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BERGMAN, A.A., ISAKOV, A.I., POPOV, Yu.P., SHAPIRO, F.L.

"Characteristics of A Lead Slowing Down Time Spectrometer and Measurement of Cross Sections for the (n,γ) Reaction,"

Lebedev Physical Inst. of Acad. Sci. USSR

paper submitted at the A-U Conf. on Nuclear Reactions in Medium and Low Energy Physics, Moscow, 19-27 Nov 57.

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BERGMAN, A. A., ISAKOV, A. I., POPOV, Yu. P., SHAPIRO, F. L.

"Measurements of the Energy Dependence of the Cross Section for the He^3 (n.p.); Li^6 (n, α); B^{10} (n. α); N^{14} (n. p) Reactions."

(Lebedev Physics Institute , Acad. Sci. USSR)

paper submitted at the All-Union Conf. on Nuclear Reactions in Medium and Low Energy Physics, Moscow, 19-27 November 1957.

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BERGMAN, A. A.

AUTHOR BERGMAN, A.A., ISAKOV, A.I., POPOV, Yu.P., SHAPIRO, F.L. 56-7-2/66

TITLE Measurements with a Slowing-Down-Time Neutron Spectrometer Employing Lead. Excited Level of the He^4 Nucleus.
(Izmereniya s neytronnym spektrometrom po vremeni zamedleniya v svintse. Vozbuzhdennyy uroven' yadra He^4 - Russian)

PERIODICAL Zhurnal Eksperim i Teoret. Fiziki, 1957, Vol 33, Nr 7, pp 9-16 (U.S.S.R.)

ABSTRACT Investigations carried out in connection with neutron reactions with a neutron spectrometer gave the following results:
1) Fe(n,γ) Resonance was found at E_R=1200±100 eV
2) Pb(n,γ) Resonance was found at E_R= 1700±150 eV and 2800±200 eV.
3) The cross section course of the reaction $B^{10}(n,\alpha)$ deviates by 5-10% from the 1/v course. In B^{11} a resonance with ER ~250 keV, Γ_α ~ ~400 keV, Γ_n~200 keV, J=5/2+ or 7/2+ was found.
4) The deviation of the course of the cross section of the reaction $Li^6(n,\alpha)$ from the 1/v course is below 5%.
5) The deviation of the course of the cross section of the reaction $He^3(n,p)$ from the 1/v course is considerable, which fact can be explained only by the presence of an excited state in He^4. The parameters of this level are either J"=1+, E_R~200 keV, Γ_{p_0}~200 keV or J=0+, E_R~500 keV Γ_{p_0}~1200 keV. (2 tables, 5 illustrations, 4 Slavic references)

ASSOCIATION Physical Institute "P.N. Lebedev" of the Academy of Sciences of the USSR (Fizicheskiy institut im. P.N. Lebedeva Akademii nauk SSSR)

SUBMITTED 22.1.1957
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BALASHKO, Yu. G., BARIT, I. YA., BERGMAN, A. A., GONCHAROV, Y. A. and SHAPIRO, F. L.

"Etude de Certaines Reactions Nucleaires sur les Noyaux legers pour des Particules Incidents d'energie Jusqu'a 1 MeV."

report presented at the International Congress for Nuclear Interactons (Low Energy) and Nuclear Structure, Paris, 7-12 July 1958.

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

Bergman, A.A.

AUTHORS: Antonov, A.V., Bergman, A.A., Isakov, A.I., Murin, I.D., Neupokoyev, B.A. 89-1-6/18

TITLE: The Investigation of the Slowing-Down of Neutrons in Graphite and Heterogeneous Uranium-Graphite-Systems by the Momentum Method (Issledovaniya zamedleniya neytronov v grafite i v uran-grafitovoy geterogennoy sisteme s pomoshch'yu impul'snogo metoda).

PERIODICAL: Physics and Thermotechniques of Reactors (Fizika i teplotekhnika reaktorov), Supplement Nr 1 to Atomnaya energiya, 1958, (USSR)

ABSTRACT: On the strength of experimental results the following may be said about the time needed for neutron slowing-down:
During the first 80 to 90 μs slowing-down of neutrons in graphite takes place as a consequence of elastic collisions with free carbon nuclei. After this time interaction between neutrons and the crystal lattice of graphite begins. It may be assumed that after about 160 μs the shape of the neutron spectrum nearly attains Maxwell's shape M(T,E), which corresponds to a temperature T(t) at that moment. In the further course of events the difference $T(t) - T_p$ decreases experimentally.

$$T(t) - T_p \approx e^{-\beta t}$$

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The Investigation of the Slowing-Down of Neutrons in Graphite and Heterogeneous Uranium-Graphite-Systems by the Momentum Method

89 -1-6/18

The temperature T at the beginning of this phase is 850-900° K and the quantity $1/\beta = 200 \pm 25\ \mu s$. In the concluding phase energy exchange between the neutrons and the medium is about three times as slow as in a monoatomic gas with the mass number 12.

The theoretical value of $1/\beta$ computed according to ref. 12 is 190 μs, which agrees well with experimental values. There are 5 figures, 2 tables and 12 references, 8 of which are Slavic.

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1. Neutrons-Velocity 2. Neutrons-Motion

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Bergman, A.A.

ANTONOV, A.V.; BERGMAN, A.A.; ISAKOV, A.I.; MURIN, I.D.; NEUPOKOYEV, V.A.

Pulse technique for the investigation of neutron slowdown in graphite and in uranium-graphite heterogeneous systems. Atom. energ. Supplement no.1:82-95 '58. (MIRA 11:5)
(Neutrons) (Nuclear reactors)

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

ACCESSION NR: AT4041825

S/2504/64/024/000/0169/0202

AUTHOR: Bergman, A. A.

TITLE: A study of deviations from the 1/V law in the energy dependence of the cross sections of the reactions (n, Alpha) and (n, p) on the light nuclei

SOURCE: AN SSSR. Fizicheskiy institut. Trudy*, v. 24, 1964. Issledovaniya po neytronnoy fizike (Research in neutron physics), 169-202

TOPIC TAGS: (n, Alpha) reaction, (n, p) reaction, neutron, neutron bombardment, light nucleus neutron bombardment, I/V law, neutron moderation, neutron flux, neutron spectrometer, neutron detector

ABSTRACT: The validity of the 1/V law was investigated for the He^3 (n, p), Li^6 (n, α), B^{10} (n, α), and N^{14} (n, p) reactions, using an experimental method based on the moderation time of neutrons in lead. The energy E of neutrons generated in bursts of 0.5 to 2 μsec. duration is determined from the time t spent in a lead moderator by the equation: $E = 183/(t + 0.3)^2$(Kev.) where t is in μsec. The experimental set-up, illustrated in the article, involves a zirconium tritium target, a detector of fast neutrons and a measuring channel in a lead block. Block diagrams of the control of the ion source and of the detection

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ACCESSION NR: AT4041825

system are given, and a detailed discussion is presented on the calibration and verification of neutron spectrometers. It is found that the proportional counters are best suited for these types of experiments. The construction of the detectors is also discussed, and it is emphasized that the error in measurements should be on the order of 1% if the results are to be meaningful. A lengthy discussion of possible sources of error follows. Methods for the calculation of the correction for dispersion in a neutron spectrum are given in the Appendix, and the corrections for different reactions are tabulated. For neutrons of small energy ($E \to 0$), the cross section is determined by the S level, and the behavior of the cross section σ_n can be described by the Breit Wigner formula for an isolated level if $E < \Gamma$ (Γ is the level width). The energy dependence of σ_n is given by

$$\frac{(\sigma_r E^{1/2})_0}{\sigma_r E^{1/2}} = 1 + \alpha\sqrt{E} + \beta E + \gamma E^2 + \ldots, \qquad (1)$$

For nuclei with spin $I \neq 0$, the cross section is given by

$$\sigma_r = \frac{(\sigma_r E^{1/2})_0}{E^{1/2}} \frac{1}{1 + \alpha\sqrt{E} + \beta E + \ldots} = \frac{(\sigma_r E^{1/2})_0}{E^{1/2}} + \Delta\sigma + \ldots, \qquad (2)$$

were $\Delta\sigma$ is a constant addition component of the reaction cross section.

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The ratio σ_{Li}/σ_{B} is given by

$$\frac{\sigma_{Li}}{\sigma_{B}} \text{const} = 1 + (\alpha_{B} - \alpha_{Li}) \sqrt{E} + (\beta_{B} - \beta_{Li}) E + (\gamma_{B} - \gamma_{Li}) E^{2}. \quad (3)$$

the parameters of which can be determined experimentally. From the experimental results, it is concluded that the reaction B^{10} (n,α) occurs either by: a) neutron capture by the state J = 5/2 with considerable contribution from capture by J = 7/2 state, or b) capture by the state J = 7/2 without a significant contribution from the J = 5/2 state. An energy level diagram of γ - transitions in B^{11} is shown. The constant components $\Delta\sigma$ of the cross section as determined experimentally are: $\Delta\sigma_{B^{10}} = 0.4 \pm 0.3$ and $\Delta\sigma_{L} = -0.3 \pm 0.01$ barns. Possible deviations of the reaction cross section for the Li^{6} (n,α) and B^{10} (n,α) reactions from the 1/V law are tabulated. The constant component $\Delta\sigma$ in the Be^{7} (n, p) reaction is found to be $\Delta\sigma_{Be} = -61 \pm 7$ barns and the dependence $(\sigma E)^{1/2} = f(E^{1/2})$ for Be^{2} (n, p) is illustrated. The ratio $\frac{\sigma_{N}}{\sigma_{Li}}$ for the N^{14} (n, p) and Li^{6} (n,α) reactions is given by

$$\frac{\sigma_{N}}{\sigma_{Li}} = \text{const}\,[1 + \alpha_{Li}\sqrt{E} + (\beta_{Li} - \beta_{N}) E + (\gamma_{Li} - \gamma_{N}) E^{2}], \quad (4)$$

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An energy level diagram of the N^{15} nucleus is shown, and a discussion of possible channels for the occurrence of N^{14} (n, p) is presented. Finally, the deviations from the 1/V law are established and the values for the constant component Δc in the cross section are determined. "The author is indebted to I. M. Frank for his interest and guidance, to F. L. Shapiro for continuous interest and discussion, to the entire neutron spectrometer group, engineers I. V. Shatranikh, A. V. Volkov, A. M. Klabukov, and to E. N. Chaykovskaya for programming on the M-20 computer." Orig. art. has: 17 figures, 3 tables and 27 numbered formulas.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva, AN SSSR (Physics Institute, AN SSSR).

SUBMITTED: 00

ENCL: 00

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NO REF SOV: 007

OTHER: 026

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1ST AND 2ND ORDERS

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PROCESSES AND PROPERTIES INDEX

Double decomposition in the absence of solvent. X. Classification of reciprocal systems. A. G. BERGMAN AND N. S. DOMBROVSKA. *J. Russ. Phys. Chem. Soc.* 61, 1451-78(1929); cf. Rostkovskii, C. A. 26, 288. There are 3 classes of reciprocal systems defined by the state of equil. (1) essentially reciprocal systems, (2) non-exchangeable reciprocal systems and (3) singular systems. Subdivision of all 3 classes is based on (a) the presence or the absence of the continuous solid phase, (b) the formation of binary or ternary compds. and (c) the effect of the layer formation within the system.

