3428. CONSTRUCTION OF THE MAIN BUILDING OF A HEAT-AND-POWER STATION IN PREFABRICATED REINFORCED CONCRETE. Borodin, K.Ya. and Pashkov, S.N. (Elekt. Sta., [Pwr Sta., Moscow], Nov. 1952, 19-25.) An illustrated description is given of the first experiment in this type of construction for a power station containing three turbo-alternators and four [illegible] 170 tons/h of steam each. The area of the building is 6,790 sq.m. and the cube is 205,000 cu.m. (L).

2

BORODIN, L. F.

L. F. BORODIN, "On the construction of correcting codes with various bases." Scientific Session Devoted to "Radio Day", May, 1956, Trudrezervizdat, Moscow, 9 Sep. 58

Methods are analyzed for constructing systematic correcting codes with an a=2 basis by adding supplementary (checking) symbols, which are the result of the operation $F_j(x)$ on m-informational symbols, to each combination of the original code k . The concept is introduced of the function $F_j(x)$, conjugate to $F_j(x)$, which is used to detect and correct errors by the checking numbers method. It is shown that a combination of a correcting code can be considered as a system of $n = m + k$ comparisons modulo a , containing a unknowns. Methods are presented of detecting and correcting errors by the unknown solutions method and by the method of solving comparison systems.

BORODIN, L.F.; ZOTOVA, Ye.N.

Parameters of transmission systems for discrete messages.
Nauch.dokl.vys.shkoly; radiotekh. i elektron.no.1:27-36 '58.
(MIRA 12:1)

1. Institut radiotekhniki i elektroniki AN SSSR.
(Information theory)

BORODIN, L.F.

One regular method for developing correcting codes. Nauch.dokl. vys.shkoly; radiotekh. i elektron.no.1:54-57 '58.
(MIRA 12:1)

1. Institut radiotekhniki i elektroniki AN SSSR.
(Information theory)

SOV/106-59-3-8/12

AUTHORS: Siforov, V.I. and Borodin, L.F.

TITLE: The Theory of Telegram Coding by Means of Uniform Correcting Codes (K teorii kodirovaniya telegramm ravnomernymi korrektiruyushchimi kodami)

PERIODICAL: Elektrosvyaz', 1959, Nr 3, pp 55-62 (USSR)

ABSTRACT: The work described has been carried out at the Institute of Radio Engineering and Electronics of the Academy of Sciences of the USSR. The use of code groups in telegrams is not new but the most recent contribution to the subject has been made by a group of Czech workers (Ref 1). Methods of constructing codes which reveal and correct errors have been described earlier (Ref 2, 3, 4, 5 and 6). The cost of sending a telegram which is partly encoded is given by (2), if the number of encoded telegrams is M_1 then the time to encode is t_1, given by Eq (7) and the time to decode is t_2, given by Eq (6). Making these substitutions in (2) we find that the coefficient expressing the improvement in the system is given by (11); the improvement is greatest when this number is least. It is obvious from this expression that the best conditions are those under

which the most frequently occurring telegrams are encoded. If we suppose that the distribution of messages is normal and that 2k of them are encoded, then Fig 1 shows the improvement in transmission for various values of dispersion and message length. These curves show that the improvement factor lies between 2 and 5. When plain text is transmitted, errors may be detected and corrected by comparison with the surrounding text. With a coded message however, quite meaningless groups are employed and other means are necessary to reveal errors. We will suppose that "a" letters are used to construct the groups. Then the general expression for a five-position code in which all the combinations differ with one another by not less than two positions is given by Eq (18). Fig 2 shows how the vocabulary may be constructed for the case where a = 5. Three tables are constructed and connected together as shown and contain the symbols inserted from the formulae (21), (22) and (23). The coded group (18) consists of four information symbols and a control symbol. Suppose

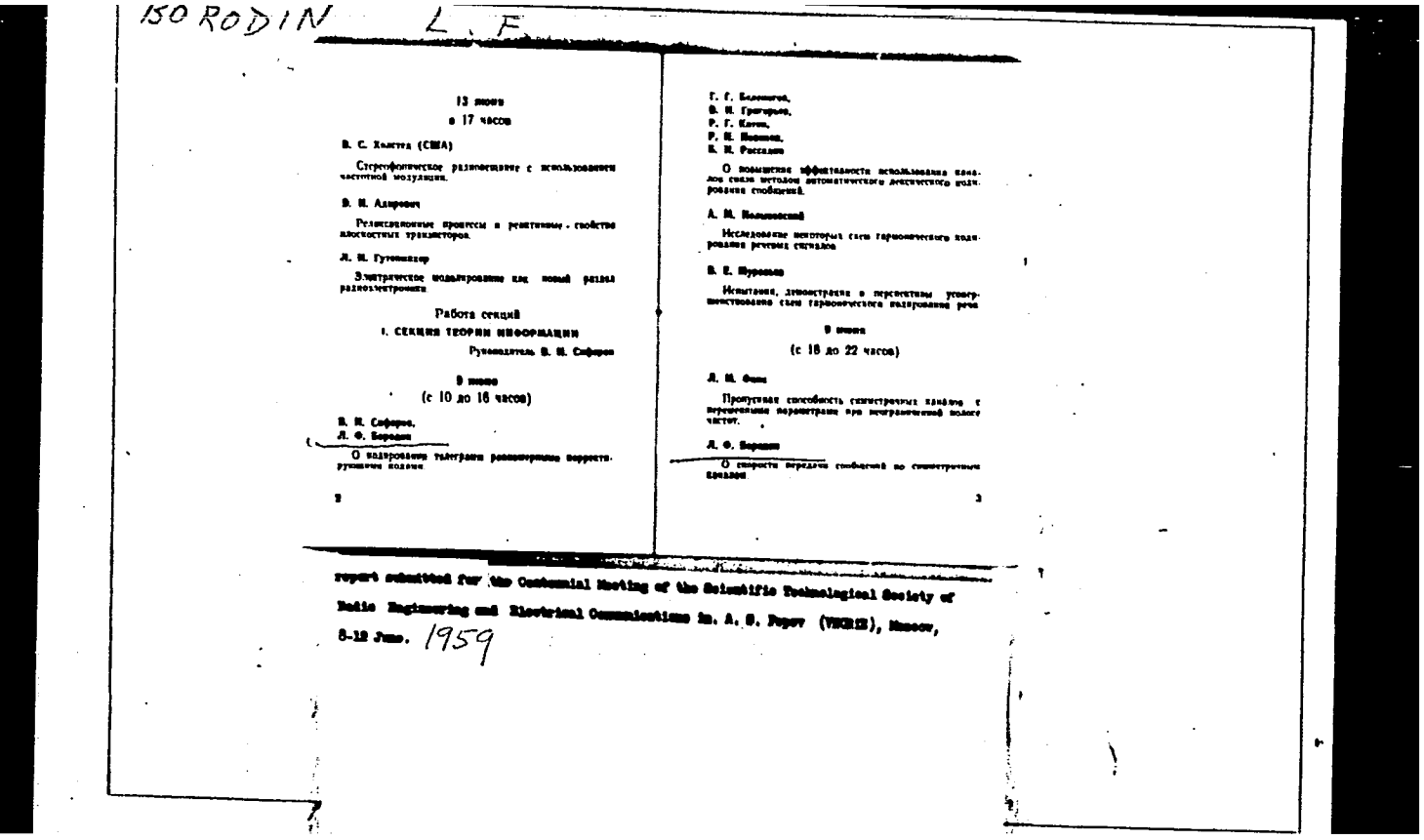
the information is 0113, the combination 01 is found in the second row of Table 1, while the combination 13 is found in the fifth column of Table III. These two lines intersect in Table II giving the control symbol 0. The construction of a code in which the groups differ by not less than three positions is undertaken with Eq (24) as a general expression (Fig 3 shows the tables for finding the control symbol). In modern telegraphic equipment a seven-unit code is employed of which five units may be used to carry information. The majority of the letters in the Russian alphabet may therefore be encoded. If the code system of Eq (24) is used then it is possible to both reveal and correct single errors. Suppose for example that the group 02132 was transmitted but that due to distortion was received as 04132. Then from the tables in Fig 3, it will be seen that if the first three letters are taken as 041 then the second two cannot be 03; this proves that the receiver is incorrect. To reveal the error we work from the other end of the message. In

The Theory of Telegram Coding by Means of Uniform Correcting Codes

Table III (Fig 3) we find the number of the row in which the combination 32 occurs; this is row 5. Along the same column in Table II (Fig 3) we find the third symbol as 1 (row 4). Further in Table I (Fig 3) the intersection of row 4 and column 5 gives 02. Since this combination (02) differs from the first two letters as received (04) in only one position, then we can conclude that the second letter as received is incorrect and that the true group should be 02132. There are 3 figures and 7 references, 5 of which are Soviet and 2 English.

SUBMITTED: 1st November 1958

Card 4/4



150 RODIN L. F.

13 июня
в 17 часов

В. С. Хелстед (США)

Стереофоническое радиовещание с использованием частотной модуляции.

В. Н. Адарович

Релаксационные процессы в реактивных свойствах плоскостных транзисторов.

Л. Н. Гутенмахер

Электрическое моделирование как новый раздел радиоэлектроники

Работа секций

I. СЕКЦИЯ ТЕОРИИ ИНФОРМАЦИИ

Руководитель В. Н. Сифоров

9 июня
(с 10 до 16 часов)

В. Н. Сифоров,
Л. Ф. Бородин

О кодировании телеграфных равномерных корректирующих кодов

3

Г. Г. Белецкий,
В. Н. Григорьев,
Р. Г. Кочин,
Р. Н. Новиков,
Б. Н. Россадин

О повышении эффективности использования каналов связи методом автоматического дискретного кодирования сообщений.

А. М. Яглом

Исследование некоторых схем гармонического кодирования речевых сигналов

В. Е. Шуровцев

Испытания, демонстрация и перспективы усовершенствования схем гармонического кодирования речи

9 июня
(с 18 до 22 часов)

Л. Н. Фомм

Пропускная способность симметричных каналов с переменными параметрами при неограниченной полосе частот.

Л. Ф. Бородин

О скорости передачи сообщений по симметричным каналам

3

report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORIS), Moscow, 8-12 June. 1959

Borodin, L. F.

PHASE I BOOK EXPLOITATION SOV/5135

Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im. A.S. Popova

100 let so dnya rozhdeniya A.S. Popova; yubileynaya sessiya (One Hundredth Anniversary of the Birth of A.S. Popov; Anniversary Session) [Moscow] Izd-vo AN SSSR, 1960. 312 p. Errata slip inserted. 2,800 copies printed.

Sponsoring Agency: Akademiya SSSR.

Chief Ed.: A.L. Mints, Academician; Editorial Board: G.D. Burdun, A.R. Vol'pert, I. Ye. Goron, L. I. Gutenmakher, I.I. Grodnev, N.D. Devyatkov, L.A. Zhekulin, S.I. Katayev, M.S. Neyman, V.I. Siforov, and N.I. Chistyakov; Ed. of Publishing House: L.V. Gessen; Tech. Ed.: S.G. Markovich.

