filial AN SSSR.
(Steel)

BABAYEVA, Nina Fedorovna; YEROFEYEV, Valentin Mikhaylovich; SIVOKONENKO, Igor' Mikhaylovich; KHOVANSKIY, Yuriy Mikhaylovich; YAVLENSKIY, Konstantin Nikolayevich; SHCHERBAKOV, Yu.A., inzh., retsenzent; SAYDOV, A.A., doktor tekhn.nauk, retsenzent; SLIV, E.I., kand.tekhn.nauk, retsenzent; KOPTYAYEV, P.P., kand.tekhn.nauk, nauchnyy red.; ORLOV, V.P., inzh., nauchnyy red.; NIKITINA, M.I., red.; TSAL, R.K., tekhn.red.

[Parts and elements of gyroscopic instruments] Detali i elementy
giroskopicheskikh priborov. By N.F.Babaeva i dr. Leningrad,
Sudpromgiz, 1962. 497 p. (MIRA 15:5)
(Gyroscopic instruments)

KOPTYAYEV, P.P.

Two-action gyrocompass with electromagnetic correction and
aperiodic reduction to the meridian. Vop. prikl. gir. no.2:
123-146 '60. (MIRA 15:4)

(Gyrocompass)

KOPTYAYEVA, V.A.; MALAFEYeva, K.M.; IVANOV, N.N.

Use of the K-160 oiling preparation in the rewinding
of capron fibers. Khim.volok. no.5:59-60 '62. (MIRA 15:11)

1. Klinskiy kombinat iskusstvennogo i sinteticheskogo
volokna (for Koptayeva, Malafeyeva). 2. Vsesoyuznyy
nauchno-issledovatel'skiy institut iskusstvennogo volokna
(for Ivanov).

(Nylon)

KOPTYAYEVA, V.A.; KHARITONOVA, G.N.; TOLPYGINA, G.P.

Experience with the KV-150-I4 high-speed twisting and spinning machine. Khim.volok. no.5:60-62 '62. (MIRA 15:11)

1. Klinskiy kombinat iskusstvennogo i sinteticheskogo volokna.

(Textile machinery)
(Nylon)

KOPTYAYEVA, V. A.

S/081/62/000/024/040/052
B106/B186

AUTHORS: Vasil'yeva, M. N., Kamerina, T. P., Komarova, Ye. I.,
Zhestkova, Ye. N., Maslova, M. F., Smirnova, Ye. V.,
Ivanov, N. N., Bikbayeva, N. S., Koptyayeva, V. A.

TITLE: Choice of a new oiling agent for processing capron in
synthetic fiber plants

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 24 (II), 1962, 947,
abstract 24P979 (Nauchno-issled. tr. Tsentr. n.-i. in-t
shelk. prom-sti. M., Nostekhidat, 1960 (1962), 82-94)

TEXT: On the basis of the results obtained in the testing of new oiling
agents the authors recommend that 2.5 - 4.5% of the type K-160 (-160)
should be applied to the fiber. The oiling agent consists of 82%
Velosite (L), 6% OP-4 (OP-4) and 6% Stearoks-6. Twisting is to be
stabilized by low-pressure steaming. [Abstracter's note: Complete
translation.]

Card 1/1

KOPTYLIN, Jerzy, mgr inż.

Devices informing about arrival and departure of trains.
Przełk kolej elektrotech 11 no.10:249-253 0 '64.

KOPTYUG, V.A.; VOROZHTSOV, N.N. (mladshiy), red.; SHPAKOVSKAYA, L.I.,
~~red.~~; OVCHINNIKOVA, T.K., tekhn. red.

[Isomerization of aromatic compounds] Izomerizatsia aro-
matischeskikh soedinenii. Pod red. N.N.Vorozhtsova. Novo-
sibirsk, Izd-vo Sibirskogo otd-ziia AN SSSR, 1963. 175 p.
(MIRA 17:3)

1. Chlen-korrespondent AN SSSR (for Vorozhtsov).

KOPTYING, V. A.

The action of aqueous methylamine on (arylsulfonyl) glycines and their *N*-substituted derivatives. L. N. Nikolenko, K. K. Babievskii, and V. A. Koptung (D. I. Mendeleev Chem. Technol. Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 91, 853-4 (1953); cf. C.A. 48, 123d. — The reaction of aq. MeNH₂ with (arylsulfonyl)glycines was investigated. PhSO₂NHCH₂CO₂H (6 g.) heated with 30 ml. 20% aq. MeNH₂ in sealed tube 8 hrs. at 240° gave 66.5% MeSPh. Similarly *p*-MeC₆H₄SO₂NHCH₂CO₂H gave 78% *p*-MeC₆H₄SMc, b₁₄ 94°, along with nearly quant. formation of CO₂. *p*-MeC₆H₄SO₂NPhCH₂CO₂H gave 52.3% PhNH₂ and 50.2% *p*-MeC₆H₄SMc. *p*-MeC₆H₄SO₂NHCH₂MeCO₂H at 270° similarly gave 67% *p*-MeC₆H₄SMc, while 2-C₆H₅SO₂NHCH₂CO₂H gave 65% 2-C₆H₅SMc, m. 50-1°. Heating 1.14 g. *p*-MeC₆H₄SH with 10 ml. 20% aq. MeNH₂ 6 hrs. at 240° gave 87% *p*-MeC₆H₄SMc; similarly *p*-ClC₆H₄SH gave 59% *p*-ClC₆H₄SMc. G. M. Rosolapoff

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Kuznetsov, I. A.

Alkylation of thionamides by amines. L. S. Nikolovskii
and V. A. Kuznetsov. J. Gen. Chem. U.S.S.R. 23, 1711-12
(1955) (Eng. translation).—See C.A. 50, 5357b.

B. M. R.

Chem

M. A. YOUTEY
3/25/55

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5
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EM
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