V. VESSELOVSKY

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3RD AND 4TH ORDERS

UK

18

Production of hydrochloric acid and magnesium oxide from waste liquors of carnallite extraction. A. G. Bergman, V. A. Klement'ev and E. B. Pevzner. *Trans. State Inst. Applied Chem.* (U. S. S. R.) 1932, No. 16, 3-15.—Preliminary expts. with the production of HCl and MgO from waste liquors (32-4% $MgCl_2$), obtained in the extn. of KCl from carnallite, resulted in 98% decompn. A mixt. of 100 parts of waste liquor and 10 parts of MgO after setting was dried at 180-200°, then crushed to 1 cm. fineness and decompd. by heating at 500° and passing in steam and a countercurrent of CO_2. The reaction chamber was a cast-Fe cylinder. Chas. Blanc

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1ST AND 2ND ORDERS

PROCESSES AND

Ca

Double decomposition in the absence of a solvent. XVII. Reciprocal systems with a single surface of crystallization. A. G. Bergman and N. S. Dombrovskaya. *J. Gen. Chem.* (U. S. S. R.) 3, 729-34(1933); cf. *C. A.* 24, 2367; 28, 2259[9].—Possible variations in the form of crystn. surfaces in various combinations of continuous solid solns. of binary systems entering the compn. of the reciprocal system are discussed. For systems with a single surface interpretation is difficult, but in the case of division of the crystn. surface within the reciprocal system into sep. planes of crystn. caused by disintegration of the solid solns. or complex formation, all the interrelations become more simple. Examples of a system with a single surface are: AgCl + NaBr ⇄ AgBr + NaCl; NaCl + KBr ⇄ NaBr + KCl and NaBr + KI ⇄ NaI + KBr. The last 2 systems have on all 4 sides continuous solid solns. with minimums, because of which with the complete reversibility of the reciprocal pair, the crystn. surfaces of these systems have a cup-like form. **XVIII. Reciprocal system with a single surface of crystallization.** AgCl + NaBr ⇄ AgBr + NaCl. N. S. Dombrovskaya. *Ibid.* 735-41.—The reciprocal system AgCl + NaBr ⇄ AgBr + NaCl is the first one investigated in which there are a single crystn. plane and 4 binary salts forming continuous solid solns. and srpg. in the form of isomorphous crystals. According to the thermal effect (5.1 Cal.) and the curvature of the isotherms, the stable pair is AgBr + NaCl. Within the system is observed the isotherm curvature, causing "inflow" on the crystn. surface as a result of the lowered reciprocal soly. of the components of the stable pair. The incoincurrence of the "inflow" with the plane of the stable diagonal cut of AgBr-NaCl is the analog of the ridge shift of the crystn. surfaces of the stable components, appearing in many irreversible reciprocal systems, *e. g.*, $Ag_2SO_4 + 2TlNO_3 \rightarrow 2AgNO_3 + Tl_2SO_4$; $Ag_2SO_4 + Tl_2Cl_2 \rightarrow Ag_2Cl_2 + Tl_2SO_4$; $Ag_2SO_4 + Tl_2Br_2 \rightarrow Ag_2Br_2 + Tl_2SO_4$; $Na_2SO_4 + MgCl_2 \rightarrow 2NaCl + MgSO_4$. In such systems the shift of the max. from the plane of the stable cut indicates some decompn. in the fused state. **XIX. Reciprocal system:** NaI + KBr ⇄ NaBr + KI. A. P. Obukhov. *Ibid.* 787-91.—The crystn. surface of the reciprocal system represents one continuous surface shaped like a flat cup with 2 raised edges adjacent to the side binary systems, and is related in its external characteristics to the first type of the first class in the classification of B. and D. In the system NaBr + AgCl ⇄ AgBr + NaCl, consisting of continuous solid solns., of which NaBr + NaCl and AgBr + AgCl have a min., while AgBr + NaBr and AgCl + NaCl have not, there was observed a shift of the reaction toward a more stable pair of NaCl + AgBr, which is related to the thermochem. reaction effect of 5.1 (cf. B. and Palkin, *Tech. entsikloped. spravc.* 7, No. 7, 198-9; 203 7, figs. 13, 16, 17 and 19). **XX. Melting-point diagrams of the ternary systems: NaCl-NaBr-NaI and KCl-KBr-KI.** V. P. Radishchev. *Ibid.* 843-51.—The fusion diagrams of the 2 systems showed a close resemblance. The surface *liquidus* (Janecke, *C. A.* 4, 705) of both systems represents 1 crystn. plane of the ternary solid solns., which near the binary system of chloride-iodide is split into 2 planes of limited ternary solid solns. The curve of the joint crystn. of the 2 kinds of limited ternary solid solns., beginning in the eutectic p. of the binary system of chloride-iodide is terminated within the system at higher temps., and, therefore, shows an upward course. According to

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PROCESSES AND PROPERTIES INDEX

Physicochemical fundamentals for preparation of complex potassium fertilizers. The polytherm of the tertiary system: KCl-NH_4Cl-H_2O. A. G. Bergman and L. B. Polyakova. Khim (U. S. S. R.) 1934, No. 7, 23-4.—The dissolving of crystals in the soln. of a known concn. and formation of the 1st crystals from the soln. were observed and the temp. recorded. By means of this polythermic method the tertiary system of KCl-NH_4Cl-H_2O was studied from +30° to −17.3° (the freezing point of the system). Three phases exist at −17.3°: ice (H_2O) 75%, KCl 10% and NH_4Cl 15%. [illegible] Pestoff

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Physical-chemical investigation of the manufacture of thermophosphates. I. The physical-chemical nature of thermophosphates. A. G. Bergman. *J. Applied Chem* (U. S. S. R.) 7, 1125-7(1934).—A general discussion with 10 references. **II. The application of light in visual observations of high temperatures.** K. Kumanin. *Ibid.* 1127-9.—The observation of the m. pt. of the crystals at high temps. was made possible by using a 1000-watt bulb with a series of reflectors. The app. is described and illustrated. **III. The interaction of apatite and soda.** A. P. Palkin and M. P. Golovkov. *Ibid.* 1130-43.—The investigation was carried out by fusing by the crystal-optical method. The presence of Na_3PO_4, CaO and NaF in the reaction products is detd. by crystal-optical methods and by investigation of the solns. The reaction proceeds thus: $3Ca_3(PO_4)_2.CaF_2 + 12Na_2CO_3 = 6Na_3PO_4 + 6NaF + 12CaO + 12CO_2$, the reaction of double decompn. exceeding more than 50% of the apatite. Results of expts. are shown in tables. **IV. The preparation of sodium phosphate.** A. P. Palkin. *Ibid.* 1144-6. A mixt. of 55% NaOH and 45% apatite was placed in a muffle furnace and heated for 1 hr. at 600-700°, cooled, broken up and heated in a Pt crucible at 1000-1100° for 2-3 hrs. The temp. was then lowered to 900° and left for 6-8 hrs. Thus 60% of the apatite was converted into a H_2O-sol. state at Na_3PO_4, and a corresponding amt. of NaF was also obtained. The residue contg. P_2O_5 and amounting to 20% of the dry residue calcd. on apatite can be used as a *fertilizer* of the type of "thermophosphate."

A. A. Boehtlingk

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PROCESSES AND PROPERTIES INDEX

CA

18

Use of magnesium chloride. Physicochemical principles of extraction and reworking of magnesium chloride. A. G. Bergman and A. P. Obukhov. *Trans. State Inst. Applied Chem.* (U. S. S. R.) No. 25, 9-19(1934).—The various natural sources of sol. Mg salts in the U. S. S. R. are reviewed and methods of extg. and reworking of $MgCl_2$ based on the physicochem. diagrams, are discussed. **Hydrolysis of magnesium chloride.** A. G. Bergman, V. A. Klement'ev and E. B. Pevzner. *Ibid.* 30-39.—The method of Prenkle and Chufarov (*C. A.* 28, 4977; cf. Ger. pat. 20,000) for the production of MgO and HCl from $MgCl_2$ by forming a solid cement of $MgCl_2$ with a little MgO and decomp. it with air-water vapor mixt. at high temp. was modified by substituting CO_2-water vapor mixt. This lab. method eliminates the oxidation of HCl and gives 95-8% decomps. of $MgCl_2$ and HCl free from Cl. About 90% of the 0.4% $MgCl_2$ and 0.5% KCl in the MgO is removed by washing and filtering. A. G. Bergman, A. I. Lyashenko and A. P. Obukhov. *Ibid.* 39-69.—The semicom. production of MgO and HCl from waste $MgCl_2$ solns. is based on the above lab. method. $MgCl_2$ is completely decompd. to MgO by heating a solid cement of $MgCl_2$ and MgO at 500-600° for 1 hr. in a rotary furnace with internal or external heating. The entire procedure and app. (illustrated) are described in detail and the process is discussed from the tech. and economic viewpoints. **Properties of magnesium oxide obtained by hydrolysis of magnesium chloride.** A. P. Obukhov, M. N. Mikhailova and V. I. Koposova. *Ibid.* 69-78.—A comparative study of the chem. and mech. properties of MgO, obtained from $MgCl_2$ at 600-800°, 900° and 1000° as described above, and of the cements prepd. from MgO with $MgCl_2$ disclosed that MgO formed at 600° meets the standard requirements for com. MgO obtained by calcining magnesite. MgO obtained at 1000° is suitable for the production of refractory lining materials. Tests with the hydration, chlorination, carbonation and cementing showed that with the increasing temp. of hydrolysis of $MgCl_2$ the chem. activity of the resulting MgO is decreased. **Hydration of magnesium oxide.** V. A. Klement'ev. *Ibid.* 78-81.—The hydration of MgO with the resulting difficulties in filtering in the process of leaching of sol. impurities was studied at various temps. The results show that the rate of hydration of MgO obtained by hydrolysis of $MgCl_2$ is considerably lower than that of MgO produced from magnesite, and is 4.70% at 15° in 48 hrs. and 90.06% at 85° in 11 hrs. The more easily hydrated MgO gives more quickly setting cements. **Ternary**

see other side

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1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

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BC

A1

Polythermal method of investigation of complex salt systems. A. G. [illegible] (Trans. VI [illegible] Congr. [illegible], 2, Pt. 1, 636–637).— The method consists in the determination of the appearance and disappearance of the first crystals. Difficulties connected with the transformation of solid phases are eliminated. Ch. Abs. (s)

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PROCESSES AND PROPERTIES INDEX

Double decomposition in the absence of a solvent. XVII. A. G. Bergman. *J. Gen. Chem.* (U. S. S. R.) 432-7(1935); *cf.* Rostkovskii, *C. A.* 29, 3583.—A summ of previous work and a discussion of systems contg. more than 4 ions. **XXVIII. Polymetric equilibrium diagram of the complex system: chlorides, bromides and iodides of sodium and potassium.** V. P. Radishchev. *Ibid.* 455-60.—The method of thermal analysis was used in investigating the temp.-compn. relation of the system: KCl-KBr-KI-NaCl-NaBr-NaI. The system is represented graphically by means of a right triangular prism, having equilateral triangles as bases and squares as faces. The components of the system are so arranged that the Na salts are at the corners of one base and the K salts at the corners of the other. The side edges of the prism represent the pairs NaCl-KCl, NaBr-KBr and NaI-KI. The interior of the system was investigated by means of 4 sections, perpendicular to the bases and passing through the lateral edge NaCl-KCl, at 25, 40, 50 and 75 mols. % bromides, the rest being iodides. The interior of the prism was found to contain (1) a field of unlimited soly. of salts in solid state and (2) a field where this soly. is interrupted. Field (1) occupies the greater half of the prism, beginning between about the 30 and 50% sections and extending to the NaCl-KBr line, and field (2) is situated near the system KCl-NaI.

S. L. Madorsky

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Ca

Physicochemical basis of obtaining complex potassium fertilizers. A. G. Bergman and L. B. Polyakova. *Kali* (U. S. S. R.) 1935, No. 8, 24-8.—The polytherm of the diagonal cross section KNO_3-NH_4Cl-H_2O of the mutual system $NH_4NO_3 + KCl = KNO_3 + NH_4Cl$ was studied in the range of +30° to the freezing of soln., −16.4°. The eutectic at −16.4° contains 6.1% KNO_3, 18.7% NH_4Cl and 75.2% H_2O (by wt.). The triple nonvariable transition point at +24.4° contains 21.9% NH_4Cl, 25.6% KNO_3 and 52.5% H_2O (by wt.). Four references.

A. Pretoff

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Double decomposition in the absence of a solvent XXXII. Multicomponent reciprocal systems. A. G. Bergman and N. B. Dombrovskaya. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* **1936**, 133-51 (in German 152); cf. *C. A.* **30**, 7980[1]. —The present investigation completes the first general characterization of complex reciprocal systems of any order. Tabulated data are presented for the compn. diagrams of reciprocal systems that have 4-11 ions, inclusive. From these results the general relations for more complex reciprocal systems can be readily detd. With the exception of certain categories of combinations within the higher orders (beginning with the sixth), the internal structures of which have not yet been completely elucidated, all of the remaining moments of complex reciprocal systems are presented in the form of extremely simple rules. The division of complex diagrams into stable complexes on the basis of the relative heats of formation of the salts greatly simplifies the study. Reciprocal systems experimentally studied include: Na, Tl ‖ Cl, NO_3, SO_4; Na, K, Mg ‖ Cl, SO_4; Na, K ‖ F, Cl, Br, I; Na, K, Tl ‖ Cl, NO_3, SO_4. **XXXIII. Stable complex of quinary reciprocal systems from nine salts.** V. P. Radishchev. *Ibid.* 153-80 (in German 180-92).—A continuation of previous work (cf. *C. A.* **30**, 7979[1]). John Livak

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L-1

Double decomposition in the absence of a solvent. XXXIII. Mutual reversible system sodium and potassium nitrates and sulphates. A. G. BERGMAN and N. M. VAKSBERG (Bull. Acad. Sci. U.R.S.S., 1937, 71—95).—The equilibrium diagram for the system KNO_3-$NaNO_3$-K_2SO_4-Na_2SO_4 has been derived.