PURPOSE: This collection of reports is intended for scientists and technicians working in radio engineering and telecommunications.

COVERAGE: The reports included in this collection were submitted at the scientific meeting held in 1959 by the Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im. A.S. Popova (Scientific and Technical Society of Radio

Card 1/7

Engineering and Telecommunication imeni A.S. Popov) in commemoration of the 100th anniversary of A.S. Popov's birth. Only 89 of the more than 300 reports submitted at the meeting are included. The remainder are published in the periodicals of the AS USSR, State Committees, the Ministry of Communications, and the Society imeni A.S. Popov. The book contains the reports read at plenary sessions by A.N. Shchukin, Academician, A.A. Pistol'kors, Corresponding Member, AS USSR, and E.I. Adirovich and L.I. Gutenmakher, Professors, as well as those selected as the most interesting given in the following sections by their respective chairmen: Theory of Information, Antenna Systems, Receiving Devices, Wire Communications, Television, Electronics, Radio Measurements, General Radio Engineering, Transmitting Devices, Radio Wave Propagation, Electron Microscopy, Radio Broadcasting, Electroacoustics and Sound Recording, Electronic Computer Engineering, and SHF Ferrite Devices. These chairmen were on the Editorial Board which prepared the papers for publication. References accompany most of the reports.

TABLE OF CONTENTS:

80579

S/109/60/005/06/001/021
E140/E163

16.6800

AUTHOR: Borodin, L.F.

TITLE: Equidistant and Other Optimal and Near-Optimal Codes

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 6, pp 883-893 (USSR)

ABSTRACT: On the basis of the theory of finite groups a method is given for constructing codes with base $a = p^{\lambda}$ (p is a prime number; $\lambda = 1, 2, 3, \ldots$) and number of combinations $N = a^m$. In particular a method is given for constructing equidistant codes in which the combinations differ from each other in exactly d positions. To construct the codes, the mathematical apparatus of the theory of finite commutative groups is employed. After presenting the method for constructing the codes, the author analyses the probability of correct reception using the equidistant codes and using an optimal self-correcting code not equidistant. It is shown that in certain systems for processing the codes the probability of correct reception of a combination may be smaller for the code with greater d_{min}. This

Card 1/2

80579

S/109/60/005/06/001/021
E140/E163

Equidistant and Other Optimal and Near-Optimal Codes

apparent paradox is due to the assumption of symbol-by-symbol reception of the code combinations. However, using Wagner's (Ref 8) method such paradoxes will not arise. For maximum probability of correct reception it is necessary to use modern statistical methods of reception and codes constructed with regard to these methods and the properties of the given channel. There are 3 tables and 8 references, of which 6 are Soviet and 2 English.

Card 2/2

SUBMITTED: November 10, 1959

20093
S/106/60/000/012/006/009
A055/A033

6,9500

AUTHOR: Borodin, L. F.

TITLE: Receiver With a "Floating" (Random) Threshold

PERIODICAL: Elektrosvyaz', 1960, No. 12, pp. 61-68

TEXT: After recalling the importance of the noiseproof feature of communication systems using correcting codes, the author of the article proceeds with a comprehensive analysis of a new method of reception of correcting code combinations. This method is based, as are the earlier described methods, upon the knowledge of a posteriori probabilities of the received symbols, but it also uses the following property of the correcting codes: The combinations, in these codes, are determinable by $n_1 < n$ symbols (n being the number of symbols in the combination). The author's method ensures a greater probability of correct reception of combinations. Indeed, the receiver's "decision" as regards the transmitted communication is taken, every time, only according to $n_1 < n$ symbols of the received combination having the greatest a posteriori probabilities. This is why the author named his method: method of reception according to the most reliable symbols or method

Card 1/4

4

Receiver With a "Floating" (Random) Threshold

of reception with a "floating" (random) threshold; (indeed, if the received symbols are numbered in the order of their decreasing a posteriori probabilities, thus forming a kind of variational series, the random value of the n_1-th member of the series constitutes a threshold determining the $n - n_1$ symbols having no influence upon the "decision"). In his comprehensive analysis, the author first examines the general case, where the transmitted combination is determined by the comparison of n_1 most reliable symbols with the symbols of all the combinations of the code occupying the same n_1 positions. In this case, the memory of the receiver must contain all the combinations of the code. Therefore, the author then examines the case of correcting codes with control symbols, where reception according to his method can be achieved without the necessity of "memorizing" all combinations. He also works out and analyzes formula allowing to calculate the probability of a correct reception. To prove the superiority of his method over other methods, particularly over the Wagner method (superiority from the point of view of the probability of a correct reception), the author resorts to a statistical experiment performed with an electronic computer. The enclosed table, containing the results of this experiment, proves that the author's

Card 2/4

Receiver With a "Floating" (Random) Threshold

method, though inferior to ideal reception, is superior to that of Wagner. Moreover, the Wagner method can apparently be applied only to binary codes, which is not the case with the author's method. There are 1 table and 10 Soviet references.

SUBMITTED: February 13, 1960

4

S/106/60/000/012/006/009
A055/A033

Receiver With a "Floating" (Random) Threshold

Table:

h_0	0,3	0,6	0,9	1,2	1,5	1,8	2,1	2,4	2,7	3,0
q	0,383	0,275	0,185	0,116	0,067	0,036	0,018	0,009	0,004	0,002
P_1	0,694	0,459	0,233	0,106	0,026	0,008	0	0	0	0
P_2	0,733	0,553	0,323	0,195	0,083	0,031	0,013	0,004	0,001	0
P_3	0,814	0,610	0,392	0,210	0,086	0,027	0,005	0,001	0	0
P_4	0,674	0,134	0,055	0,018	0,004	0	0	0	0	0

44

Card 4/4

82868
S/108/60/015/008/005/006
B012/B067

6.9000

AUTHOR: Borodin, L. F., Member of the Society (UNOR: E)

TITLE: Ideal Identification Device for Compound Signals

PERIODICAL: Radiotekhnika, 1960, Vol. 15, No. 8, pp. 42-52

TEXT: In the present paper it is first shown that the method of symbol reception is no optimum method even if the receiving device has a receiver which, according to V. A. Kotel'nikov (Ref. 1), is ideal. The block diagram used in this method is shown in Fig. 1. Figs. 2 and 3 show the block diagrams of reception devices by means of which ideal methods of identification may be realized. Besides, simpler though not ideal reception methods can be used for these block diagrams, e.g. Vagner's method (Ref. 4), and the method of reception according to the most reliable symbols. An identification device is described which for a given receiver warrants the maximum probability of correct reception of the correction code combinations. It is demon trated that the use of such an ideal device and of equidistant codes makes it possible to transmit the

Card 1/2

Ideal Identification Device for Compound Signals

communications with required authenticity in the channel. The possibility of correcting the errors by mathematical operations is pointed out and illustrated by an example. In the present paper, the method described was compared with the method of symbol reception, Vagner's method, and the method of reception according to the most reliable symbols by means of a statistical experiment made on a high-speed electron computer. The results of these investigations are presented in Table 1. They show that the ideal identification device described is the best one as to error frequency, and that the method of symbol reception is worst. The author thanks V. I. Siforov, Corresponding Member AS USSR, for his interest shown in the paper, and Ye. P. Nesterova for having conducted the statistical experiment. There are 3 figures, 2 tables, and 9 references: 8 Soviet and 1 French.

SUBMITTED: September 23, 1959

16.7000

S/044/60/000/012/011/014
C 111/ C 333

AUTHOR: Borodin, L. F.

TITLE: Some questions of the theory of construction of correcting codes

PERIODICAL: Referativnyy zhurnal, Matematika, no. 12, 1960, 131, abstract 14137 (Sb. tr. Nauchno-tekhn. o-vo radiotekhn. i elektrosvyazi im. A. S. Popova, 1958, vyp. 2, 110-151)

TEXT: The following correcting code is considered. Let: a be a natural number; R the ring of the smallest nonnegative remainders mod a; R_m and R_n -- normed vector spaces of lines with the dimensions m and n over the ring R, $m \leqq n$, the norm is equal to the number of the nonvanishing coordinates. The correcting code K is the mapping of the set $K_0 \subset R_m$ (initial code) for a certain mapping of R_m into R_n. Let $n - m = k$ and F_1, F_2 -- mappings of R_m into R_n. The elements of K are written in the form: $(x_1, \ldots, x_m, F_1(x_1, \ldots, x_m), \ldots, F_k(x_1, \ldots, x_m))$, where $(x_1, \ldots, x_m) \in K_0$. General considerations on the transmission of such codes in a channel with disturbances are described. The author considers the

Card 1/2

22863
S/044/60/000/012/011/014
C 111/ C 333

Some questions of the theory of ...

possibilities of determination and correction of errors based on algebraic relations. Several special cases are explicitly considered. For the case where a is a prime number, a method is given for constructing some concrete codes.

[Abstracter's note: Complete translation.]

Card 2/2

30128
S/194/61/000/007/052/079
D201/D305

6.9500

AUTHOR: Borodin, L.F.

TITLE: Symmetrical channels' speed of information transmission

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1961, 4, abstract 7 I43 (V sb. 100 let so dnya rozhol. A.S. Popova, M., AN SSSR, 1960, 57-73)

TEXT: The capacity is determined of 3 types of symmetrical channels. 1) A symmetrical transformation and erase channel whose input alphabet consists of a symbols (S) and the output of (a+1) S, any S transmitted with probability q being received correctly, with probability s being transferred into S absent in the input alphabet and with probability p being received incorrectly. 2) A symmetrical transformation channel, in which the output andinput alphabets are the same as in the first, but a transmitted S is either correctly received or transformed into S which is absent in the input alphabet.

Card 1/2

30128
S/194/61/000/007/052/079
D201/D305

Symmetrical channels' speed...

3) A symmetrical transformation channel having the same input and output alphabets with any transmitted S being either correctly received or transformed into any other S. The dependence is considered of the channel capacity on the probability of erasing of S. A graphical method is given of determining the optimum value of the probability of erasing S, at which the channel capacity is maximum. The spped of transmitting information is considered when using uniform correcting codes. The optimum code of erasing channel, at a sufficiently large number of S in a code group, make it possible to transmit information through an erasing channel, with a reliability and speed given in advance which is near the max. channel capacity. 9 references. [Abstracter's note: Complete translation]

Card 2/2

BORODIN, L. F.

Cand Tech Sci - (diss) "Several problems of the theory of correcting codes." Moscow, 1961. 17 pp; (Moscow Power Inst); 150 copies; price not given; (KL, 7-61 sup, 232)

S/109/62/007/008/001/015
D409/D301

6.9500

AUTHOR: Borodin, L.F.