R. T.

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Physicochemical investigation of complex fertilizers. Ternary system: H_2O–NH_4NO_3–$NH_4H_2PO_4$. A. G. Bergman and P. F. Rozhkarev. *J. Applied Chem.* (U. S. S. R.) 10, 1531–6(in French 1536)(1937).—The system from freezing to 30° was investigated by the method of polymetric analysis (cf. *C. A.* 31, 3193[1]). The obtained diagram represents a simple ternary system with the eutectic point −16.8° at the compn. NH_4NO_3 41.5, $NH_4H_2PO_4$ 2.0, and H_2O 56.5%. NH_4NO_3 had a strong salting out effect upon $NH_4H_2PO_4$; for that reason most of the diagram of the system is occupied with $NH_4H_2PO_4$. NH_4NO_3 and $NH_4H_2PO_4$ did not form any chem. compds. or solid soln. The exptl. data are tabulated and plotted. A. A. P.

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Discovery of boron in Central Asia. A. G. Bergman. *Compt. rend. acad. sci. U. R. S. S.* 14, ~~315-7(1937)~~ (in English). Brines contg. as much as 0.24% B_2O_3 are found in some lakes and springs of Russia. All samples except those from springs are satd. with salt. High conens. of K are also assocd. with B. The sources of these lakes and springs probably contain higher conens. of B and K.

R. E. DeRight

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1ST AND 2ND ORDERS — 3RD AND 4TH ORDERS

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1 The polytherm of a reciprocal system of ammonium and potassium chlorides and nitrates. (The conversion of ammonium nitrate). A. G. Bergman. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* 1938, No. 1, 203-19(in English 216).—The polytherms of both diagonal sections of the reciprocal system at −20° to 30° are presented. The diagonal section KNO_3-NH_4Cl becomes stable below 24.4°. The equil. eutectic point −16.4° is at the compn. KNO_3 6.1, NH_4Cl 18.7 and H_2O 75.2% by wt. The degree of conversion of NH_4NO_3 decreases with an increase of temp., and the equil. point is at 17.8°, when the degree of conversion is equal to 50%. The data of Jänecke for 0°, 20°, 40° and 60° (cf. *C. A.* 23, 744, 2875; 26, 5484) and those of Aronova and Luskaya (cf. *C. A.* 26, 2106; 27, 5154) were supplemented.

A. A. Palguny

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Polytherm of the reciprocal system of magnesium and potassium chlorides and nitrates (the conversion of magnesium nitrate). A. G. Bergman and G. I. Nagornyi. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* 1938, No. 1, 217-28 (in English 228).—The polytherm of diagonal section of the system KNO_3-$MgCl_2$-H_2O was investigated at from −33.2° to 30°. Below −23.2°, the diagram of state represents a simple ternary system with the eutectic point at −33.2°. Above −23.2° the crystn. field of the interchange product KCl, appeared. The interchange reaction proceeded only in the direction of the stable components: KNO_3 and $MgCl_2$, reaching a max. conversion at −23.2° with the yield of 96% of KNO_3. The conversion of $Mg(NO_3)_2$ in comparison with that of NH_4NO_3 or $Ca(NO_3)_2$, yielded the largest amt. of KNO_3. Tables, diagrams and a discussion are given. Seven references.

A. A. Podgorny

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Physicochemical study of the equilibrium of the aqueous reciprocal system of potassium and ammonium nitrates, monophosphates and chlorides ("nitrophoska I"). I. A. G. Bergman. *Bull. acad. sci. U. R. S. S., Classe math. nat., Sér. chim.* 1938, No. 1, 229-35(in English 235).—The principal types of five-component systems are briefly reviewed. The reciprocal system "nitrophoska I" is generally outlined. **II. The polytherm of the reciprocal system of potassium and ammonium nitrates and monophosphates.** A. G. Bergman and P. F. Bochkarev. *Ibid.* 237-65(in English 265-6); cf. *C. A.* 32, 1846[1].—The following polytherms were investigated: KNO_3-KH_2PO_4-H_2O; NH_4NO_3-$NH_4H_2PO_4$-H_2O; the diagonal section of KNO_3-$NH_4H_2PO_4$-H_2O and that of NH_4NO_3-KH_2PO_4-H_2O in the interval from complete solidification to 30°. The system does not contain hydrates of any components. The polytherms of both ternary systems are simple ternary systems with eutectic points: −3.8° at the compn. KNO_3 7, KH_2PO_4 9.3 and H_2O 83.7% by wt.; and −16.8° at the compn. NH_4NO_3 41.5, $NH_4H_2PO_4$ 2 and H_2O 56.5% by wt., resp. The first diagonal section is a stable diagonal and, in the investigated temp. interval, is a simple ternary system without any obvious signs of interchange. It has a eutectic point −6.3° at the compn. $NH_4H_2PO_4$ 13.2, KNO_3 9.6 and H_2O 77.2%. The second, metastable diagonal contains the field of the interchange products KNO_3 and $NH_4H_2PO_4$. The region of sepn. of KNO_3 lies below 4°. The continuous solid solns. of the side ternary system KH_2PO_4-$NH_4H_2PO_4$-H_2O decomp. within the reciprocal system at low temp. under the action of NH_4NO_3 and KNO_3, forming individual fields of limited solid solns. Thirteen references. A. A. Podgorny

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A-1

Equilibrium in aqueous potassium and ammonium nitrates, dihydrogen phosphates, and chlorides. A. G. Bergmann and P. F. Botschkarev (Bull. Acad. Sci. U.R.S.S., 1938, Sér. Chim., 227—266).—Data are recorded for the temp. ranges from complete solidity to 30°. No evidence of hydrate formation has been obtained. Eutectics are formed at −3·8° (KNO_3 7, KH_2PO_4 9·3, H_2O 83·7%), −16·8° (NH_4NO_3 41·5, $NH_4H_2PO_4$ 2, H_2O 56·5%), and −6·3° ($NH_4H_2PO_4$ 13·2, KNO_3 9·6, H_2O 77·2%).

E. S. H.

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Physicochemical analysis of the reaction between organic amines and acids. I. Reaction of urea with fatty acids. A. O. Bergman and M. N. Kuznetsova. *J. Gen. Chem.* (U. S. S. R.) 9, 631-6(1939).—The reaction is dependent on the mol. wt. of the acid. Of the fatty acids studied, formic, acetic, propionic, butyric, valeric, pelargonic, lauric, palmitic and stearic, only the first 3 react to form compds. of type $CO(NH_2)_2.2RCO_2H$, the stability of which decreases with increase in R. Addn. compds. of type 1:1 are not formed. The acids from $C_4H_8O_2$ to $C_{10}H_{20}O_2$ are miscible with urea in all proportions but do not form addn. compds. Beginning with $C_{11}H_{22}O_2$ limited soly. in the liquid state is noted, the soly. decreasing with increase in R. Both palmitic and stearic acids are practically immiscible with urea. **II. Thermal analysis of the ternary system urea-acetic acid-water.** M. N. Kuznetsova and A. O. Bergman. *Ibid.* 637-41.—The equil. diagram for the system, contg. 4 crystn. fields, is divided by the binary section H_2O (I)-$CO(NH_2)_2.2AcOH$ (IV) into two ternary systems: I-AcOH (III)-IV with a eutectic at −28.5° and the compn. 2.5% $CO(NH_2)_2$ (II), 34.5% III, 63.0% I, and I-IV-II with a eutectic at −22.0° and the compn. 16.0% II, 12% III, 72.0% I. IV is stable in the presence of I, from which it may be crystd. Tabulated data.

John Livak

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6

Chemistry of manganese in the molten state. I. Reaction of manganese chloride with chlorides of univalent metals. K. K. Natavlishvili and A. G. Bergman. *J. Gen. Chem.* (U. S. S. R.) 9, 812 6(1939). — With the exception of LiCl, $MnCl_2$ in the molten state forms double compds. with chlorides of univalent metals. The 3 systems studied, $MnCl_2$-TlCl (I), $MnCl_2$-KCl (II) and $MnCl_2$-RbCl (III), behave normally and double compds. are formed in every case. System I forms one compd. $MnCl_2$.TlCl, m. 407°, and has 2 eutectics: at 400° with 38 mol. % TlCl and at 328° with 78.5% TlCl. The diagram for II agrees with that obtained by Sandonnini and Scarpa (*C. A.* 8, 471). System III forms 2 compds: $MnCl_2$.RbCl, m. 552°, and $MnCl_2$.2RbCl, m. 460°, with 3 eutectics at 400°, 454° and 436°, corresponding, resp., to 31, 67 and 71 mol. % RbCl. Data are tabulated.

John Livat

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CA

2

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Physicochemical investigation of the aqueous reciprocal system of potassium and ammonium nitrates and monophosphates. III. Polytherm of the reciprocal system of potassium and ammonium nitrates and monophosphates. P. F. Bochkarev and A. G. Bergman. *Bull. acad. sci. U. R. S. S., Classe sci. chim.* 1949, 879-95 (in English, 396); cf. *C. A.* 33, 7184[1].—Polytherms of the aq. reciprocal system K, NH_4 H_2PO_4, NO_3 within the interval from complete solidification to +30° were constructed by the Rneke method. In this system, the compd. $xKNO_3$, yNH_4NO_3 is represented by a small field, limited by 0 and 30°, widening with rise of temp. The major part of the diagram is occupied by solid solns. of $NH_4H_2PO_4$ and KH_2PO_4 that decomp. at low temp. in H_2O in the presence of nitrates, forming independent fields of limited solid solns. Upon melting, these solid solns. are stable within a square describing the system. The double-decompn. reaction is shifted toward the stable pair KNO_3-$NH_4H_2PO_4$, which is a simple system with a eutectic point at 188° and 33 mol. % KNO_3. The stable diagonal KNO_3-$NH_4H_2PO_4$ divides the square into the systems $NH_4H_2PO_4$-KNO_3-KH_2PO_4 (I) and $NH_4H_2PO_4$-KNO_3-NH_4NO_3 (II). In I, KNO_3 and solid solns. of monophosphates occupy crystn. fields. The crystn. curve shows no min. between the eutectic point KH_2PO_4-KNO_3 (+243°) and that of the stable diagonal (+188°). In system II, two ternary points are found, a transitional point at 150° for a compn., in mol. %, 77.5 NH_4NO_3, 12.5 KNO_3 and 10 $NH_4H_2PO_4$, and at 189°, for 86.5 NH_4NO_3, 6.0 KNO_3 and 7.5 $NH_4H_2PO_4$. J. G. Tulpin

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Physicochemical analysis of fused-salt systems. I. Electric conductivities of two-component systems of sodium, potassium, thallium, mercury or silver nitrates, chlorides or iodides. A. G. Bergman and I. M. Chagin. *Bull. acad. sci. U. R. S. S., Chim. sér. chim.* 1940, 727–38 (in English, 738).—The systems $NaNO_3$-KNO_3, HgI_2-$HgCl_2$, $TlNO_3$-HgI_2, $TlNO_3$-$HgCl_2$, and $AgNO_3$-HgI_2 were studied. The deviation of the min. on the cond. curve which represents definite chem. compds. is attributed to the nonuniform increase of the degree of dissocn. with the temp. of the components into their ions. This causes a displacement of the min. in the direction of the less-conducting component. Thus, the constancy of the relation between the concn. of the ions is obtained by the change of the compn. of the mixt., i. e., by the increase of the amt. of the slightly dissocd. component and the decrease of the rapidly increasing concn. of the ions of the 2nd component with the increase of the temp. The *S*-type curves predicted previously by B. were realized. An irrational min. was observed on the sp. cond. isotherm of the system $TlNO_3$-HgI_2; it disappears with increase of the temp. The leveling of the isotherms (predicted previously by B.) of the sp. cond. with increase in temp. was confirmed. In a homogeneous medium the formation of definite chem. compds. is manifested on the cond. curves only by sharp rational min. Twenty references.

W. B. Heuer

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2

Physicochemical analysis of the equilibria of the reciprocal system $2NaCl + MgSO_4 \rightleftarrows Na_2SO_4 + MgCl_2$ in the El'ton Lake brine. I. B. Feigel'son and A. G. Bergman. *Ann. sector anal. phys.-chim., Inst. chim. gén.* (U. S. S. R.) 13, 157-88(1940); cf. *C. A.* 29, 2033[4]; 34, 6417[1].—From the combined results of physicochem. studies of the El'ton Lake brine over a period of 6 yrs. by F. and other workers it was possible to construct a complete polythermic diagram of the equil. system Na, Mg‖Cl, SO_4 at from −20° to 25° at intervals of 5°. The max. $MgCl_2$ concn. in brines during the summer drops to a min. in the winter. **Cyclochronograms of salt lakes. El'ton Lake (1932–1936).** N. S. Kurnakov, I. B. Feigel'son and A. G. Bergman. *Ibid.* 189-212; cf. *C. A.* 32, 3099[8].

Chas. Blanc

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2

Composition diagram of ternary systems with potassium and sodium chlorides, fluorides and carbonates. N. M. Volkov and A. G. Bergman. *Compt. rend. acad. sci. URSS* 3(28), 957-9(1960)(in English).—The system

NaCl-NaF forms a eutectic system with limited solid solns. The eutectic corresponds to 670° for 34.5 mol. % NaF. The system Na_2F_2-Na_2CO_3 has a simple eutectic at 690° with 40 mol. % Na_2F_2, and the Na_2Cl_2-Na_2CO_3 system is simple with a eutectic at 638° for a compn. of 41.3 mol. % Na_2Cl_2. The ternary diagram for NaF, NaCl and Na_2CO_3 is divided into 3 fields of crysts., the NaF field occupying 56% of the area, NaCl 28.9% and Na_2CO_3 15.1%. The ternary eutectic corresponds to 54 mol. % Na_2CO_3, 31% Na_2Cl_2 and 15% Na_2F_2 at 575°. The system KCl-KF has a simple eutectic at 55 mol. % KCl at 606°. The system K_2F_2-K_2CO_3 contains the compd. $KF.K_2CO_3$ within the range 30.5-45.0% KF at 680-677°. The eutectic corresponds to 30.5% K_2F_2 at 658°. The system K_2Cl_2-K_2CO_3 has a eutectic corresponding to 45.5% K_2Cl_2 at 628°. The ternary system K_2Cl_2-K_2F_2-K_2CO_3 contains the K_2F_2 field 39.5% of the area, K_2Cl_2 32.4%, K_2CO_3 21.5% and the compd. $KF.K_2CO_3$ 6.6%. The ternary transformation point at 532° corresponds to 26.5 mol. % K_2F_2, 33.5% K_2Cl_2, 40% K_2CO_3. The ternary eutectic is at 528° with a eutectic compn. of 35% K_2Cl_2, 28% K_2F_2 and 37% K_2CO_3. The eutectic mixts. of these systems can be used as *salt baths for the thermal treatment of alloys.* H. E. Mesmore

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Ca

6

Ternary systems with five ions, sodium fluoride, potassium chloride, sodium carbonate and sodium fluoride, potassium chloride, potassium carbonate. N. N. Volkov and A. G. Bergman. *Compt. rend. acad. sci. U. R. S. S.* 27, 970-1 (1940) (in English).—The binary systems NaF-KCl, KCl-Na_2CO_3 and Na_2CO_3-NaF form simple eutectics. The ternary system of these compds. is likewise of the simplest type and the eutectic compn. is 11 mol. % Na_2F_2, 33 mol. % K_2Cl_2 and 56 mol. % Na_2CO_3 at 558°. The ternary system K_2Cl_2-Na_2F_2-K_2CO_3 is composed of three simple binary eutectics. The ternary eutectic temp. is 520° and the compn. is 24% Na_2F_2, 57% K_2CO_3 and 19% K_2Cl_2. These salts may be used as salt baths for the thermal treatment of alloys. H. B. M.

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Composition diagram of the system NaCl-$CaCl_2$-$BaCl_2$. A. G. Bergman and S. P. Pavlenko. *Compt. rend. acad. sci. U. R. S. S.* 27, 972-3(1940)(in English).—NaCl-$CaCl_2$ forms a simple eutectic at 494° composed of 53.2 mol. % $CaCl_2$. The NaCl-$BaCl_2$ also forms a simple eutectic at 640° composed of 58.5% NaCl. The binary system $CaCl_2$-$BaCl_2$ forms a eutectic at 592° for 36.7% $BaCl_2$, the transition point of the compd. $CaCl_2.BaCl_2$ being at 632° for 45% $BaCl_2$. The ternary diagram areas are $BaCl_2$ 47.2, NaCl 27.1, $CaCl_2$ 20.6 and $CaCl_2.BaCl_2$ 5.1%. The ternary eutectic temp. is 480° for the mol. compn. $CaCl_2$ 47, NaCl 38.5 and $BaCl_2$ 14.5%. The transformation point is 500° for the mol. compn. $CaCl_2$ 39, NaCl 42 and $BaCl_2$ 19%. This ternary system may be of use as a *salt bath in the thermal treatment of alloys.*

H. E. Messmore

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Melting diagram of the system $PbCl_2$-$CdCl_2$-TlCl. A. G. Bergman and T. M. Tapchanyan. *Ann. sector anal. phys. chem., Inst. chim. gén.* (U.R.S.S.) 14, 330-48 (1941).—The concern of this investigation was one of the faces of the tetrahedron formed by the system $PbCl_2$-$CdCl_2$-TlCl-AgCl. The face studied represented the ternary system $PbCl_2$-$CdCl_2$-TlCl. The results are tabulated and presented in a diagram. In the face studied there are 8 distinct areas of crystn. Three of these are crystn. areas of the components $PbCl_2$, $CdCl_2$, and $TlCl$. The remaining 5 are crystn. areas of double salts. The largest of these areas is taken up by the compd. TlCl.$CdCl_2$ contg. 29.9% of $CdCl_2$. This compd. has an α and a β modification. On the side $TlCl$-$PbCl_2$ the compd. $TlCl_2$.-$2PbCl_2$ was identified.

M. Hosch

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Fusibility diagram of the system LiF-KF-MgF_2. A. G. Bergman and S. P. Pavlenko (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, 30, 818—819).—The binary system KF-MgF_2 shows a compound *KF,MgF*$_2$ with m.p. 1056°, and a transition point at 870°, 22 mol.-% MgF_2, belonging to the incongruently melting compound *2KF,MgF*$_2$. The eutectic points are at 1004°, 69·6 mol.-% MgF_2, and at 786°, 14 mol.-% MgF_2. The system LiF-KF forms an eutectic at 490°, 50·5 mol.-% LiF. The system LiF-MgF_2 shows a min. on the curve of continuous solid solutions at 742°, 33 mol.-% MgF_2. The min. at 45 mol.-% MgF_2, 669° reported by Tacchini (A., 1925, ii, 122) was not observed. When 5—6% of KF is added the continuous solid solutions within the ternary system change to limited solutions and an equilibrium curve is obtained. The general form of the state diagram of the system LiF-KF-MgF_2 is shown diagrammatically and the following singularities are noted: triple point of the phase triangle KF-LiF-*2KF,MgF*$_2$ melting-solidification temp. 488°; triple point of the phase triangle LiF-MgF_2-*KF,MgF*$_2$ melting-solidification temp. 713°, composition 63·5 mol.-% LiF, 30·5 mol.-% MgF_2, 6 mol.-% KF.

O. D. S.

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Fusion diagram for the system LiF–KF–NaF. A. G. Bergman and E. P. Dergunov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, 31, 753–754).—The equilibrium diagram is given. In the binary system KF–NaF, the eutectic is at 710° and 40 mol.-% NaF. In the system LiF–NaF, the eutectic temp. is 652° (39 mol.-% NaF), and in the system LiF–KF it is 492° (50 mol.-% KF). For the ternary system the eutectic temp. is 454° (11·5 mol.-% NaF, 42 mol.-% KF). The very considerable lowering of m.p. of the individual constituents is noticeable. A. J. M.

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Dr. Abs. A I--6, Kinetic theory, Thermodynamics.

Fusion diagram of the system $LiF-NaF-MgF_2$. A. G. Bergman and E. P. Dergunov (Compt. rend. Acad. Sci. U. R. S. S., 1941, 31, 755-756).—LiF and MgF_2 form a continuous series of solid solutions with a min. at 742° (33 mol.-% MgF_2). In the binary system $NaF-MgF_2$, a compound NaF, MgF_2, m.p. 1030°, is formed. It forms a eutectic with NaF (75 mol-% NaF) at 830°, and with MgF_2 (64 mol.-% MgF_2) at 1000°. There are two ternary eutectic points. In the system $LiF-NaF-NaF,MgF_2$, the eutectic separates at 630° (10 mol-% MgF_2, 43 mol.-% NaF, 47 mol-% LiF). In the system $LiF-MgF_2-NaF,MgF_2$, the eutectic separates at 684° (29 mol.-% MgF_2, 12 mol.-% NaF, 59 mol,-% LiF). A. J. M.

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

Double decomposition in the absence of a solvent. LXI. Irreversible mutual system of fluorides and tetraborates. LXII. Reversible mutual system, with separation date layers, of chlorides and tetraborates of sodium and potassium. A. G. Bergman and I. N. Nikonova (J. Gen. Chem. Russ., 1942, 12, 449—[illegible], 460—467).—LXI. Liquidus curves are given for the systems $Na_2B_4O_7$–$K_2B_4O_7$, showing a continuous series of solid solutions with a min. at 686° and 35 mol.-% [illegible] B_2O_7, eutectic at 680° and 80 mol.-% $Na_2B_4O_7$ [illegible] B_2O_7, transition point at 754° and 75·5 mol.-% [illegible] 712° and 44 mol.-% $K_2B_4O_7$. The system [illegible] eutectic points at 632° with 42·5 mol.-% $K_2B_4O_7$ [illegible] and 34·0 mol.-% K_2F_2, at 635° with 44·5 mol.-% [illegible] mol.-% $K_2B_4O_7$, and 18·0 mol.-% Na_2F_2, and at [illegible] mol.-% $K_2B_4O_7$, 28 mol.-% Na_2F_2, and 19·5 mol.-% K_2F_2. Mixtures of these compositions are suitable for salt baths for heat-treatment of metals.

LXII. In each of the systems, Na_2Cl_2–$Na_2B_4O_7$ and K_2Cl_2–$K_2B_4O_7$, there is an extensive break in liquid solubility, from 0·1 to 57 mol.-% $Na_2B_4O_7$ (above 800°, crystallisation horizontal) in the first case and from 6 to 61·5 mol.-% $K_2B_4O_7$ (above 763°) in the second. The liquidus lines for melts richer in borate show a transition point and a eutectic point. There is evidence of the formation of compounds $NaCl,Na_2B_4O_7$ and $KCl,2K_2B_4O_7$. In the reversible mutual system, $Na,K/Cl,B_4O_7$, the layer regions occupy in projection 64% of the total area of the square, the corners of which represent the individual salts; they are comprised within the fields of solid solubility of KCl and NaCl and they extend right across the square. Two eutectics and one transition point are described. The temp. and compositions ($Na_2B_4O_7$: $K_2B_4O_7$: K_2Cl_2 in mol.-%) are: eutectic E_1, 612°, 58·5 : 15·0 : 26·5; transition point E_2, 622°, 55·5 : 18·0 : 26·5, and eutectic E_3, 620°, 63·0 : 26·0 : 9·0. These low-m.p. mixtures should be suitable for heat-treatment salt baths and as fluxes in refining Al alloys.

G. S. S.

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Sulphate nitrophosphate. I. Polytherm of the ternary system H_2O-K_2SO_4-$(NH_4)_2SO_4$. A. G. Bergman and M. I. Schelochovitsch (*J. Appl. Chem. Russ.*, 1942, 15, 187—193).—The eutectic point for the H_2O-K_2SO_4 system is at 6·8 wt.-% of K_2SO_4 and −1·8°, and for H_2O and $(NH_4)_2SO_4$ at 29·6 wt.-% of $(NH_4)_2SO_4$ and −18·85°. $(NH_4)_2SO_4$ and K_2SO_4 form a complete series of solid solutions between the f.p. and 30° (no measurements above 30°).

J. J. B.

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Double decomposition in the absence of a solvent. Singular irreversible-reciprocal systems without separation into layers from potassium and calcium chlorides and fluorides and sodium and calcium chlorides and fluorides. I. K. Krauze and A. G. Bergman (Compt. rend. Acad. Sci. U. R. S. S., 1942, 35, 20-24).--The systems Na, Ca|F, Cl and K, Ca|F, Cl in which double decomp. tends to occur with the formation of CaF_2 and NaCl and CaF_2 and KCl, respectively, have been studied. The compound KF, CaF_2, m.p. 1070°, has been shown to exist. J. W. S.

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Cr. Abs

Constitution diagram of the reciprocal system of fluorides and carbonates and of chlorides and carbonates of sodium and potassium. N. N. Volkov and A. G. Bergman (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, 35, 47–50).—Equilibrium data for the systems NaF–KF–Na_2CO_3–K_2CO_3 and NaCl–KCl–Na_2CO_3–K_2CO_3 are recorded.