TITLE: Some problems of the theory of group codes

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 8, 1962, 1275-1284

TEXT: The construction of optimal codes is considered. First, the necessary and sufficient conditions for construction of the group code (n,d), where n = m + k (m denoting the number of information digits, and k the number of checking digits), d - the number of positions, are ascertained. The combinations of the code (n,d) can be obtained by means of a system of n linear forms

$$F_1(x) \ldots F(x) \ldots F_n(x), \qquad (3)$$

defined over a finite field with respect to the m independent variables $(x_1, x_2, \ldots, x_m)$. The set of linear forms (3) determines uniquely the number d. Hence the problem of constructing a code with given d(2) reduces to determination of the corresponding sys-

Card 1/3

Some problems of the theory ...

tem (3). The necessary and sufficient conditions are found which system (3) has to satisfy in order that the combinations of the code should differ by at least d(2) positions (i.e. the code be optimal). These conditions are derived by means of theorems and lemmas. Theorem III: In order to determine k linear forms for the checking digits of the code, it is necessary and sufficient to find a matrix of order kxm, so that any of its submatrices of order txh should be of rank h ($t = k - d + h + 1$; $1 \leq h \leq m$). The obtained general theorems are used for construction of optimal codes as follows. The number d_{min} cannot exceed 1 + k. Therefore codes in which

$$d_{min} = 1 + k, \qquad (14)$$

are optimal. The author calls such codes minimax codes. From the above theorems and formula (14) follow additional results, which facilitate the search for the linear forms used in the construction of minimax codes. Further, the restrictions are considered, which can be imposed on optimal-coding problems. These restrictions are stated in the form of theorem X; thereby the author follows a procedure similar to that of C.W. Helstrom (Ref. 7: Maximum-weight

Some problems of the theory ...

group codes for the balanced M-ary channel. IRE Trans. Inform. Theory, 1960, IT-6, 5, 1960). The results are however obtained in a different form. Theorem XI: If system (3) contains only linear forms of the arbitrarily given set $M(\varphi(x))_{\gamma}^{\nu}$, then the code constructed by means of such a system, is optimal; (the set M consists of n_ν linear forms, any ν forms of which are linearly independent $(2 \leqslant \nu \leqslant m)$; n_ν denotes the maximum possible number of forms; γ indicates the field). This theorem is illustrated by examples. The problem of determining (in the general case) the linear forms of the set M, deserves a special investigation; it would permit determining uniquely the set of forms which the optimal system (3) should be sought for given m, n and γ. The most important English-language reference reads as follows: W.W. Peterson, Error correcting codes, M.I.T. Press, John Wiley and Sons, New York - London, 1961.

SUBMITTED: December 15, 1960

Card 3/3

35379
S/108/62/017/003/005/009
D299/D301

9,3279

AUTHORS: Borodin, L.F., and Grushko, I.I., Members of the Society (see Association)

TITLE: On the usefulness of introducing redundancy intervals

PERIODICAL: Radiotekhnika, v. 17, no. 3, 1962, 37 - 47

TEXT: The feasibility is considered of increasing the probability of proper reception of error-correcting code combinations, through the introduction of redundancy intervals. The necessary and sufficient conditions are formulated which would make the introduction of such an interval useful. Simple estimates are obtained for redundancy intervals maximizing the probability of correct reception and minimizing the probability of error. In the transmission of independent messages over discrete channels, it is convenient to use optimal error-correcting codes; this applies in particular to communication systems, whose operation is judged by one of the following criteria: 1) Q - the maximum probability of correct reception of each of the messages; 2) P - the minimum probability of incorrect reception of each of the messages for a given probability Q. It is

Card 1/4

proposed maximizing Q and minimizing P for Q = const., by transforming the symmetrical channel into a symmetrical channel with redundancy, i.e. into a channel at whose input γ signals $b_1, \ldots b_\gamma$ are applied, and at whose output one obtains $\gamma + 1$ signals $b_1, \ldots, b_\gamma$. x. The statistical properties of a symmetrical channel with redundancy are determined by 3 probabilities. Formulas are obtained which hold for any symmetrical channel; for convenience however, a binary symmetrical channel is considered (without affecting the generality of the analysis). The combinations Z of the optimal error-correcting code are written in the form

$$z_1^{\nu}, \ldots, z_j^{(\nu)}, \ldots, z_n^{(\nu)}. \qquad (4)$$

On introduction of a redundancy interval, the coincidence device starts operating as an error-correcting and error-detecting device, even if it was only error-correcting before that. The probability of correct reception of the code combination is:

Card 2/4

$$Q(s) = \sum_{i=0}^{K} C_n^i s^i Q_{n-i}(s) \qquad (19)$$

where $Q_{n-i}(s)$ denotes the "mean" probability of correct reception under the condition that the combination contains i symbols x. The introduction of the redundancy interval is justified if for some $s \neq 0$,

$$Q(s) \geqslant Q_n. \qquad (23)$$

Hence the necessary and sufficient condition for (23) to hold, is

$$\left.\frac{\partial Q(s)}{\partial s}\right|_{s=0} \geqslant 0. \qquad (24)$$

By differentiating Eq. (19), one obtains

$$\left.\frac{\partial Q(s)}{\partial s}\right|_{s=0} = nQ_{n-1}(0) - \frac{nQ_n(0)}{2q_0} - \qquad (25)$$

$$-\frac{1}{2}(q_o - p_o)\sum_{j=0}^{\Delta_n} j\,\alpha_j p_o^{j-1} q_o^{n-j-1} \geqslant 0, \qquad (25)$$

which is necessary and sufficient condition, justifying the introduction of the redundancy interval. The maximum gain obtained thereby, is estimated; this gain, denoted by $\Delta Q = Q(s_o) - Q_o$, is found to be

$$\Delta Q \approx \frac{ns_1}{4}\left[Q_{n-1}(0)(1 + 2p_o) - \frac{Q_n(0)}{q_o}\right]. \qquad (44)$$

There are 6 figures and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc (in translation).

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im.A.S. Popova (Scientific and Technical Society of Radio Engineering and Electrical Communications imeni A.S. Popov) [Abstractor's note: Name of Association taken from first page of journal]

SUBMITTED: September 30, 1961

Card 4/4

BORODIN, L. F.; GRUSHKO, I. I.

"Les systemes adaptatifs de decodage."

report submitted for 4th Intl Cong, Cybernetics, Namur, Belgium, 21-25 Oct 64.

ACC NR: AP6019725 SOURCE CODE: UR/0108/66/021/006/0062/0071

AUTHOR: Borodin, L. F. (Active member of the society); Grushko, I. I. (Active member of the society)

ORG: Scientific and Technical Society of Radio Engineering and Electrocommunication im. A. S. Popov (Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi)

TITLE: Adaptive decoding systems [Reported at the All-Union NTORiE Conference, May 1964]

SOURCE: Radiotekhnika, v. 21, no. 6, 1966, 62-71

TOPIC TAGS: digital decoder, ~~digital~~ radio communication system, adaptive control ~~decoding~~

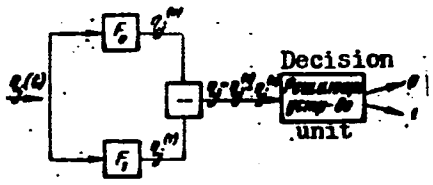
ABSTRACT: Some points associated with the adaptive decoding of digital radio signals are discussed. The procedure of passing decision re the received signal depends on the channel condition. With a preset upper limit of incorrect-decoding probability, the rate of transmission is maximized. The entire problem of optimization of message transmission is not tackled; only a few principal techniques for solving this problem are discussed. Mixed with noise, a sequence of signals: $\eta_1(t), \eta_2(t), \ldots, \eta_j(t), \ldots, \eta_m(t)$, arrives at the receiver. Each signal can be

UDC: 621.391.154

Card 1/2

ACC NR: AP6019725

represented as: $\eta_j(t)=\mu y_i(t)+\xi(t)$, where $i = 0, 1$, μ is the attenuation, and $\xi(t)$ is a stationary random process with a zero average value and a known correlation function. A random signal $\eta_i(t)$ is simultaneously processed in filters F_0 and F_1 (see figure) which try to determine whether this signal resembles $y_0(t)$ or $y_1(t)$ transmitted into the channel. Random values $\eta_j^{(0)}$ and $\eta_j^{(1)}$ are the results of this processing; one of these values is subtracted from the other, thus revealing which of these values represents the original signal. In an adaptive decoder, the received signal is applied to a channel-monitoring device where a decision re the channel condition is reached. If the channel condition ensures that the probability of error is under its preset value, the decoded signal is regarded as true. If the signal-to-noise ratio is higher than its preset value, a different decision (e.g., RΩ) is made; meanwhile, the received signal is either knocked off or stored. The above procedure is a modification of the method of reception based on the most reliable symbols. Orig. art. has: 9 figures and 8 formulas.



SUB CODE: 17 / SUBM DATE: 28Jul64 / ORIG REF: 005

Card 2/2

BORODIN, L.P.

Desman and muskrat; ecological relationship of these species and their economic significance. Biul.MOIP.Otd.biol. 70 no.1:30-32 Ja-F '65. (MIRA 18:6)

BORODIN, L.P.