F. I. G.

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

Polytherm of the ternary system H_2O–KCl–KBr. A. G. Bergman and N. A. Vlasov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **36**, 57—61).—The system H_2O–KCl–KBr has been studied at > 30°. The only solid phases formed are ice and KCl–KBr solid solutions. The eutectic point is at −13·4° and KCl 6·6%, KBr 25·6%.

J. W. S.

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Bc

A-1

Solubility and interaction of acid anhydrides in systems with metal halides. A. G. Bergman and G. I. Nagorni (*Bull. Acad. Sci. U.R.S.S., Cl. Sci. Chim.*, 1942, 328—337).—In melts of $NaF-KF-B_2O_3$ and of $KF-KCl-B_2O_3$ the temp. of appearance and disappearance of crystals is observed. The eutectic temp. (716°) of NaF-KF is reduced to 600° by ~40% of B_2O_3; at higher [B_2O_3] the melts solidify to a glass. B_2O_3 is insol. in liquid KCl; ~40% of KF is required for complete miscibility. $KF-KCl-B_2O_3$ melts containing >60% of B_2O_3 form glasses. Probably a compound KF,B_2O_3 exists. Glasses of $NaF-KF-B_2O_3$ are not hygroscopic. J. J. B.

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Fusibility diagram of the ternary system sodium chloride–fluoride–chromate. I. S. Rasseskaja and A. G. Bergman (*Compt. rend. Acad. Sci. U.R.S.S.*, 1943, 38, 176—177).—In a study of baths for thermal treatment of metals, heat carriers, and welding fluxes, the ternary and the three component binary systems were investigated. NaCl–NaF has m.p. 675° (33·5 mol.-% NaF); NaCl–Na_2CrO_4 has m.p. 572° (78·5 mol.-% Na_2CrO_4); NaF–Na_2CrO_4 has m.p. 642° (81·5 mol.-% Na_2CrO_4); all are simple eutectics. The eutectic point of the ternary system is at 530° and NaF 13, NaCl 21·5, Na_2CrO_4 65·5 mol.-%. N. M. B.

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Ca 16.

Polytherm of the ternary system: sodium chloride-sodium bromide-water from complete f.p. to 50°. N. A. Vlasov and A. G. Bergman (*Compt. rend. Acad. Sci. U.R.S.S.*, 1949, 69, 211—214).—Solubilities of NaBr and NaCl in H_2O are recorded for −20° to 50°. In this temp. range there are two fields of solid solutions, one consisting of the anhyd. salts, the other of the dihydrates. The fields of crystallisation of ice, $Na(Cl,Br),2H_2O$, and $Na(Cl,Br),5H_2O$ meet in a eutectic point at −29·2° with NaCl 8·0, NaBr 31·6, H_2O 62·4%.

F. R. G.

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Simplest inorganic glasses on the basis of calcium nitrate. A. G. Bergman (*Compt. rend. Acad. Sci. U.R.S.S.*, 1943, 38, 204—206).—In the system $Ca(NO_3)_2$–KNO_3–$NaNO_3$ glasses are obtained by the solidification of melts in the field of primary crystallisation of $4KNO_3.Ca(NO_3)_2$ and adjoining regions. The eutectic is at 133° and the ternary transition point is at 160° and 53·9% KNO_3, 29·4% $Ca(NO_3)_2$. The system $Ca(NO_3)_2$–$NaNO_3$ has a eutectic at 232° and 54·9% of $NaNO_3$, with no compound formation. The system $Sr(NO_3)_2$–KNO_3–$NaNO_3$ shows neither glass nor compound formation.

L. J. J.

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CA

2

Polytherms of the ternary system NaBr-KBr-H_2O from the temperature of complete solidification to 50°. N. A. Vinogr and A. G. Bergman. *Doklady Akad. Nauk S. S. S. R.* 39, 140-51(1943); *Compt. rend. acad. sci. U. R. S. S.* 39, 141-5(1943); cf. *C. A.* 38, 10°.—Tabulated data and two phase diagrams are given. In the phase diagrams, the fields representing various solid phases have boundaries intersecting at various points at which the compn. of the system, the temp. and the solid phases are as follows: 26.0% NaBr (*A*), 4.0% KBr (*B*), 59.5% H_2O (*C*), −33°, ice (I), α-KBr (II) NaBr.$2H_2O$ (III); 28.0% *A*, 2.8% *B*, 53.4% *C*, −26.0°, III, NaBr.$2H_2O$ (IV), II; 47.0% *A*, 7.8% *B*, 55.2% *C*, 46°, IV, NaBr (V), β-KBr (VI); 41.4% *A*, 5.4% *B*, 53.2% *C*, 7.0°, II, VI, IV; 41.5% *A*, 58.5% *C*, −23.5°, III, IV; 53.4% *A*, 46.6% *C*, 20.2°, IV, V; 40.8% *A*, 59.7% *C*, −22.2°, I, III; 30.6% *B*, 69.4% *C*, −13.2°, II, I; 40.0% *B*, 60.0% *C*, 22°, II, VI. J. W. Perry

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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PROCESSES AND PROPERTIES INDEX

2

Sulfate nitrophoska I. IV. Polytherm of the ternary system: ammonium sulfate, water, ammonium monophosphate. F. V. Bel'chev and A. G. Bergman. *J. Applied Chem.* (U.S.S.R.) 17, 520-6(1944)(English summary); cf. *C.A.* 37, 2265[1].—In the system H_2O-$(NH_4)_2SO_4$-$NH_4H_2PO_4$ the isotherms and polytherms were established from the complete f.p. to 30°. The system is characterized by 3 fields of satn. corresponding to 3 solid phases: ice, $(NH_4)_2SO_4$ and $NH_4H_2PO_4$. The eutectic lies at 37.9% $(NH_4)_2SO_4$, 4% $NH_4H_2PO_4$, and 58.1% H_2O, and at −19.6°. The character and direction of isotherms in this system, as well as the dimensions of the solid phase fields, show an effective salting-out effect of $(NH_4)_2SO_4$ on $NH_4H_2PO_4$.

G. M. Kosolapoff

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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CA

Fusion diagram of the system KF-NaF-MgF_2. A. G. Bergman and E. P. Dergunov. *Compt. rend. acad. sci. U.R.S.S.* 48, 329-31(1945).—The KF-NaF-MgF_2 system studied is one of the 4 triple systems forming the faces of the compn. tetrahedron of a quadruple system of Li, K, Na, and Mg fluorides, which is being investigated primarily to find *fluoride fluxes for the refining of nonferrous metals and their alloys.* The compds. in the KF-NaF-MgF_2 system det. the nature of the quadruple system as a whole, as the fourth component, LiF, does not form any addnl. compds. and serves only as a solvent. The method used was the visual-polythermal method, where the temps. at which the first crystals appear and the last disappear are detd. by means of a Pt/Pt,Rh thermocouple. The formation of 3 compds.—$2KF.MgF_2$, $KF.MgF_2$, and $NaF.MgF_2$—divides the compn. triangle into 4 simple systems. The resulting 3 eutectics correspond to the following temps. and compn. (in mol. %): eutectic (1) at 975°—53.5% MgF_2 (I), 33.0% NaF (II), and 13.5% KF (III); eutectic (2) at 798°—22.5% I, 62.5% II, and 15.0% III; and eutectic (3) at 685°—6.5% I, 34.5% II, and 59.0% III. The transition triple point occurs at 710° and has the following compn.: 11.0% I, 39.0% II, and 50.0% III. Frank Gonet

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— Ternary component of the [illegible] quaternary reciprocal system [illegible] H_2O. [illegible] A. G. Bergman, V. P. Radishchev, I. N. Nikanova, V. N. Bruskina, K. B. Sitarnina, and M. A. Yatsuk. *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* 15, 157-69(1947).—Studied were the quaternary systems of the 6 salts. In the system KNO_3-KCl was observed the compd. $KNO_3.KCl$, m. 300° (decomp.). This compd. had a polymorphic transformation at 265°. At the eutectic point 330° it contd. 6 mol. % of KCl and at the transition point 17.4 mol. % KCl. In the system NH_4NO_3-KNO_3 was observed the compd. $2NH_4NO_3.KNO_3$, m. 170°. There were indications of the existence of a compd. richer in KNO_3. The eutectic of the double salt was at 166.7°, at which point it contd. 11.2 mol. % of KNO_3. At the transition point 170.5° it contd. 16.5 mol. % of KNO_3. In the eutectic, 147°, system NH_4NO_3-$NH_4H_2PO_4$ was observed a wide range of $NH_4H_2PO_4$ solid solns. At the eutectic point this system contd. 12.5 mol. % of $NH_4H_2PO_4$. The eutectic of the system KNO_3-KH_2PO_4 was at 264.5° and contd. 29.2 mol. % of KH_2PO_4. In the system KCl-KH_2PO_4, the eutectic point was at 280° when it contd. 5.5 mol. % of KCl. The system NH_4Cl-$NH_4H_2PO_4$ had a eutectic point at 184° when it contd. 12.2 mol. % of NH_4Cl. $NH_4H_2PO_4$ and KH_2PO_4 formed a continuous series of solid solns. The ternary system NH_4NO_3-$NH_4H_2PO_4$-NH_4Cl had a eutectic point at 131.5° when it contd. NH_4NO_3 80.25, $NH_4H_2PO_4$ 5.75, and NH_4Cl 14 mol. %. The eutectic point of the system KNO_3-KH_2PO_4-KCl was at 225° at which point it contd. KNO_3 53.75, KH_2PO_4 38.75, and KCl 7.5 mol. %. Since within this system KNO_3.KCl formed, it had a transition point at 270° at which it contd. KNO_3 53.75, KH_2PO_4 31.75, and KCl 9.5%. The reversible system K, NH_4 || Cl, NO_3 could be studied only up to 200°. This system had 3 nonvariant points: eutectic at 131.0° when it contd. NH_4NO_3 75.2, NH_4Cl 14.35, and KNO_3 10.55%, a transition point at 145.5° when it contd. NH_4NO_3 70.15, NH_4Cl 13.0 and KNO_3 16.85%, and a transition point at 135.0° when it contd. NH_4NO_3 74.60, NH_4Cl 13.75, and KCl 11.75%. The reversible system K, NH_4 || Cl, H_2PO_4 was studied up to 400°. The liquidus consisted of 2 areas of crystn. of continuous solid solns. of (K, NH_4)Cl and (K, NH_4)-H_2PO_4. The curve of combined crystn. had a min. at 150°. The irreversible system K, NH_4 || NO_3, H_2PO_4 had a stable diagonal representing $NH_4H_2PO_4$-KNO_3 dividing the system into 2 ternary areas. The diagonal has a eutectic at 188° where it contd. 23% of KNO_3. One of the ternaries, KNO_3-KH_2PO_4-$NH_4H_2PO_4$, had a liquidus divided by a continuous curve into 2 areas of continuous solid solns. (K, NH_4)H_2PO_4 and KNO_3. This curve had no min. The other ternary, KNO_3-$NH_4H_2PO_4$-NH_4NO_3, had a transition point at 150° where it contd. NH_4 87.0, K 13.0, and NO_3 90%. This point is formed by the area of $KNO_3.2NH_4NO_3$ and the eutectic of 130° at which point (eutectic) the compn. is NH_4 83.75, K 6.25, and H_2PO_4 9%. None of the studied salts formed hydrates, yet H_2O affected considerably the equil. Fusion diagram of

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the quaternary reciprocal system NH_4, K || Cl, NO_3, H_2PO_4. *Ibid.* 300-39.—The fusion diagram of the system was studied up to 180° in the region adjacent to NH_4NO_3. Within this region were crystd. NH_4NO_3, $2NH_4NO_3.KNO_3$, KNO_3, $NH_4(K)Cl$, and $NH_4(K)H_2PO_4$. These spaces made contact at the eutectic point approx. 123° and at the transition point approx. 134°. At the eutectic point the approx. compn. was NH_4 90.5, K 9.5, Cl 13.75, H_2PO_4 3.75, NO_3 82.50 ion %, and the solid phases $NH_4(K)Cl$ + $NH_4(K)H_2PO_4$ + NH_4NO_3 + $2NH_4NO_3.KNO_3$. At the transition point the approx. compn. was NH_4 86.0, K 14.0, Cl 13.25, H_2PO_4 4.80, NO_3 81.95 ion %, and the solid phases $2NH_4NO_3.KNO_3$ + $NH_4(K)Cl$ + $NH_4(K)H_2PO_4$ + KNO_3. Also studied was the effect of addn. of NaCl and KH_2PO_4 on the m.p. Addn. of NaCl lowered the quaternary eutectic point, 123°, by 9°. Addn. of KH_2PO_4 lowered the eutectic point, 112°, of the ternary system NH_4, Na || Cl, NO_3 by 9°.

M. Hosch

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CA

The ternary adiagonal, reciprocal system of the fluorides and chlorides of sodium and barium. K. I. Ranashek and A. G. Bergman. *Doklady Akad. Nauk S.S.S.R.* 56, 485-6(1947); *Chem. Zentr.* (Russian Zone Ed.) 1948, 1, 1167.—The surface of the liquidus curves in the system Na_2F_2-NaCl-BaF_2-$BaCl_2$ is divided into 5 cryst. fields. The greater portion of this surface (about 51%) represents the field of the compd. $BaF_2.BaCl_2$. Three triple points were established: a eutectic contg. $BaCl_2$ 50, NaCl 36, and Na_2F_2 5% at 617°; a transition point with BaF_2 37, NaCl 43.5, and Na_2F_2 19.5% at 634°; and a eutectic contg. Na_2F_2 49, $BaCl_2$ 32, and NaCl 19% at 630°.

M. G. Moore

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CA

The nonreversible, reciprocal, "two-ridge" system of the fluorides and chlorides of barium and potassium. B. I. Banashek and A. G. Bergman. *Doklady Akad. Nauk S.S.S.R.* 57, 905-6(1947); *Chem. Zentr.* (Russian Zone Ed.) 1949, I, 2; cf. *C.A.* 44, 8217h.—A study made of the 4 binary systems belonging to the quaternary system: Ba-K-Cl-F verified the results of Ponomareff (*C.A.* 9, 1435), Plato (*C.A.* 3, 502, 3019), and Gernsky (*C.A.* 8, 2536). The visual polythermal method was used for the investigation. Two diagonal and 23 interior lines (of intersection) form the square liquidus diagram of the reciprocal system. The pure salts are represented at the corners of the square. The most sharply defined, stable line of the system is the K_2Cl_2-BaF_2 line. The next in order of stability is the K_2Cl_2-$BaF_2.BaCl_2$ line. The BaF_2 region occupies 50.12% of the field; next is the $BaF_2.BaCl_2$ region (29.13%). These 2 fields are characterized on the space model by 2 sharply defined ridges (space folds). There are 4 eutectics at 575° (BaF_2, K_2F_2, K_2Cl_2), 616, 625, and 729°. The last 3 contain no K_2F_2. The nonreversible, reciprocal system of the diagonal type is characterized by the formation of the compd. $BaF_2.BaCl_2$, which does not affect the direction and displacement of the displacement reactions. This is also true of the chlorides, which occupy only 0.75% of the liquidus field.

M. G. Moore

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A. G.

USSR/Fusion May 1947
Barium compounds
Sodium compounds

"A Triple Nondiagonal System of Four Compounds: NaCl, $BaCl_2$, NaF and BaF_2," E. I. Banashek, A. G. Bergman

"Doklady Akademii Nauk SSSR" Vol LVI, No 5

The determination of the varying fusion point of a mixture of fluorides and chlorides of barium and sodium of varying proportions. Phase diagram given.

PA 9T54

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CA

2

Solid solutions and complex formation in the reciprocal system potassium and sodium nitrates and chromates. A. G. Bergman and N. M. Valnberg. *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* 15, No. 3, 68-81(1948).—The expt. data are given in detail. The characteristic feature of the system was the decompn. of the solid solns. of chromates. Below this decompn. temp. at approx. 607° 2 solid phases were formed: chromoglauserite I, $K_2CrO_4 \cdot Na_2CrO_4$, and chromoglauserite II, the compn. of which was not ascertained but as compared with chromoglauserite I it was poorer in the K salt and enriched with the Na salt. Each of these double salts had an individual field of crystn. within the reciprocal system. The entire diagram of state, therefore, comprised 2 areas of solid solns. of chromates and nitrates and 2 inner areas of chromoglauserites I and II. The behavior of the system in fusions was very different from its behavior in aq. solns.

M. Hosch

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

USSR/Chemistry - Solutions, Solid May 1948
Chemistry - Systems, Physicochemical Analysis of Ternary

"Complex Formation and Solid Solutions in a Ternary System of Potassium, Rubidium and Magnesium Fluorides," Ye. P. Dergunov, A. G. Bergman, Inst Gen and Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR, Moscow, 8 pp

"Zhur Fiz Khim" Vol XXII, No 5

Study of system carried out by visual-polythermal method in a platinum crucible fitted with a platinum-rhodium thermocouple. Results are listed and plotted. In ternary system KF - RbF - MgF_2, complexes form an uninterrupted series of solid solutions depending on magnitudes of ionic radii and types of crystalline lattices. Submitted 27 Jun 1947.

68T23

BERGMAN, A. G.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

PA-77T13

BERGMAN, A. G.

USSR/Chemistry - Alkali Metal Halides Apr 1948
Chemistry - Fluorides

"Complex Formation Between the Fluorides of Alkaline Metals and Metals of the Fourth Group," Ye. P. Dergunov and A. G. Bergman, Lab of Fused Salts, Inst Gen and Inorg Chem imeni N. S, Kurnakov, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LX, No 3

Authors have two goals: (1) to explain experimental method of obtaining data for studying fluorides of alkaline metals with fluorides of fourth group, and (2) to report results of studies conducted on tertiary system KF-RbF-ThF. Submitted by Acad I. I. Chernyayev 26 Feb. 1948.

77T13

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

1. MUKIMOV, S. M. ; BERGMAN, A. G.

2. USSR (600)

4. Fertilizers and Manures

7. Investigation of composite fertilizers of the nitrophoska type. Trudy Inst. khim. Uz.SSR no. 2 1949.

9. Monthly List of Russian Accessions, Library of Congress, March 1953. Unclassified.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A. G.

PA 65/49T15

USSR/Chemistry - Decomposition Apr 49
Solutions, Solid

"Double Decomposition in the Absence of a Solvent: The Formation of Complexes, Solid Solutions, and Double Decomposition in Fusions of the Fluorides and Chlorides of Strontium and Barium," A. G. Bergman, G. A. Bukhalova, 8 3/4 pp

"Zhur Obshch Khim" Vol XIX, No 4

Determines by visual-polythermic analysis that between fluorides and chlorides of strontium and barium are formed stable anionic complexes of $SrCl_2 \cdot SrF_2$ and $BaCl_2 \cdot BaF_2$, which melt at 960°

65/49T15

USSR/Chemistry - Decomposition (Contd) Apr 49

and 1008° and undergo homeomorphic transformation at 890° and 950°. Submitted 4 Jan 48.

65/49T15

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

MUKIMOV, S.M.; KRYLOVA, N.I.; BERGMAN, A.G.

Reactions in melts of sodium, potassium, magnesium, and calcium sulfates. Trudy Inst. Khim. Akad. Nauk Uzbek S.S.R., Inst.Khim., Obshchaya i Neorg. Khim. No.2, 94-112 '49. (MLRA 5:12)
(CA 47 no.18:9128 '53)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

MUKIMOV, S.M.; KAPKAYEVA, R.I.; BERGMAN, A.G.

The cyclic conditions of the chloride-sulfate lake Tuz-Kane. Trudy Inst. Khim. Akad. Nauk Uzbek S.S.R., Inst. Khim., Obshchaya i Neorg. Khim. No.2, 145-51 '49. (MLRA 5:12)
(CA 47 no.18:9072 '53)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

URAZOV, G.G., akademik; BERGMAN, A.G., professor, doktor khimicheskikh nauk.

Remarks on the paper of I.V. Tananaev "Measuring light absorption in solutions as a method of physicochemical analysis" presented in competition for the Prize of N.S.Kurnakov. Izv.Sekt.fiz.-khim.anal.17:8-14'49. (MLRA 7:6)

(Chemistry, Analytical) (Absorption of light)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

CA

2

Homeomorphism of potassium halide salts and the polytherms of the systems KCl-KBr-H_2O, NaCl-NaBr-H_2O, and NaCl-KCl-H_2O. A. G. Bergman and N. A. Vlasov. *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* 17, 319-37(1949).—KCl, KBr, and KI manifested homeomorphic transformation $\alpha \rightleftharpoons \beta$ at 27.5, 22.0, and 11°, resp. Similar transformation was also observed in solid solns. of these salts. The side faces of diagrams of the systems KBr-KCl-H_2O, NaBr-NaCl-H_2O, and NaBr-KBr-H_2O were studied from the temp. of their complete freezing to 30-50°. A similar polytherm of the system KBr-KCl-H_2O was constructed from literature data. Of these systems the simplest was KBr-KCl-H_2O, in which only 2 crystn. fields were observed: ice and continuous solid solns. K(Cl, Br). The solid-soln. crystn. field was subdivided into areas of α- and β-homeomorphs. The system NaBr-NaCl-H_2O formed 2 fields of solid solns. Na(Cl, Br).$2H_2O$ and Na(Cl, Br). In addn. this system had a field of ice and one of NaBr.$5H_2O$. The areas of solid-soln. dihydrate, NaBr pentahydrate, and ice met in a eutectic point at −29.2° and corresponding to NaBr 74.95, NaCl 25.05, and H_2O 848 moles. In the system NaBr-KBr-H_2O, the components crystd. in their pure state. The 6 fields of crystn. met in 4 ternary points. At the eutectic point of −32.0°, corresponding to NaBr 91.34, KBr 8.66, and H_2O 850 moles, the fields of NaBr pentahydrate, KBr, and ice met. In the absence of solid solns. between KBr and NaBr, the homeomorphic transformation of KBr was lowered from 22 to 7°. This peculiarity distinguishes homeomorphic transformation from heteromorphic.

M. Hosch

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A.G.; VLASOV, N.A.

Polythermal of, Na, K // Cl, Br the reciprocal system from -33°C to 30 -40°C. Izv. Sekt. fiz. khim. anal. 18:201-220 '49. (MIRA 11:4)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR.

(Thermochemistry) (Electrolytes)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

CA

2

Chemistry of multicomponent systems. A. G. Bergman (N. S. Kurnakov Inst. of Gen. and Inorg. Chem., Acad. Sci, U.S.S.R.). *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* 19, 113-19 (1949).—A review. To date 25 cations and 30 anions were studied. The systems investigated comprised approx. 300 binary, 60 ternary, 10 quaternary reciprocal, 1 quinque-component, and parts of more complicated systems. M. Hosch

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

CA

Ternary reciprocal system of fluorides and chlorides of lithium and calcium. G. A. Bukhalova and A. G. Bergman. *Dokhady Akad. Nauk S.S.S.R.* 66, 67-70(1949). The 4 binary systems were studied previously (cf. C.A. 3, 302; 18, 1445). All form simple eutectics except the system CaF_2-$CaCl_2$, where there is a peritectic point in addition to the eutectic. The reciprocal system has 6 crystn. regions where the solid phases are, resp.: LiF, CaF_2, $CaF_2.CaCl_2$, $CaCl_2$, and α- and β-LiCl. There are 3 eutectic points, lying on a slightly curved line, having values of temp. (°C.), equiv. % Ca, and equiv. % F, and with solid phases in equil. as follows: 472, 22.5, 13.0, LiF + CaF_2 + LiCl; 450, 51.0, 6.5, $CaCl_2$ + CaF_2 + $CaCl_2$ + LiCl; and 485, 35.0, 25.0, CaF_2 + $CaF_2.CaCl_2$ + LiCl. Between adjacent eutectic points there are relative max.: 492, 30, 30.0, LiCl + CaF_2; and 492, 40.0, 20.0, LiF + $CaF_2.CaCl_2$.

Arild J. Miller

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A.G.

Two-fold irreversible-reciprocal system of potassium and barium fluorides and chlorides. F. I. Bannshek and A. G. Bergman. *Izvst. Sektora Fiz.-Khim. Anal., Akad. Nauk S.S.S.R.* 20, 94-108(1950); cf. *C.A.* 45, 7863*i*.—The binary component system K_2F_2-BaF_2 had a eutectic point at 729° and 58.0 mol. % K_2F_2. KF-KCl had a eutectic at 606° and 55 mol. % KCl. K_2Cl_2-$BaCl_2$ formed a compd. $K_2Cl_2.BaCl_2$, m. 660°. This compd. formed 2 eutectics with the parent salts at 651° and 640°. BaF_2-$BaCl_2$ formed a compd. $BaF_2.BaCl_2$, m. 1008-10°. The eutectic points of this system were at 840° and 15 mol. % BaF_2 and 940° and 78 mol. % BaF_2. $BaF_2.BaCl_2$ underwent geomorphic transformation at 940° and 27 mol. % BaF_2. The internal diagonal cut K_2Cl_2-BaF_2 had a eutectic at 739° and 14 mol. % BaF_2. The BaF_2 branch of the curve had an S-shaped appearance. The internal diagonal cut K_2F_2-$BaCl_2$ was unstable. On the BaF_2 and BaF_2-$BaCl_2$ curve the maxima were at 914° and 48 mol. % BaF_2 and 940° and 70 mol. % BaF_2, resp. Along the diagonal K_2Cl_2-BaF_2 extended the field of BaF_2 in the shape of a fold. Another fold was formed by $BaF_2.BaCl_2$. This indicates that within this reciprocal system the process of complex formation does not displace the process of metathetic decompn.