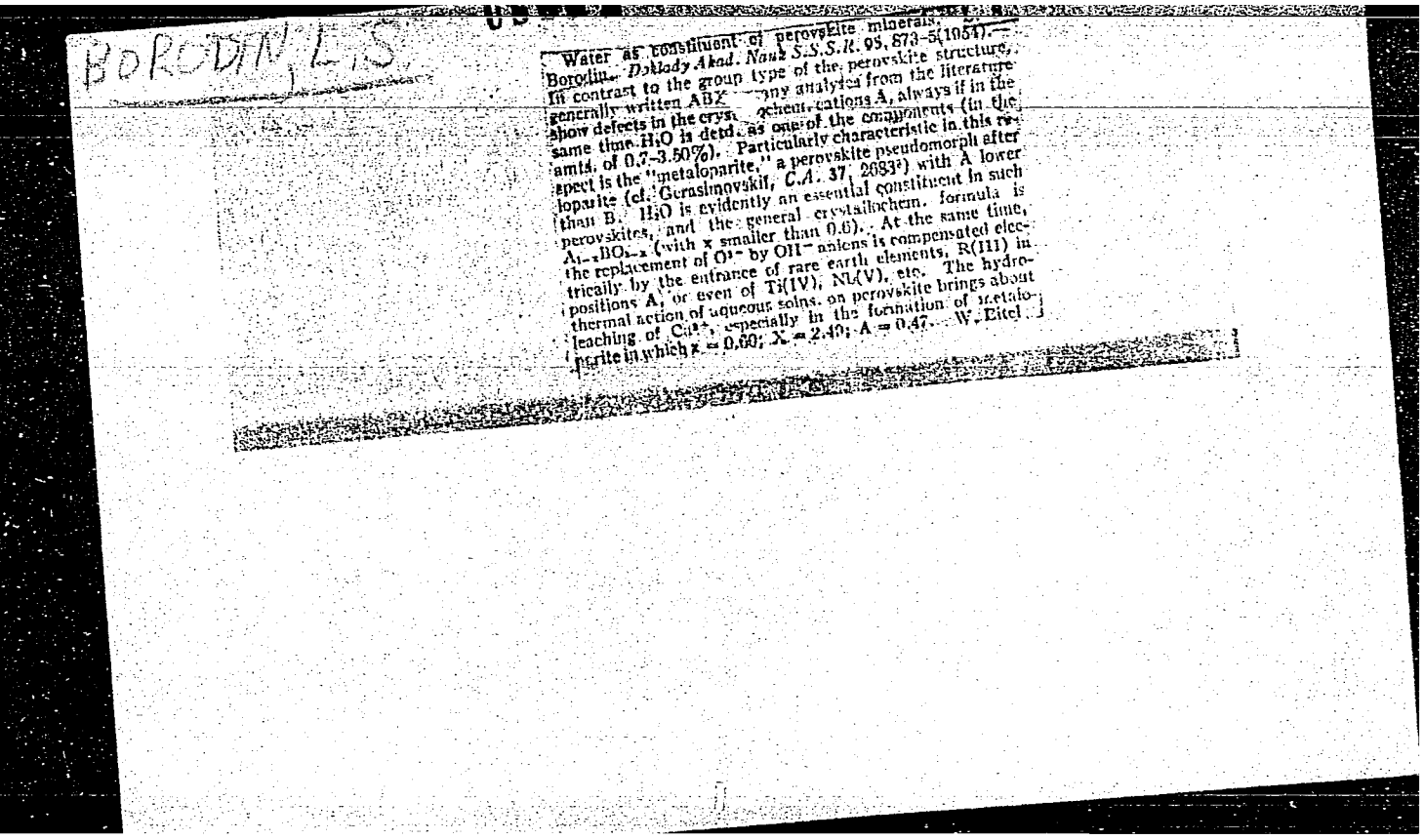
Role of elk in forestry. Soob.Inst.lesa no.13:102-110 '59. (MIRA 13:2)

1. Oksky gosudarstvennyy zapovednik.
(Elk) (Forests and forestry)

BORODIN, L.P.

Increasing the stand density of pine plantations as biological method of protecting pine from elk. Soob.Inst.lesa no.13: 124-126 '59. (MIRA 13:2)

1. Okskiy gosudarstvennyy zapovednik. (Pine) (Elk)



BORODIN, L.S.

Water as constituent of perovskite minerals. Borodin. *Doklady Akad. Nauk S.S.S.R.* 95, 873–5(1954).—In contrast to the group type of the perovskite structure, generally written ABX$_3$, many analytical data from the literature show defects in the cryst. schem. relations A, always if in the same time H_2O is detd. as one of the components (in the amts. of 0.7–3.50%). Particularly characteristic in this respect is the "metaloparite," a perovskite pseudomorph after loparite (cf. Gerasimovskiĭ, *C.A.* 37, 2683[3]) with A lower than B. H_2O is evidently an essential constituent in such perovskites, and the general crystallochem. formula is $A_{1-x}BO_{3-x}$ (with x smaller than 0.6). At the same time, the replacement of O^{2-} by OH^- anions is compensated electrically by the entrance of rare earth elements, R(III) in positions A, or even of Ti(IV), Nb(V), etc. The hydrothermal action of aqueous solns. on perovskite brings about leaching of Ca^{2+}, especially in the formation of metaloparite in which x = 0.60; X = 2.40; A = 0.47. W. Eitel

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000206420017-9"

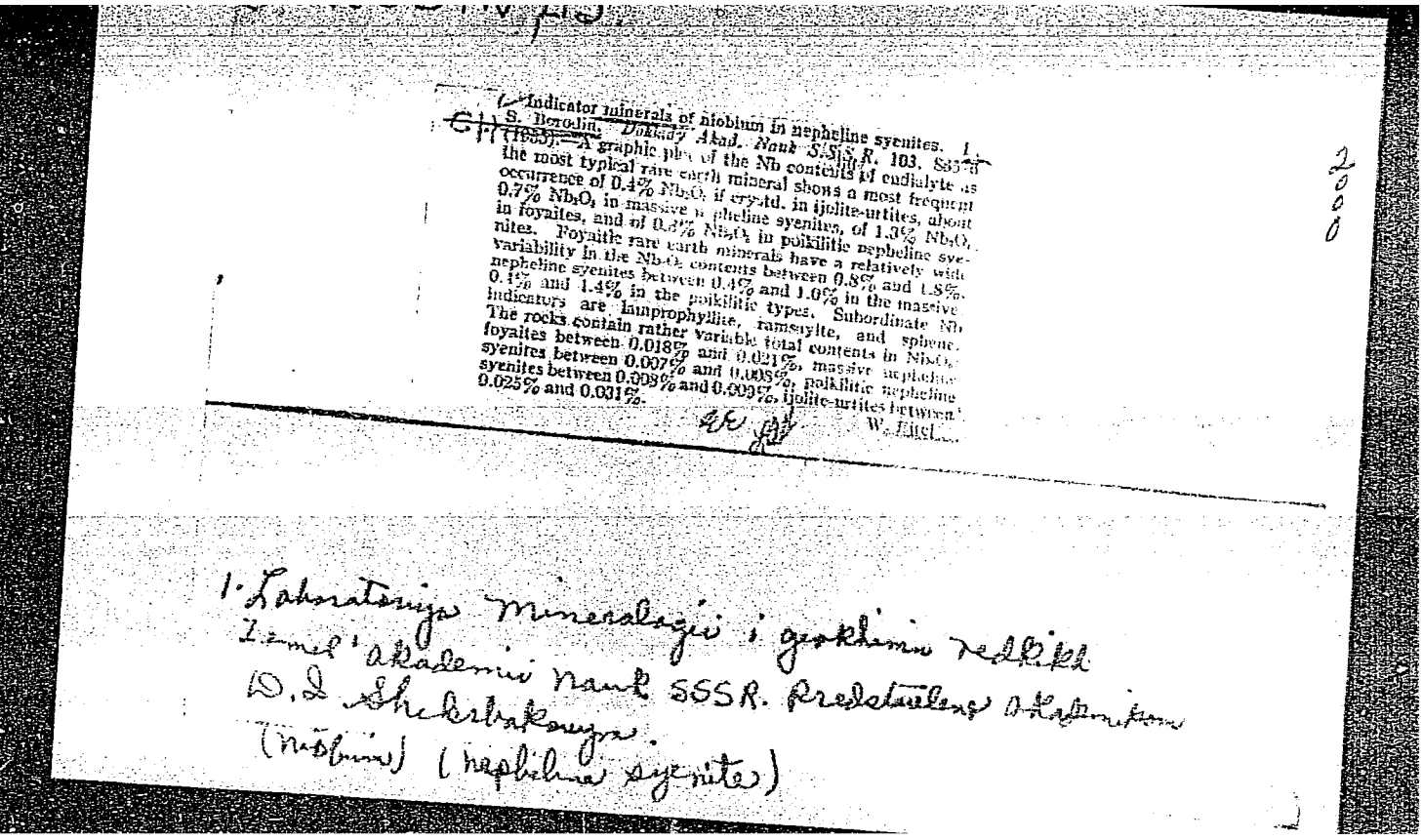
BORODIN, L.S.

Belovite, a new mineral from alkaline pegmatites. L. S. Borodin and M. E. Kazakova. *Doklady Akad. Nauk S.S.S.R.* 95, 813–16(1954).—Belovite belongs to the apatite group, as a Sr-rare earth phosphate mineral of the compn. $(Sr, Ce, Na, Ca)_5[PO_4]_3(OH,O)_2$. It forms hexagonal prismatic crystals up to a length of 2 cm., with simple forms $\{10\bar{1}0\}$ and $\{0001\}$; cleavage parallel to the prism is poor. Parallel to (0001) is a sepn. plane with fracture uneven. The hardness is 5 and d. is 4.19. It is honey-yellow with glassy luster and on fractures fatty, streak white. It is optically neg., uniaxial, $\omega = 1.660$; $\epsilon = 1.640$, easily sol. in dil. HCl and HNO_3. Dimensions of the unit cell are: $a_0 = 9.62$ A.; $c_0 = 7.12$ A.; $c/a = 0.74$. It contains Na_2O 3.00; K_2O 0.20; MgO 0.18; CaO 5.23; SrO 33.60; BaO 0.98; rare earths 24.00, 11.25 of which is Ce_2O_3; Fe_2O_3 0.60; P_2O_5 28.88; SiO_2 0.20; SO_3 1.12; H_2O 0.80; total 99.44%. The rare earth elements are in the ratio Ce: La: Nd: Pr = 1.0:0.6:0.5:0.2. The group formula is $A_5B_3O_{12}X$, with A = Sr, Ce, Ca, Na; B = P, S, Si; X = OH. In spite of the great analogy of belovite with F apatite there are rather considerable distinctions in da., the consts. a_0, c_0, ω, ϵ, $\epsilon - \omega$, and the chem. stability to acids. The nepheline syenite pegmatite in which belovite was detected contains about 50% microcline, 35% nephelite, and 15% aegirite. The belovite is associd. with eudialyte, ussingite, partly sodalite and natrolite, and aegirite, rarer are murmanite, schizolite, erikite, neptunite, and steenstrupine. Belovite occurs only in the central parts of the pegmatite in intimate intergrowths with ussingite, which is a metasomatic product from microcline.

W. Eitel

Irinite, a new mineral of the perovskite group. L. S. Borodin and M. E. Kazakova. *Doklady Akad. Nauk S.S.S.R.* 97, 725–8(1954); cf. *C.A.* 49, 1063i.—The new mineral occurs in foraitic nepheline syenite pegmatites, in cubic crystals of 0.5 to 1 cm. diam., with forms {100}{111}, and fluorite-type twins. Color is reddish brown, or brownish yellow, streak brownish yellow; luster greasy. It is isotropic in thin sections, with $n = 2.105$; hardness 5 to 5½, no cleavage, fracture conchoidal. D. is 4.470; insol. in HCl and HNO_3, partially sol. in hot H_2SO_4. Irinite is a metamict mineral. Crystals annealed at 650° show the typical perovskite x-ray interferences; a_0 (min.) = 3.83 A. Chem. analysis: TiO_2 40.45; ThO_2 13.00; Ce_2O_3 24.00; $(Nb,Ta)_2O_5$ 0.31; Fe_2O_3 0.88; CaO 1.83; Na_2O 6.41; H_2O+ 1.22; H_2O- 0.03%. The dehydration is complete at 700°. The crystallochem. formula is not in agreement with the type ABX_3; it is written: $(Na_{0.74}Ce_{0.21}Th_{0.06}Ca_{0.03})$-$(Ti_{0.91}Nb_{0.05}Fe_{0.03})[O_{2.72}(OH)_{0.28}]$, which corresponds to the type formula $A_{1-x}B[O_{3-x}(OH)_x]$, but with a high deficit in A cations, because of the higher valency of the cations of the rare earth elements, and of Th^{4+}, in isomorphous statistical distribution over the A positions. The pegmatite in which irinite was discovered is a microcline-perthite-arfvedsonite pegmatite with subordinate nepheline, eucolite, aegirine, catapleiite, ilmenite, and astrophyllite, with a central enrichment in the late-magmatic crystns. Irinite belongs to the parageneses of the dark-colored minerals, especially in its assocn. with aegirine; it is also interspersed between microcline and arfvedsonite, and associ. with catapleiite. Albite veinlets intersect the pegmatite as youngest mineralizations. The microcline-perthite is intensely albitized in the contact zone, the arfvedsonite changed to aegirite. Albite also replaces the irinite locally.