M. Hosch

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CA

6

Effect of complex formation on the exchange in ternary reciprocal systems. A. G. Bergman and G. A. Bakhalova. *Zhur. Obshchei Khim.* 20, 230-9(1950); *J. Gen. Chem. U.S.S.R.* 20, 245-9(1950)(Engl. translation); cf. *C.A.* 24, 2307.—(1) In the case of formation of only one binary compd. in the reciprocal system AX + BY ⇄ AY + BX, the representative square is triangulated by secants drawn between the representative point of the compd. and the opposite corners of the square; such systems, illustrated by Li, Sr || F, Cl, are termed "adiagonal." At points of intersection between secants and diagonals the reactions 2AY + BX → AY.BY + AX and 2BY + AX → AY.BY + BX, by the criterion of heats of formation proceed from left to right. By the same criterion, if one of the 2 secants starts at the representative point of the complex, and the other coincides with a diagonal, the reactions are AY.BY + AX → BX + 2AY and 2BY + AX → AY.BY + BX; in such systems, illustrated by Na, Sr || F, Cl, the triangulating stable sections are the diagonal BX — AY and the secant BX — AY.BY. Two possible variants of this case are detd. by whether the diagonal section is the predominating one and the adiagonal subordinate, as in K, Na || F, B_4O_7, or vice versa, as in Li, K || Cl, SO_4. The latter case is termed "adiagonal with subordinate diagonal section." (2) In the case of 2 compds. lying on opposite sides of the square, if the exchange decompn. reaction predominates, as in Ag, Tc || Cl, SO_4, the square is triangulated in the 1st place, by a diagonal, and each resulting triangle by a secant. In the presence of predominating complex formation, the basic square is primarily divided into 2 rectangles, each of which can be viewed as a new reciprocal system, subject to further triangulation; an example is Li, K || SO_4, WO_4. If one of the 2 compds. is predominating the square is primarily divided adiagonally, and the inner triangle subsequently split in two by the line connecting the 2 complexes. If, in addn. to complex formation, there is a continuous series of solid solns. both between pairs of components and between the complexes, the representative square is simply divided into 2 rectangles, as in Sr, Ba || F, Cl. A particular type, illustrated by Ca, Ba || F, Cl, arises when only one adiagonal section is significant, the remaining secants having no binary-system character. Systems in which the line connecting the representative points of the complexes on 2 opposite sides of the square is a triangulating section are termed "belt-type reciprocal systems," and are characterized by the feature that the crystn. fields of pairs of diagonally opposed components are sepd. by contiguous crystn. fields of the 2 components. N. Thon

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65A

KI-4

Ternary system of $Ca(NO_3)_2$-KNO_3-$NaNO_3$ in melts. P. I. Protsenko and A. G. Bergman (*J. gen. Chem. USSR*, 1950, **20**, 1365—1375 (U.S. transl., 1421—1431)).—The system is studied by experimental determination of m.p. diagrams. The stability region of the binary incongruent compound $4KNO_3.Ca(NO_3)_2$, having a eutectic at 146°, is established. Contrary to the data of Menzies and Dutt (1930), the system has two important points (1) a ternary eutectic at 133° [KNO_3 39·4, $Ca(NO_3)_2$ 48·8, and $NaNO_3$ 11·9%], and (2) a ternary transition point at 160° [KNO_3 49·2, $Ca(NO_3)_2$ 32·8, and $NaNO_3$ 18%]. The data are discussed briefly in relation to the possible substitution of $Ca(NO_3)_2$ for $NaNO_3$ in an electrolytic salt-bath.

W. J. Baker.

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CA

Tertiary salt-bearing halite-sulfate region of Tyanshan. A. G. Bergman and V. N. Shcherbina (Geol. Inst., Kirgiz Sect., Acad. Sci. U.S.S.R.). *Doklady Akad. Nauk S.S.S.R.* 72, 1083-6(1950).—The region represents a unique formation with peculiar paragenesis of salt minerals, being a residuum of an intracontinental, high-level, high-sulfate water reservoir, or reservoir chain, which had never been connected to an ocean, thus differing sharply from oceanic compn. The basic minerals are gypsum, anhydrite, glauberite, NaCl, mirabilite, thenardite, and bloedite. Glauberite is found either dispersed or in thick massive sheets of 80-95% assay. Halite is found in close paragenesis with it, reaching several tenth % or several % in various locations. Anhydrite is assocd. with it in small amts. (under 1%). In several intermountainous regions there is, instead, predominant deposition of glauberite assocd. with either gypsum, anhydride, halite, or thenardite; mirabilite is absent. Typical analyses are supplied. G. M. Kosolapoff

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C a
1951

Complex formation between chlorides of alkali and alkaline earth metals. E. P. Dergunov and A. G. Bergman. *Doklady Akad. Nauk S.S.S.R.* 75, 815-18(1950); cf. *C.A.* 43, 4590c.—LiCl-$CaCl_2$ and NaCl-$CaCl_2$ do not form compds. KCl-$CaCl_2$ yields $KCaCl_3$, with congruent m.p. 754°. RbCl-$CaCl_2$ forms $RbCaCl_3$, m. 930°, while CsCl-$CaCl_2$ forms $CsCaCl_3$, m. 1080°. The stability of these compds. increases in passing from K to Cs. The KCl-$SrCl_2$ system forms unstable K_2SrCl_4 and $KSrCl_3$, with eutectic at 580° at 50 mol. % KCl. In the RbCl-$SrCl_2$ system there forms $RbSrCl_3$, m. 705°, while in CsCl-$SrCl_2$ system there exists $CsSrCl_3$, m. 907°, showing a similar rise in stability in passing toward Cs. In going from K to Cs the tendency for formation of $MM'Cl_3$ compds. increases; this is attributed to the influence of ionic radii of both the alkali and the alk. earth metals, since the approach to Cs involves the approach to closer correspondence of ionic radii of the metals and Cl, while the bivalent metal ion fits the "holes" provided by the univalent ions in the lattice. Hence, the smaller is the bivalent ion the more stable is the complex formed. The complex formation with Sr is much less pronounced than with Ca. $RbCaCl_3$ and $CsCaCl_3$ are isomorphous as are chlorides of Rb and Cs, forming a continuous series of solid solns. without a min. In the ternary system, $RbCaCl_3$-$CsCaCl_3$ forms a sharply defined ridge, which rises far above the m.p. of pure components, and on the $CsCaCl_3$ side it displays a singular ridge line slowly declining to $RbCaCl_3$. No decompn. of solid solns. among the chlorides of Rb and Cs and the complexes $RbCaCl_3$ and $CsCaCl_3$ within the equil. triangle on the liquidus surface takes place. In RbCl-CsCl-$CaCl_2$ system the region of solid solns. of $RbCaCl_3$-$CsCaCl_3$ occupies 73.65% of total compn triangle.

G. M. Kosolapoff

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A.G

Bergman, A. G., and Luzhnaya, N.P.: Fiziko-khimicheskie osnovy izucheniya i ispol'zovaniya solyanykh mestorozhdeniy khlorid-sulfatnogo tipa. (Physicochemical Bases for the Study and Exploitation of Chloride-Sulfate Salt Deposits.) Inst. Obshchey i Neorg. Khim. im. N. S. Kurnakov. 1951. 231 pp. r. 14, k. 90.

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A. G.

USSR/Chemistry - Nitrates

Aug 51

"The Interaction of Nitrates and Nitrites of Metals of the First and Second Groups of D. I. Mendeleyev's Periodic System in Melts. II. Investigation of the Ternary System Composed of Strontium, Potassium, and Sodium Nitrates in Melts," P. I. Protsenko, A. G. Bergman, Chair of Gen and Inorg Chem, Rostov-on-the Don State U

"Zhur Obshch Khim" Vol XXI, No 8, pp 1380-1387

Constructed phase diagrams for binary systems $SrNO_3$-$NaNO_3$ and $SrNO_3$-KNO_3 and ternary system $SrNO_3$-$NaNO_3$-KNO_3 on the basis of thermochem and other data. Found mp and compn for eutectic in case of all 3

188T8

USSR/Chemistry - Nitrates (Contd)

Aug 51

systems. Line of cocrystn divides phase diagram of ternary system into range of $SrNO_3$ crystn and range of solid solns of KNO_3 and $NaNO_3$ (with higher mp) acts as stabilizer of solid solns.

188T8

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191T35

BERGMAN, A. G.

USSR/Chemistry - Fluorine Compounds Sep 51

"A Diagonal Combined [Interacting] System of Fluorides and Chlorides of Calcium and Barium," G. A. Bukhalova, A. G. Bergman, Inst Gen and Inorg Chem imeni N. S. Kurnakov, Acade Sci USSR

"Zhur Obshch Khim" Vol XXI, No 9, pp 1570-1579

From temp and compn observations for interacting system Ca-Ba:F-Cl constructed 3-dimensional phase diagram. Discussed interaction of, ion exchange between, and formation of double salts by different components on basis of diagram.

191T35

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A. G.

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
General and Physical Chemistry

Chem 9
3

The interaction of nitrates and nitrites of metals of the first and second groups of the periodic system in the molten state. III. The ternary system of nitrates of barium-potassium-sodium. P. I. Protsenko and A. G. Bergman (Rostov-on-Don State Univ.). *J. Gen. Chem. U.S.S.R.* 21, 1731-6(1951)(Engl. translation); *Zhur. Obshchei Khim.* 21, 1580-7(1951); cf. *C.A.* 46, 7384h, 9006c.—The binary systems $Ba(NO_3)_2$-$(NaNO_3)_2$ and $Ba(NO_3)_2$-$(KNO_3)_2$ were defined more precisely. The former has a eutectic at 294° and 12.5 mole % $Ba(NO_3)_2$, and the latter at 287° and 22.5 mole % $Ba(NO_3)_2$. There are no compds. formed; the mixts. cannot be heated above 500° without decompn. In the ternary system, contrary to Harkins and Clark (*C.A.* 9, 2477), there is no ternary eutectic, but rather a min. at 216° at the compn. 5.4 $Ba(NO_3)_2$, 46 $(NaNO_3)_2$, and 48.6 mole % $(KNO_3)_2$. There are only 2 crystn. areas, 1 for $Ba(NO_3)_2$ and the other for an isomorphous mixt. of the K and Na nitrates.

Bernard M. Zeffert

4-28-54

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A. G.

USSR/Chemistry - Lithium Compounds Oct 51

"Exchange Decomposition in Absence of a Solvent. LXX. Irreversible Mutually Interacting System of Chlorides and Sulfates of Lithium and Zinc," N. N. Yevseyeva, A. G. Gorgman, Lab of Lelted Salts, Inst of Gen and Inorg Chem, Acad Sci USSR.

"Zhur Obshch Khim" 21, No 10.

Investigated binary systems Li_2Cl_2-$ZnCl_2$, Zn Ci_2-$ZnSO_4$ $ZnCl_2$, the latter system being irreversible with quil displaced in direction shown. Detected presence of 2 double compds. Determines and descusses fields of cr stn of solid phases. Discusses characteristics of systems.

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BERGMAN, A. G.

Chem (3)

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
General and Physical Chemistry

Crystallization volumes in the 5-complex mutual system of fluorides, chlorides, bromides, and iodides of potassium and sodium. A. G. Bergman, V. P. Radishchev, and N. S. Dombrovskaya. *Doklady Akad. Nauk S.S.S.R.* 77, 811-13 (1951).—Data were obtained on the crystn. temps. in this complex system and are presented in the form of a complex triangular prism, having a tetrahedron at each of its 2 ends, one representing the system Na||F,Cl,Br,I; the other K||F, Cl,Br,I (cf. *C.A.* 44, 9227*i*). Results were obtained for each of the 8 vertexes (pure components), 16 edges (binary mixts. of the type NaCl-NaBr), 8 triangular planes (ternary systems of the type Na||Cl,Br,I), 6 rectangular planes (ternary reciprocal systems of the type Na,K||Cl,Br), the 2 tetrahedral ends, and 4 quaternary prismatic inner surfaces of the type Na,K||Cl,Br,I. The interactions among the salts can be summarized by 3 equations: (1) KF + KCl + KBr + 3NaI = NaCl + NaBr + NaF + 3KI; (2) KF + KCl + NaBr + NaI = NaF + NaCl + KBr + KI; and (3) 3KF + NaCl + NaBr + NaI = 3NaF + KCl + KBr + KI.