W. Eitel



Indicator minerals of niobium in nepheline syenites. I.
S. Borodin. *Doklady Akad. Nauk S.S.S.R.* 103, 83[illegible]
(1955).—A graphic plot of the Nb contents of eudialyte as
the most typical rare earth mineral shows a most frequent
occurrence of 0.4% Nb_2O_5 if crystd. in ijolite-urtites, about
0.7% Nb_2O_5 in massive nepheline syenites, of 1.3% Nb_2O_5
in foyaites, and of 0.3% Nb_2O_5 in poikilitic nepheline sye-
nites. Foyaitic rare earth minerals have a relatively wide
variability in the Nb_2O_5 contents between 0.8% and 1.8%,
nepheline syenites between 0.4% and 1.0% in the massive
0.1% and 1.4% in the poikilitic types. Subordinate Nb
indicators are lamprophyllite, ramsayite, and sphene.
The rocks contain rather variable total contents in Nb_2O_5:
foyaites between 0.018% and 0.021%, massive nepheline
syenites between 0.007% and 0.008%, poikilitic nepheline
syenites between 0.008% and 0.009%, ijolite-urtites between
0.025% and 0.031%.

W. Eitel

2
0
0
0

1. Laboratoriya Mineralogii i geokhimii redkikh
Imeni akademika Nauk SSSR. Predstavlen Akademikom
D. I. Shcherbakovym.
(niobium) (nepheline syenites)

BORODIN, L.S.

Observations on the niobium content of nepheline syenites.
Dokl. AN SSSR 103 no.6:1061-1063 Ag '55. (MLRA 9:1)

1.Laboratoriya mineralogii i geokhimii redkikh elementov Akademii nauk SSSR. Predstavleno akademikom D.I.Shcherbakovym.
(Niobium) (Nepheline syenite)

USSR/Cosmochemistry. Geochemistry. Hydrochemistry. D

Abs Jour : Referat. Zhurnal Khimiya, No 6, 1957, 18893

Author : L.S. Borodin.
Inst :
Title : Concerning the Occurrence of Beryllium in the Khibinskiy Alkaline Range and Beryllium Contents in Nepheline-Sienites.

Orig Pub : Dokl. AN SSSR, 1956, 109, No 4, 811-812

Abstract : Beryllium contents in 6 group samples prepared from 90 mean samples were determined by the spectral method. The analysis results (in 10^{-5}%) were the following: trachytoidal khibinite 8, normal khibinite 6, medium grained nepheline-sienite 7, rischortite 6, foyanite 6, ijolite-urtite 5. Considering the obtained data, the author doubts the correctness of beryllium contents in nepheline-sienites established by Goldschmidt and assumes that they have been very much exaggerated

Card 1/1

-6-

BORODIN, L. S.

USSR/Cosmochemistry - Geochemistry. Hydrochemistry. D.

Abs Jour : Ref Zhur - Khimiya, No 9, 1957, 30362

Author : Borodin, L.S., Nazarenko, I.I., Rikhter, T.L.
Inst : Academy of Sciences USSR
Title : The New Mineral Zirconolite -- A Complex Oxide of AB_3O_7 Type.

Orig Pub : Dokl. AN SSSR, 1956, 110, No 5, 845-848

Abst : In 1955, was discovered, in a nameless pyroxenic massif, a new zirconium mineral which has been named zirconolite, by analogy with other zirconium minerals (zircon, zirkelite and cyrtolite). In the marginal portions of the massif extensive development of nephelinization processes had occured. By action of solutions inflowing from nephenilization zones various metasomatic rocks were formed and replacement took place of titanium magnetite, the ore mineral of pyroxenites, by perovskite, sphene and garnet. Separations of zirconolite were observed in metasomatic

Card 1/3

Lab. Mineral & Geochem. of Rare Elements AS UCCR

USSR/Cosmochemistry - Geochemistry. Hydrochemistry. D.

Abs Jour : Ref Zhur - Khimiya, No 9, 1957, 30362

calcite-pyroxene-amphibolite rock with perovskite and sphene, in the form of metamictic separations up to 1 cm in dimension. Single crystalline forms have the shape of depressed octahedrons twinned along (111). The color is grey-brown to black (grownish-yellow streak); color distribution is uneven. Hardness 5.5-6, specific gravity 4.017 (brown) - 4.237 (dark brown). No cleavage cracks. Fracture rough to shelly. Decomposes on heating in HCl and H_2SO_4. In polished sections yellow or brown, isotropic; refraction index 2.06 ± 0.05 (brown) - 2.17 ± 0.03 (dark brown). X-ray and thermal analyses established the amorphous structure of the mineral. Chemical composition of dark-brown and light-brown zirconolite (respectively, in %): Nb_2O_5 3.26, 2.86; TiO_2 31.69, 29.91; Fe_2O_3 5.49, 4.60; Al_2O_3 1.03, 1.04; MgO 0.45, 0.50; ZrO_2 32.84, 31.17; U_3O_8 1.53. 1.75; ThO_2 0.58, 0.46; Ce_2O_3 6.22, 6.00;

Card 2/3

USSR/Cosmochemistry - Geochemistry. Hydrochemistry. D.

Abs Jour : Ref Zhur - Khimiya, No 9, 1957, 30362

CaO 11.05, 10.79; FeO -, 0.36; MnO 0.06, 0.13; Na_2O 0.37, 0.46; SiO_2 2.05, 4.50; loss on calcining 3.35, 5.66; total 99.98, 100.20. TR composition, according to roentgeno-spectral analysis data, is the same for both varieties (in %): Ce_2O_3 2.5, Nd_2O_3 2.0, Sm_2O_3 0.7, Gd_2O_2 0.4, Pr_2O_3 0.3, La_2O_3 0.2, Y, Eu, Tb and Dy n . 10^{-2}.

Crystallochemical formula: $(Ca_{0.76}Ce_{0.15}Na_{0.04}U_{0.02}Th_{0.01})_{0.98}Zr_{1.03}(Ti_{1.53}Fe_{0.27}Nb_{0.09}Al_{0.08}Mg_{0.04})_{2.01}O_7$.

In the opinion of the authors, zirkelite from Ceylon (Blake G.S., Smith H., Mining Mag., 1913, 16, No 77) and zirconolite are, respectively, the uranium-thorium and the rare-earth varieties of the same mineral species.

Card 3/3

BORODIN, L.S.

Geochemistry of the Khibiny alkaline massif. Trudy Inst. min., geokhim. i kristallokhim. red. elem. no.1:23-34 '57. (MIRA 11:6)
(Khibiny Mountains--Rocks, Igneous)

BORODIN, L.S.

Principal characteristics of the texture and composition of Khibiny veined formations (pegmatities) in connection with their genesis and classification. Trudy Inst. min., geokhim. i kristallokhim. red. elem. no.1:123-137 '57. (MIRA 11:6)
(Khibiny Mountains--Pegmatites)

SOV/137-58-8-18099

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 270 (USSR)

AUTHOR: Borodin, L. S.

TITLE: Quantitative Spectroscopic Determination of Niobium in Titanium and Zirconium Minerals (Kolichestvennoye spektroskopicheskoye opredeleniye niobiya v mineralakh titani i tsirkoniya)

PERIODICAL: Tr. In-t mineralogii, geokhimii i kristallokhimii redk. elementov AN SSSR, 1957, Nr 1, pp 182-187

ABSTRACT: The methods for the preparation of standards for the determination of Nb in eudialite, sphene, rincolite, astrophyllite, and lamprophyllite are described in detail. The conditions of the taking of an exposure are: Test sample 10 - 15 mg, upper electrode ground to a wedge-shaped point, a crater 5 mm deep and 3 mm in diameter drilled in the lower electrode, time of complete evaporation of specimen 4 - 5 min with a 10-amp current. Calibration curves were plotted according to 3 - 4 standard samples. The spectro-photometry was conducted according to the lines of Nb 2671.9 and 2716.6 angstrom. The results of the determination of Nb in 20 specimens

Card 1/2

Quantitative Spectroscopic Determination (cont.)

parallel with the determination of Nb in them by the chemical method are adduced. The average magnitude of deviation from the chemical analysis consisted of ± 13% with an Nb content of 0.15 - 5.0%.

Z. G.

1. Titanium—Spectrographic analysis 2. Zirconium—Spectrographic analysis 3. Niobium—Determination

BORODIN, L.S.; NAZARENKO, I.I.

Chemical composition of pyrochlore and isomorphous substitutions in the molecule $A_2B_2X_7$. Geokhimiia no.4:278-295 '57. (MIRA 12:3)

1. Institute of Mineralogy, Geochemistry and Crystallochemistry of Rare Elements, Academy of Sciences, U.S.S.R., Moscow.
(Pyrochlore)

BORODIN, L.S.

11-5-1/15

SUBJECT: USSR/Geology

AUTHOR: Borodin, L.S.

TITLE: On Types of Carbonatite Deposits and their Connection with Massifs of Ultrabasic - Alkaline Rocks (O tipakh karbonatitovykh mestorozhdeniy i ikh svyazi s massivami ul'traosnovnaykh - shchelochnykh porod)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, 1957, # 5, pp 3-16 (USSR)

ABSTRACT: Among the new types of deposits of industrial significance, the most important ones are carbonatite deposits of niobium, zirconium and rare earths. The most important minerals of carbonatite deposits are pyrochlore, monazite and baddeleyite. Carbonatite deposits are also often important deposits of apatite and magnetite ores.

Studies of carbonatite deposits have shown that the following properties are characteristical for them:

1. The presence of an endogenous rock of essentially carbonate composition, carbonatite, and of definite paragenesis of primary and secondary minerals, including those with rare

Card 1/5

TITLE: On Types of Carbonatite Deposits and their Connection with Massifs of Ultrabasic - Alkaline Rocks (O tipakh karbonatitovykh mestorozhdeniy i ikh svyazi s massivami ul'traosnovnykh - shchelochnykh porod)

metals;

2. A genetic and often spatial connection with massifs of ultrabasic - normal and alkaline rocks;

3. The occurrence of carbonatites among the enclosing rocks, independently of the presence of carbonate varieties (limestones, dolomites, etc.);

4. The intensive manifestation of processes of metasomatic changes in the enclosing rocks, which leads sometimes to the formation of concentric zones of metasomatic rocks around the carbonatite core;

5. Association with stable sections of the earth's crust (ancient plateaus, shields).

Card 2/5 Based on the data of both foreign and Soviet carbonatite deposits, two extreme types can be singled out:

TITLE: On Types of Carbonatite Deposits and their Connection with Massifs of Ultrabasic - Alkaline Rocks (O tipakh karbonatitovykh mestorozhdeniy i ikh svyazi s massivami ul'traosnovnykh - shchelochnykh porod)

1. One type of deposits is represented by the so-called carbonatite "cores" or "plugs" surrounded by zones of altered enclosing rocks of the "phenite" type. Zones of ultrabasic and alkaline (nepheline-pyroxene) rocks are absent. According to some geologists, the origin of these carbonatites is connected with the filling of volcanic craters by some special carbonatite magma. The carbonatite cores extend to great depths, and therefore it is more correct to call them pillars. Sometimes, their upper parts are several kilometers in diameter. The origin of this type of deposits is connected with explosion phenomena.

2. The other type consists of carbonatites which are spatially connected with massifs of ultrabasic - alkaline rocks, forming among the latter individual bodies or zones. These massifs are associated with ancient plateaus and shields. Transitions exist between these two extreme cases through a series of intermediate cases.

TITLE: On Types of Carbonatite Deposits and their Connection with Massifs of Ultrabasic - Alkaline Rocks (O tipakh karbonatitovykh mestorozhdeniy i ikh svyazi s massivami ul'traosnovnykh - shchelochnykh porod)

The origin of carbonatite deposits is closely connected with processes of metasomatic changes in ultrabasic rocks (pyroxenites and others). Here, the nephelinization process of pyroxenite plays an important role.

Industrially-important concentrations of rare elements are directly connected with the formation process of metasomatic rocks. Therefore, niobium, rare earths, zirconium and other rare elements are concentrated in the rock zones which correspond to the late phases of metasomatic processes. So, for instance, niobium is concentrated in the zones of carbonate and apatite-olivine-magnetite rocks forming the mineral pyrochlore.

The most important criterion for evaluating these ultrabasic - alkaline rock fields, with respect to occurrence of carbonatite deposits in them, is the presence of nepheline-pyroxene rocks of metasomatic genesis, associated with pyroxenes

11-5-1/15

TITLE: On Types of Carbonatite Deposits and their Connection with Massifs of Ultrabasic - Alkaline Rocks (O tipakh karbonatitovykh mestorozhdeniy i ikh svyazi s massivami ul'traosnovnykh - shchelochnykh porod)

and peridotites.

The article contains 4 figures and 3 photos.

The bibliography lists 20 references, 6 of which are Slavic.

ASSOCIATION: Institute of Mineralogy, Geochemistry and Crystallochemistry of Rare Elements of the USSR Academy of Sciences in Moskva.

PRESENTED BY:

SUBMITTED: 6 February 1957

AVAILABLE: At the Library of Congress

Card 5/5

BORODIN, L.S.;NAZARENKO, I.I.

Eudialyte from alkaline rocks of Turiy Cape and its chemical formula. Dokl. AN SSSR 112 no.2:318-321 Ja '57. (MLRA 10:4)

1. Predstavleno akademikom N.V. Belovym.
(Gyda Peninsula--Eudialyte)

Borodin, L.S.

AUTHORS Borodin, L.S. and Nazarenko, I.I. 20-4-43/60

TITLE On the Deviations of the Pyrochlorine - Group Minerals from the $A_2B_2X_7$ type Formula and on the Part Played by the Water of Constitution in the Crystal Lattice of Pyrochlorine.
(Ob otstupleniyakh mineralov gruppy pirokhlora ot tipovoy formuly $A_2B_2X_7$ i o roli konstitutsionnoy vody v kristallicheskoy reshetke pirokhlora.)

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol. 115, Nr 4, pp. 783-786

ABSTRACT The composition of minerals of the pyrochlorine group varies within rather wide limits and is highly complicated. Among the chief components are: Nb, Ta, Fe, Na, Ca, Th, U and a number of others. Therefore a sufficiently accurate, complete chemical analysis of this mineral was for methodical reasons rendered very difficult. The hitherto published chemical analyses cannot be used for calculation, since the total quantity of the components either does not reach or surpasses 100 %. Besides that no sufficient accuracy of the content of

CARD 1/4

On the Deviations of the Pyrochlorine - Group Minerals from the $A_2B_2X_7$ Type Formula and on the Part Played by the Water of Constitution in the Crystal Lattice of Pyrochlorine.

several chief components can be guaranteed. Therefore the authors mainly used their own original data in this paper. The calculation of the chemical pyrochlorine analyses (tab. 1) shows that in a number of cases its composition does not correspond to the type formula $A_2B_2X_7$ or $A_2B_2O_6$ (OH, F) (tab.2). According to all other characteristics there was no doubt that the investigated minerals belong to the pyrochlorine group. The deviations from the formula $A_2B_2X_7$ are above all due to less and less quantities of cations in group A as compared to B. The greatest deviations occurred when it contained water. According to Machatschki this fact (in the pyrochlorine varieties mariakite and hatchettolite) is due to a secondary modification in which an extraction of comparatively large cations Ca and Na takes place. As compensation for the extracted cations a positively-charges hydrogen ion H^+ penetrates into the mineral lattice. In other words, part of the total amount of water in the hydrated pyrochlorine

On the Deviations of the Pyrochlorine - Group Minerals from the $A_2B_2X_7$ Type Formula and on the Part Played by the Water of Constitution in the Crystal Lattice of Pyrochlorine.

varieties must form a portion of the anion group $O_6(OH,F)$. The other part, however, must be present in group A, in order to compensate the deficiency of alkaline cations. Moreover the cation deficiency may be due to the participation of highervalent cations in the crystal lattice at the expense of low-valent cations. Isomorphous replacements of this type can occur only in group A of pyrochlorine, since in the isomorphous replacements of group B no cations with a valence higher than that of niobium are possible. In view of the above-said it is suitable to start with a constant number of cations of group B in the calculation of chemical pyrochlorine analyses, as they authors did. The degree of the replacement of oxygen by hydroxyl and fluorine and, accordingly, the total amount of the latter in the anion group (H_Σ) is determined from the total of valences of cations (W_k) : $H_\Sigma = 14 - W_k$

On the Deviations of the Pyrochlorine - Group Minerals from the $A_2B_2X_7$ Type Formula and on the Part Played by the Water of Constitution in the Crystal Lattice of Pyrochlorine.

where 14 is the highest possible number of negative valences for 7 anion units of oxygen. The cation deficiency of group A can be compensated by a corresponding replacement of part of the oxygen ions by hydroxyl ions. In minerals of the pyrochlorine group this leads to the fact that the total of atomic quantities of the oxygen atoms is as a rule less than 6 and the total amount of hydroxyl and fluorine ions is accordingly more than 1. The connection between the cation deficiency of group A and the hydration is graphically well demonstrated (fig. 1).
There are 1 figure and 1 Slavic reference.

ASSOCIATION: Institute for mineralogy, geochemistry and crystallography of rare earths AN USSR
(Institut mineralogii, geokhimii i kristallokhimii redkikh elementov Akademii nauk SSSR)

PRESENTED: By N.V. Belov, Academician, Feb. 12, 1957
SUBMITTED: February 12, 1957
AVAILABLE: Library of Congress.

CARD 4/4

SOV/7-58-5-11/15

AUTHOR: Borodin, L. S.

TITLE: On the Chemical Nature of the Pyroxene Aegirinization and Nephelinization Processes During the Formation of Metasomatic Nephelin-Pyroxene Rocks (Ijolites)(K khimizmu protsessov egirinizatsii i nefelinizatsii piroksena pri obrazovanii metasomaticheskikh nefelino-piroksenovykh porod(iyolitov))

PERIODICAL: Geokhimiya, 1958, Nr 5, pp. 501 - 502 (USSR)

ABSTRACT: This article deals with theoretical investigations of the problem of the transition of pyroxenites into ijolites-melteigites. The aegirinization is caused by the addition of endogenic solutions rich in sodium- and aluminium according to the following equation:
pyroxene + (Na) $\longrightarrow$ aegirinizated pyroxene + (Ca).
The balance of the valence could be arranged by the introduction of Al^{3+}; however, the assumption that the bivalent iron is oxidized is better suited, as the redox potential of the reaction $Fe^{2+} \longrightarrow Fe^{3+} + e^-$ according to Mezon (Ref 3) amounts at a pH 8 only to -0.2 V. In the nephelinization, however, the whole crystal lattice of pyroxene is re-formed. Nephelin is formed by way of an intermediate compound;

Card 1/2

On the Chemical Nature of the Pyroxene Aegirinization and Nephelinization Processes During the Formation of Metasomatic Nepheline Pyroxene Rocks (Ijolites) SOV/7-58-5-11/15

pyroxene (Ca (and Mg) partly removed) $\longrightarrow$ aegirinizated pyroxene $\longrightarrow$ nepheline (Ca and Mg completely removed)

$Ca(Mg,Fe)\,Si_2O_6 \longrightarrow (Ca,Na)\,(Mg,Fe,Al)\,Si_2O_6 \longrightarrow Na_4Al_4Si_5O_{18}$

aegirinization nephelinization

(The nepheline formula corresponds to the result of the structural determination carried out by N.V.Belov, Ref 1)
There are 4 references, 3 of which are Soviet.

ASSOCIATION: Institut mineralogii, geokhimii i kristallokhimii redkikh elementov AN SSR, Moskva (Institute for the Mineralogy, Geochemistry and Crystal Chemistry of Rare Elements, AS USSR, Moscow)

SUBMITTED: January 6, 1958

Card 2/2

Borodin, L.S

AUTHOR: Borodin, L.S. 11-58-6-3/13

TITLE: The Nephelinization and Aegirinization Processes of Pyroxenites in Connection With the Problem of the Genesis of Alkaline Rocks of the Iolite and Melteigite Types (O protsessakh nefelinizatsii i egitinizatsii piroksenitov v svyazi s problemoy genezisa shchelochnykh porod iyolitov-mel'teigitov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, 1958, Nr 6, pp 48-57 (USSR)

ABSTRACT: Structural correlation of nepheline and pyroxene in alkaline rocks of the iolite-melteigite type, and the peculiarities of their geological situation, indicate the metasomatic origin of nepheline. The author also comes to the conclusion that the formation of iolites and melteigites, which form together with pyroxenites the complex block of ultra-basic alkaline rocks, was brought about not by the intrusion of alkaline magma, but was a result of nephelinization and aegirinization of pyroxenites and other ultrabasic rocks.
There are 10 figures, and 10 references, of which 6 are Soviet, 2 Norwegian, 1 Swedish and 1 South African.

Card 1/2

11-58-6-3/13

The Nephelinization and Aegirinization Processes of Pyroxenites in Connection With the Problem of the Genesis of Alkaline Rocks of the Iolite and Melteigite types

ASSOCIATION: Institut mineralogii, geokhimii i kristallokhimii redkikh elementov AN SSSR Moscow (The Moscow Institute of Mineralogy, Geochemistry and Crystallochemistry of Rare Minerals of the AS USSR)

SUBMITTED: May 3, 1957

AVAILABLE: Library of Congress

Card 2/2 1. Geology 2. Rock-Determination

BORODIN, L.S.; NAZARENKO, I.I.

Pyrochlore from vein formations of the Lovozero and Khibiny alkali massifs. Trudy Inst.min., geokhim.i kristalokhim.red.elem. no.2: 138-143 '59. (MIRA 15:4)
(Lovozero tundras--Pyrochlore) (Khibiny Mountains--Pyrochlore)

BORODIN, L.S.

Perovskite mineralization in the Vuoriyarvi massif. Geol. rud. mestorozh. no.5:21-30 S-O '59. (MIRA 13:2)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov AN SSSR, Moskva.
(Vuoriyarvi region--Perovskite)

BORODIN, L. S. ; BARINSKIY, R.L.

Rare earths in perovskites (knopites) from ultrabasic and alkaline rock massifs. Geokhimiia no.4:291-297 '60. (MIRA 13:10)

1. Institute of Minerarology, Geochemistry and Crystal Chemistry of Rare Elements, Academy of Sciences, U.S.S.R., Moscow.
(Rare earths) (Perovskite)

S/030/60/000/05/23/056
B015/B008

AUTHORS: Andreyeva, T. F., Candidate of Biological Sciences, Borodin, L. S., Candidate of Geological and Mineralogical Sciences, Glazunov, M. N., Candidate of Physical and Mathematical Sciences

TITLE: Application of Stable Isotopes in Science and Technology

PERIODICAL: Vestnik Akademii nauk SSSR, 1960, No. 5, pp. 82-83

TEXT: The Conference which was convened by the German Academy of Sciences in Berlin dealt with this problem. The Conference was held in Leipzig from December 10 to 12, 1959. A large number of scientists, collaborators of various scientific research organizations and delegates from the industry of Eastern Germany, as well as scientists from Hungary, the Chinese People's Republic, Poland, the USSR, Czechoslovakia and Yugoslavia attended. I. Muehlenpford, Director of the Institute of Physical Methods of the Separation of Isotopes, opened the Conference which dealt with problems of the application of isotopes in biology and chemistry, as well as the

Card 1/2

working methods with stable isotopes. The following lectures were delivered on part of the Soviet scientists: T. F. Andreyeva offered results in the use of N^{15}, for the study of the synthesis of the amino acids and albumins in plant leaves. V. I. Spitsyn and V. G. Finikov ascertained with the aid of O^{18} the stability of the oxygen bond in crystal lattices of solid bodies, as well as the influence of β-radiation on the rate of the isotope exchange. O. V. Uvarov reported on the method of the separation of boron isotopes. The following persons who attended the Conference are mentioned next: G. Huebner, G. Michael, Kh. Huebner, E. Krel, G. Faust, G. Voit, V. Goerisch, E. Skramlik (all from Eastern Germany); D. Szugar, I. Złotowski, G. Wincel, A. Stroka (all from Poland); V. Hanuš (Czechoslovakia); Chin Lin (Chinese People's Republic). The results of the work of the Conference showed comprehensive possibilities for the application of stable isotopes in various fields of scientific research.

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000206420017-9"

BORODIN, L.S.; BYKOVA, A.V.; KAPITONOVA, T.A.; PYATENKO, Yu.A.

Recent data on zirconolite and its niobium variety. Dokl. AN SSSR 134 no.5:1188-1191 O '60. (MIRA 13:10)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov Akademii nauk SSSR. Predstavleno akademikom N.V.Belovym.
(Afrikanda region--Zirconolite)
(Aldan Plateau--Zirconolite)

BORODIN, L.S.

Relationships between rare earth elements and some characteristics of their fractionation during endogenous formation of minerals. Geokhimiia no.6:506-517 '60. (MIRA 13:10)

1. Institut mineralogii, geokhimii i kristallogkhimii redkikh elementov AN SSSR, Moskva.
(Rare earth metals) (Mineralogical chemistry)

S/007/60/000/004/001/005
B002/B055

AUTHORS: Borodin, L. S., Barinskiy, R. L.

TITLE: Rare earths in perovskites (knopites) from massifs of ultrabasic alkali rocks

PERIODICAL: Geokhimiya, no. 4, 1960, 291-297

TEXT: In general, previous geochemical studies of rare earth elements were only concerned with individual rare-earth minerals. The present publication, however, deals with the rare-earth (RE) content of perovskites and knopites, the variety richer in RE, from various rocks. The study aimed at establishing the properties of perovskites as geochemical indicators of RE and other rare elements. The chemical composition of 13 perovskite samples from ultrabasic alkali rocks (Kareliya, Kol'skiy peninsula, Polar Siberia and Aldan) was determined. The samples were collected by L. S. Borodin. One sample was supplied by S. P. Stoyalov. R. L. Barinskiy determined the chemical composition X-ray spectroscopically in chemically separated RE precipitates. The chemical separation was carried out by Z. Katayeva,

Card 1/5

Rare earths in perovskites...

T. A. Kapitonova and I. S. Razina, analysts of the IMGRE AN SSSR (Institute of Mineralogy, Geochemistry, and Crystallochemistry of Rare Elements, AS USSR). All the perovskite samples were found to contain relatively large amounts of cerium, lanthanum, neodymium and praseodymium, and very small quantities of yttrium earths. A plot of the total RE content (abscissa) against the relative content of individual RE (relative to $\Sigma RE = 100\%$) (ordinate) makes the following geochemical conclusions possible (Fig.1): The total RE content of perovskites and the concentrations of the individual RE elements are correlated. The relative contents of neodymium and praseodymium, i.e., the less basic elements, increase with decreasing age of the perovskite generations, whereas the lanthanum content decreases. The cerium content remains more or less constant (46-52% of ΣRE). A correlation also exists between the relative contents of the individual elements and those of lanthanum (Fig. 2) and neodymium (Fig. 3). Altogether, the perovskites may be divided into two types: 1) perovskites with higher concentrations of basic elements, especially lanthanum. These perovskites come from olivinites, pyroxenites, melilitites and rocks containing perovskites of conventional habit; 2) perovskites containing larger

Rare earths in perovskites...

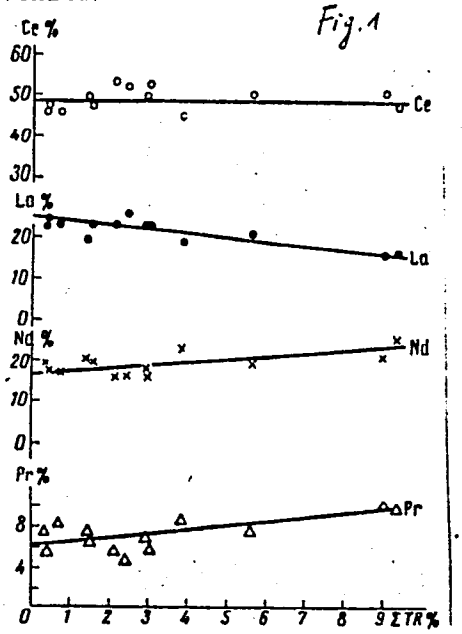
quantities of the less basic lanthanides, generally termed knopites. The total RE- and niobium contents of this type are high. From these results it is assumed that perovskites are of a hydrothermal-metasomatic origin. Mention is made of E. A. Bagdasarov, Ye. M. Epshteyn, A. A. Kukharenko, and Ye. I. Semenov. There are 3 figures, 1 table, and 13 references: 12 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut mineralogii, geokhimii i kristallokhimii redkikh elementov AN SSSR, Moskva (Institute of Mineralogy, Geochemistry, and Crystallochemistry of Rare Elements, AS USSR)

SUBMITTED: December 29, 1959

Rare earths in perovskites...

Fig. 1



Card 4/5

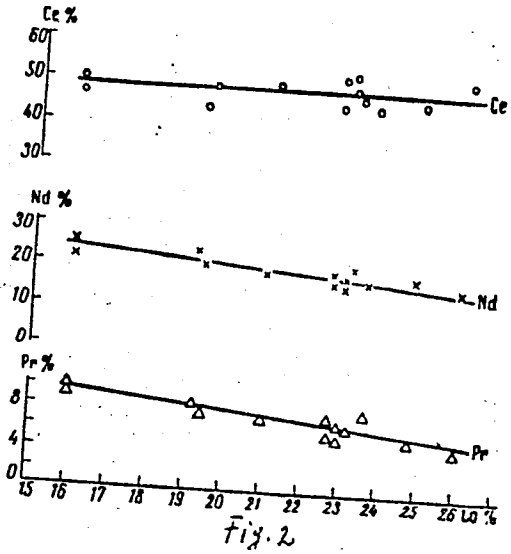


Fig. 2

Card 5/5

BORODIN, L.S.

Metasomatic perovskite from pyroxenites of the Vuoriyarvi massif.
Geol.rud.mestorozh. no.4:101-102 Jl-Ag '61. MIRA 14:10)
(Vuoyarvi region--Perovskite)
(Vuoyarvi region--Pyroxenite)

BORODIN, L.S.; BARINSKIY, R.L.

Rare earth composition in pyrochlores from massifs of ultrabasic-alkaline rocks and carbonatites. Geokhimiia no.6:486-492 '61. (MIRA 14:6)

1. Institute of Mineralogy, Geochemistry and Crystal Chemistry of Rare Elements, Academy of Sciences U.S.S.R., Moscow.
(Rare earth metals)
(Pyrochlore)

BORODIN, L.S.; BYKOVA, A.V.

Zirconium schorlomite. Dokl. AN SSSR 141 no.6:1454-1456 D '61.
(MIRA 14:12)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov AN SSSR. Predstavleno akademikom N.V.Belovym.
(Schorlomite) (Zirconium)

S/677/61/000/007/001/003
E193/E383

AUTHOR: Borodin, L.S.

TITLE: Correlation associations of rare-earth elements and some specific features of their distribution in [predominantly] cerium- and cerium-bearing minerals

SOURCE: Akademiya nauk SSSR. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. Trudy. no. 7. 1961. Voprosy mineralogii i geokhimii redkikh elementov. 3 - 25

TEXT: In contrast to procedures advocated by other workers in this field, the present author used lanthanum graphs in his study of the nature of correlation associations in cerium-bearing minerals. Lanthanum was chosen as the reference element because of its proximity to lanthanoids proper, and because, at the same time, it differs from other lanthanoids regarding those chemical properties which depend directly on the basicity of the medium (thus, for instance, lanthanum is more basic than any of the other trivalent rare-earth elements and is characterized by lowest stability of its complex compounds). According to

Card 1/4

Correlation associations S/677/61/000/007/001/005
E193/E383

D.S.Korzhinskiy, an increase in the basicity of magma and magmatic aqueous solutions brings about an increase in the activity of all bases (weak bases, in particular) which is reflected in the systematic variation of the paragenetic ratios of minerals, sequence of crystallization processes and composition of minerals. Consequently, using lanthanum (the strongest base among lanthanoids) as an indicator of the basicity of the medium provided the most convenient means of elucidating the geochemical variations in the composition of the rare-earth group, particularly in essentially cerium minerals. Starting from these premises, the present author constructed a series of lanthanum graphs, i.e. graphs in which the concentration of various rare-earth elements is plotted against the lanthanum content in the mineral. Graphs of this type were constructed for perovskite, monozite, rinkolite, lovchorrite, wudjavrite, sphene and apatite. In addition to these graphs, data are given on the distribution of rare-earth elements in minerals in Khibiny and Lovozero massives, and lanthanum graphs are reproduced for these minerals which include eudialyte, rinkolite,

Card 2/4

Correlation associations ....

sphene, apatite, loparite, apophyllite and steenstrupine. The geochemistry of the minerals studied is discussed in the light of both these data and views expressed by other workers. Among other points made in the concluding paragraphs, it is stated that comparison of the composition of the minerals of various origins with which the present work is concerned indicates that in the case of solutions with a "complex" content of rare-earth elements which, at the same time, are characterized by high chemical activity of the most strongly basic elements (lanthanum and cerium, in particular), no separation of the rare-earth into two groups (cerium and yttrium groups), each containing approximately an equal number of elements, takes place. Under these conditions, selective separation is possible as well as the appearance of par excellence rare-earth, essentially cerium-bearing minerals. There is a close relationship between these processes which depend on specific conditions of fractional crystallization, particularly on the basicity of the medium. For this reason, the rare-earth elements content of minerals (including complex minerals) cannot be identified

Correlation associations S/677/61/000/007/001/003
E193/E383

with the content of these elements in the mineral-forming molten solutions; neither can it be regarded as being determined mainly by the crystal structure of these minerals. There are 7 figures, 7 tables and 23 references: 20 Soviet-bloc and 3 non-Soviet-bloc.

Card 4/4

BORODIN, L.S.; KAPUSTIN, Yu.L.

First find of burbankite in the U.S.S.R. Dokl. AN SSSR 147 no.2:462-465 N '62. (MIRA 15:11)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. Predstavleno akademikom D.I. Shcherbakovym.
(Burbankite)

S/677/62/000/009/002/003
A057/A126

AUTHOR: Borodin, L.S.

TITLE: Some basic problems of rare-earth geochemistry

SOURCE: Akademiya nauk SSSR. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. Trudy, no. 9, 1962. Redkiye elementy v massivakh shchelochnykh porod., 94 - 124

TEXT: The present paper was read at the meeting of the Scientific Board of the IMGRE AS USSR in April 25, 1961. The author gives a thorough discussion of the basic problems of the geochemistry of rare earths citing his own papers and criticizing those of other authers. The paper contains the following chapters: On the connection between the composition of rare earths and the composition and structure of minerals; on the separation of rare earths during the formation of minerals and "indicator" relations of lanthanides; the use of lanthanide diagrams in studying the rare earth metals mineralization of alkali rocks; classification of the composition of rare earths in minerals. The author draws the following conclusions: The formation of cerium or yttrium miner-

Card 1/3

Some basic problems of rare-earth geochemistry

als is determined by the fractionating degree of the terminal cerium or yttrium compositions of lanthanides in dependence of the alkalinity of the solutions or melts, by the primary clark ratios of lanthanides, by the relative concentration of yttrium and by other conditions. A less important factor is the role of crystallochemical structure in the development of selective compositions of rare earths in minerals, especially yttrium minerals. Three groups have to be distinguished among lanthanides in respect to characteristic variations of the composition of rare earths: 1) the most basic with La, Ce, Pr, and Nd; 2) the least basic with Er, Tu, Yb, and Lu; and 3) the "intermediate" ones with Sm, Eu, Gd, Tb, Dy, and Ho. The first group is characteristic of typical cerium minerals, the other two of yttrium minerals. In relation to the degree of selectivity of the composition of rare earths all minerals containing rare earths as the main component, or as isomorphic admixture, are divided into: 1) Minerals with a complete content of rare earths; 2) cerium, or yttrium minerals with a complex content of lanthanides; and 3) cerium, or yttrium minerals with a selective content of lanthanides - lanthanum and neodymium, or gadolinium-dysprosium and erbium-ytterbium content. Investigations of the variation of the rare earth content in minerals, typomorphic for single complexes of rocks or deposits, by

Some basic problems of rare-earth geochemistry

S/677/62/000/009/002/003
A057/A126

means of diagrams of multiple correlation - of the lanthanum content for alkaline rocks, or possibly of the ytterbium content for acidic rocks - allow the use of these minerals as indicators of the conditions of alkalinity of mineral-forming solutions. The following characteristic ratios of lanthanides might be used: Nd : La for selective cerium compositions, and TR_{Y_1} : TR_{Y_2} the two yttrium sub-groups for yttrium minerals. In case of a well developed multiple correlation of lanthanides for the combination of different minerals the lanthanum diagram might be considered as a form of general geochemical diagrams and can be used in determinations of principal questions of the genesis of alkaline rocks. There are 8 figures and 2 tables.

Card 3/3

BORODIN, L. S.

Petrography and origin of the Vuoriyarvi massif. Trudy IMGRE no.9:161-206 '62. (MIRA 16:1)

(Vuoriyarvi region—Petrology)

TIKHONENKOV, Igor' Petrovich; VLASOV, K.A., glav. red.; BORODIN, L.S., kand. geol.-miner. nauk, otv. red.; SLEPNEV, Yu.S., red. izd-va; NOVICHKOVA, N.D., tekhn. red.

[Nepheline syenites and pegmatites in the Khibiny Mountains and the role of postmagmatic phenomena in their formation] Nefelinovye sienity i pegmatity Khibinskogo massiva i rol' postmagmaticheskikh iavlenii v ikh formirovanii. Moskva, Izd-vo Akad. nauk SSSR, 1963. 246 p. (MIRA 16:7)

1. Chlen-korrespondent AN SSSR (for Vlasov).
(Khibiny Mountains--Nepheline syenite)
(Khibiny Mountains--Pegmatites)

BORODIN, L.S.

Correlation of rare earth elements and some features of their distribution in cerium and cerium-containing minerals. Trudy IMGRE no.7:3-25 '61. (MIRA 16:11)

BORODIN, L.S.

Perovskites in ultrabasic rocks of the Afrikanda Massif and some problems of the origin of this massif. Trudy IMGRE no.15:20-105 '63. (MIRA 16:11)

BORODIN, L.S.

Carbonatites and nepheline syenites; contrivution to the general petrology of the ultrabasic massifs, alkali rocks, and carbonatites. Izv. AN SSSR.Ser.geol. 28 no.8:23-42 Ag '63. (MIRA 17:2)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov AN SSSR, Moskva.

VLASOV, K.A., glav. red.; SERDYUCHENKO, D.P., doktor geol.-min. nau, red.; YES'KOVA, Ye.M., kand. geol.-miner. nauk, red.; BORODIN, L.S., kand. geol.-miner. nauk, red.

[Geochemistry, mineralogy, and genetic types of rare element deposits] Geokhimiia, mineralogiia i geneticheskie tipy mestorozhdenii redkikh elementov. Moskva, Izd-vo "Nauka." Vol.1. [Geochemistry of rare elements] Geokhimiia redkikh elementov. 1964. 685 p. (MIRA 17:5)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. 2. Chlen-korrespondent AN SSSR (for Vlasov).

SHCHEGLOV, A.D.; BEUS, A.A.; BORODIN, L.S.; ITSIKSON, G.V.; PAVLOVSKIY, A.B.; RUNDKVIST, D.V.; SILORENKO, Z.V.; TVALCHRELIDZE, G.A.

Conference on the problems of postmagmatic ore formation.
Sov. geol. 7 no.3:144-153 Mr '64. (MIRA 17:10)

BORODIN, L.S., kand. geol.-miner. nauk, otv. red.

[Petrology and geochemical characteristics of complex of ultrabasites, alkali rocks, and carbonatites] Petrologiia i geokhimicheskie osobennosti kompleksa ul'trabazitov, shchelochnykh porod i karbonatitov. Moskva, Nauka, 1965. 286 p. (MIRA 18:8)

1. Moscow. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov.

BORODIN, L.S.

Rare-earth elements as geochemical indicators in solving the problems of endogenous mineral formation. Izv. AN SSSR. Ser. geol. 30 no.7:3-20 Jl '65. (MIRA 18:7)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov (IMGRE), Moskva.

BORODIN, L.S.; LAPIN, A.V.

Perovskite olivinites and carbonatites as possible types of complex tantatalum-bearing and niobium ores. Sov.geol. 8 no.11:132-136 N '65. (MIRA 19:1)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov Gosudarstvennogo geologicheskogo komiteta.

BELOUS, N.Kh., st. nauchn. sotr.; KAZANSKIY, Yu.P.; VDOVIN, V.V.; KLYAROVSKIY, V.M.; KUZNETSOV, V.P.; NIKOLAYEVA, I.V.; NOVOZHILOV, V.I.; SENDERZON, E.M.; AKAYEV, M.S.; BABIN, A.A.; BERDNIKOV, A.P.; GORYUKHIN, Ye.Ya.; NAGORSKIY, M.P.; PIVEN', N.M.; BAKANOV, G.Ye.; GEBLER, I.V.; SMOLYANINOV, N.M.; SMOLYANINOVA, S.I.; YUSHIN, V.I.; D'YAKONOVA, N.D.; REZAPOV, N.M.; KASHTANOV, V.A.; GOL'BERT, A.V.; SIDOROV, A.P.; GARMASH, A.A.; BYKOV, M.S.; BORODIN, L.V.; KYCHKOV, L.F.; KUCHIN, M.I.; SHAKHOV, F.N., glav. red.; SHPAKOVSKAYA, L.I., red.

[West Siberian iron ore basin] Zapadno-Sibirskii zhelezorudnyi bassein. Novosibirsk, Red.-izd. otdel Sibirskogo otdniia AN SSSR, 1964. 447 p. (MIRA 17:12)

1. Akademiya nauk SSSR. Sibirskoye otdeleniye. Institut geologii i geofiziki. 2. Institut geologii i geofiziki Sibirskogo otdeleniya AN SSSR (for Belous, Kazanskiy, Vdovin, Klyarovskiy, Kuznetsov, Nikolayeva, Novozhilov, Senderzon). 3. Institut gornogo dela (for Akayev). 4. Novosibirskoye geologicheskoye upravleniye Ministerstva geologii i okhrany nedr SSSR (for Babin, Berdnikov, Goryukhin, Nagorskiy, Piven').

(Continued on next card)