Arild J. Miller

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2

State diagram of the binary system water-hydrogen peroxide. K. E. Mironov and A. G. Bergman. *Doklady Akad. Nauk S.S.S.R.* 81, 1081-3(1951).—The striking absence of solid soln. with ice has aroused doubts about the reality of the solid solns. of H_2O and H_2O_2 reported by Giguère and Maass (*C.A.* 34, 2968*). Reexamn. of the system revealed the absence of the solid soly. claimed by G. and M. Even a soln. contg. 1.0% H_2O_2 has distinct eutectic arrests both on cooling and on heating curves (−52.4°); consequently, solid soly. of H_2O_2 in H_2O, if it exists at all, cannot be more than 0.1% H_2O_2. A 97.4% soln. of H_2O_2 shows a distinct eutectic arrest (−55.3°) on both heating and cooling curves; therefore, solid soly. of H_2O in H_2O_2 cannot be more than a few tenths of a %. The existence of a compd., $2H_2O.H_2O_2$, m. −50.2° was confirmed; however, this compd. forms no solid solns. of any significant concn. with any component. The complete system consists of 4 branches, corresponding to ice, the compd. $2H_2O.H_2O_2$, and 2 forms of H_2O_2, with the latter 2 branches intersecting at −29°, 76.5% H_2O_2. This transition is not very marked, but is distinct enough to be undoubtedly real. If it were heteromorphous (of the 1st kind, with change of the crystal lattice), it should manifest itself in pure 100% H_2O_2 at the same temp.; if the transition is homeomorphous (of the 2nd kind, without change of lattice), it could be different in pure H_2O_2 and in H_2O_2-H_2O solns. Cooling and heating curves of 85–97% H_2O_2 solns. give eutectic arrests with 2 portions, the lower of which, almost horizontal, corresponds to eutectic crystn. or fusion at −55.7°, and the upper, sloping portion apparently corresponds to a transition of the 1st kind at about −51.0 to −51.5°. The positions of the 2 eutectic points, −52.5°, 46.1% H_2O_2, and −55.7°, 60.2% H_2O_2, are close to those reported by other authors. In the concn. range from 50 to 80% H_2O_2, the liquid solns. near the fusion curve show increased viscosity and a tendency to undercooling. The increased viscosity may possibly correspond to formation of compds. in the liquid phase. N. Thon

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USSR/Chemistry - Fluorine and Chlorine Compounds Jan 52

"Double Decomposition in the Absence of a Solvent. Complex Formation, Solid Solutions, and Double Decomposition in Melts of Calcium and Strontium Fluorides and Chlorides," G. A. Bukhalova, A. G. Bergman

"Zhur Obshch Khim" Vol XXII, No 1, pp 23-31

Constructed and investigated phase diagram of Ca, Sr-F, Cl system, consisting of 3 planes of cryst. of solid solns: Ca and Sr fluorides; Ca and Sr chlorides; and both complexes (incongruently melting $CaF_2.CaCl_2$ and congruently melting $SrF_2.SrCl_2$).

207T11

USSR/Chemistry - Fluorine and Chlorine Compounds (Contd) Jan 52

Comparison of results of this and former investigations showed general relationships between complex formation and double decompn for 3 mutual systems formed by fluorides and chlorides of Ca, Sr, and Ba.

207T11

BERGMAN, A. G.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A.

Chem (4)

hemical Abstracts
ol. 48 No. 5
ar. 10, 1954
eneral and Physical Chemistry

Solubility, viscosity, and specific gravity diagrams of the ternary system potassium iodide–potassium bromide–water at 0°, 15°, 35°, and 50°. S. M. Mukimov, R. I. Kapkaeva, and A. Bergman. *Trudy Inst. Khim. Akad. Nauk Uzbek. S.S.R.* 3, 58–66 (1952).—As a part of the investigation of the reversible reciprocal system KI + NaBr ⇌ KBr + NaI the soly., viscosity η, and sp. gr. of the ternary system KI–KBr–H_2O were detd. at 0, 15, 35, and 50°. The phase relations are given in triangular diagrams, and those of η and sp. gr. in rectangular. The ternary-phase equil. isotherms consist of 2 branches that meet at point *B* with 2 limited fields of solid solns. given for KI in wt. %: 0–95, 93.5–100; 0–13.5, 90.5–100; 0–19, 80.5–100; 0–26.1, 77–100, at 0, 15, 35, and 50°, resp. The isotherms for η and sp. gr. break sharply at *B*, forming max. The sp. gr., η, and the wt. % of KBr and KI at *B* are: 1.6596, 1.5197, 6.95, 83.57; 1.6980, 1.1984, 9.47, 83.03; 1.7442, 1.0000, 49.25, 34.70; 1.7628, 1.0030, 40.60, 57.14, at 0, 15, 35, and 50°, resp. The difference between the systems KCl–KBr–H_2O and KBr–KI–H_2O is considered remarkable in that the former gives continuous solid solns. from the freezing temp. −14.2 to 50° and higher (*C.A.* 37, 1323). This cannot be explained by the difference in ionic radii. **Solubility, viscosity, and specific gravity isotherms of the ternary system potassium bromide–sodium bromide–water at 0° and 25°.** S. M. Mukimov and R. I. Kapkaeva. *Ibid.* 67–74 (1952).—The isotherms of the ternary-phase equil. consist of two branches that meet at a point *B* the compn. of which in wt. % for KBr and NaBr are: 4.86, 41.05 and 7.07, 44.38, at 0 and 25°, resp. The only solid phases indicated by the tie lines are KBr and NaBr.$2H_2O$. The sp. gr. and η form sharp max. at *B* at: 1.5609, 4.6423 and 1.5778, 2.6234 at 0 and 25°. The satd. solns. from the above study were dild. with water 4:1, 2:1, and 1:1; and the sp. gr. and η were detd. The curves of these undersatd. solns. were parallel to those of the satd. solns. This suggests a *method for the detn. of η and sp. gr. of solns. [illegible]ous at satn.*

I. Bencowitz

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BEKHUL', S.I.; BERGMAN, A.G.

Systems: potassium nitrite - potassium nitrate and potassium nitrite - sodium nitrite. Izv.Sekt.fiz.-khim.anal. 21:172-177 '52. (MLRA 6:7)

1. Institut obshchey i neorganicheskoy khimii imeni N.S.Kurnakova Akademii nauk SSSR. (Systems (Chemistry)) (Nitrates) (Nitrites)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A.G.; BERUL', S.I.

Interrelation of sodium and potassium nitrates in fusions. Izv.Sekt.fiz.-khim.anal. 21:178-183 '52. (MLRA 6:7)

1. Institut obshchey i neorganicheskoy khimii imeni N.S.Kurnakova Akademii nauk SSSR. (Nitrates) (Solutions, Solid)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

Irreversibly reciprocal systems of sodium and potassium fluorides and chromates. [illegible] Dergunov and [illegible] Moscow [illegible] Akad. Nauk S.S.S.R. 21, 184- [illegible] NaF and KF form [illegible]

[illegible] the K_2CrO_4 contents are [illegible] 68.5 mol %, resp. Na_2CrO_4 and K_2CrO_4 form continuous [illegible] temp. min. 752° at 30 mol % K_2CrO_4. The diagram of Na_2F_2-K_2CrO_4 is stable. [illegible] intersecting at [illegible] eutectic [illegible] 30 mol % Na_2F_2. The [illegible] consists of [illegible] for each of the components and one [illegible] metathetic [illegible] intersects with the KF at [illegible]° and with the Na_2CrO_4 branch at [illegible]°. In addn. 14 internal cuts were studied and the data recorded. From all the data a projection was constructed of the crystal surface of $Na_2K_2F_2CrO_4$ with 50°

[illegible] The solid solns. of [illegible] chromates do not [illegible] reciprocal system [illegible]

[illegible] K chromates. These [illegible] crystal. Because of [illegible] eutectic [illegible] mol %. [illegible]

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A. G.

Irreversibly reciprocal systems of potassium and sodium sulfates and hydroxides. A. G. Bergman and V. A. Khitrov (N. S. Kurnakov Inst. Gen. Inorg. Chem., Acad. Sci. U.S.S.R., Moscow). *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei Neorg. Khim., Akad. Nauk S.S.S.R.* 21, 199-207(1952).—A phase diagram was constructed for this system using available and newly obtained data for binary systems within the quaternary system, data obtained for diagonal cuts, and for 9 internal cuts. On a liquidus surface projection there were 3 triple points, 2 of which are transition points and 1 a eutectic point. One of the transition points is at 435°. The compn. of the liquid phase at this point was: $(NaOH)_2$ 49.0, Na_2SO_4 41.3, and $(KOH)_2$ 9.7 mol.% and of the solid phase: Na_2SO_4, $Na_2SO_4 \cdot NaOH$, and $3K_2SO_4 \cdot Na_2SO_4$. The other transition point occurred at 319° at which the compn. of the liquid phase was: $(NaOH)_2$ 77.9, Na_2SO_4 18.3, and $(KOH)_2$ 3.8 mol.% and of the solid phase $3K_2SO_4$, $Na_2SO_4 \cdot NaOH$, and $3K_2SO_4 \cdot Na_2SO_4$. At the eutectic point which occurred at 281° the compn. of the liquid phase was: $(NaOH)_2$ 80.7, Na_2SO_4 16.3, and $(KOH)_2$ 3.0 mol.% and of the solid phase K_2SO_4, $Na_2SO_4 \cdot NaOH$, and NaOH. $Na_2SO_4 \cdot NaOH$, m. incongruently 480°, can be classed as an orthosulfate. The glaserite $K_2SO_4 \cdot Na_2SO_4$ formed below the decompn. temp. of solid soins. of sulfates.

M. Hoseh

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A. G.

Reciprocal system of sodium and zinc chlorides and sulfates. N. N. Evseeva and A. G. Bergman (N. S. Kurnakov Inst. Gen. Inorg. Chem., Acad. Sci. U.S.S.R., Moscow). *Izvest. Sektora Fiz.-Khim. Anal., Inst. Obshchei Neorg. Khim., Akad. Nauk S.S.S.R.* 21, 208-27(1952).—The purpose of this investigation was to study the effect of at. radii and generalized at. moments ($\mu = z/r$, where z is charge and r is radius of Na and Zn on the formation of kainite-type compds. in chloride-sulfate reciprocal systems. For Na the radius is 0.98 A. and the generalized moment is 1.02. For Zn it is 0.83 A. and 2.41, resp. Data obtained from studying the component systems, diagonal cuts, and internal cuts were used for constructing phase diagrams. Thermographic curves and photomicrographs were obtained for reaction products at various stages of the investigation. The assumed heat of the metathetic reaction in the system Na, Zn||Cl, SO_4 is very small (0.75 Cal. per 1 g. equiv.) so that the conditions are favorable for the formation of a hetero-ionic compd. of kainite type, e.g., $Na[ClZnSO_4]$, yet by expt. no such compd. was found. The liquidus surface consists of 10 crystn. fields of which 5 belong to compds. formed within this system: $ZnCl_2 \cdot 2NaCl$, $Na_2SO_4 \cdot ZnSO_4$, $Na_2SO_4 \cdot 3ZnSO_4$, $ZnCl_2 \cdot ZnSO_4$, and a triple hetero-compd. the compn. of which was not ascertained. $ZnCl_2 \cdot ZnSO_4$ could not be studied because of its hygroscopicity and its tendency to vitrify. The other compds. crystd. in low syngony and had double refraction and pos. extinction. The first 3 compds. were stable within wide temp. limits down to room temp.

M. Hosch

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Thermochemical Interrelation in ternary [illegible] [illegible] forming complexes [illegible]

[illegible] contrary to the direction indicated by the assumed thermo-chem. effect of the reaction [illegible]

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BERGMAN, A. G.

Rassonskaia, I. S., Bergman, A. G.- "Fusibility diagram of the ternary system: potassium fluoride-potassium chloride-potassium chromate." (p. 1089)

SO: Journal of General Chemistry, (Zhurnal Obshchei Khimii), 1952, Vol. 22, No. 7

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[illegible]

which the presence of LiCl decompd. the nitrates; conjugate liquid phases appear between 20 and 27% LiCl at 325 and 450°, and a cuteetle at 100° with $AgNO_3$ + $AgNO_3$ + $AgCl$. The liquidus of the [illegible]

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BERGMAN, A.G.

The saline lakes of the northwestern Aral Sea territory, the Plateau of Ustyurt, and the lower parts of the Amu-Dar'ya basin. A. G. Bergman, M. G. Valyashko, and I. B. Belgel'son. *Trudy Lab. Gidrogeokhimii, Akad. Nauk S.S.S.R.* 2, 17-67(1953).—Detailed description of each of the 30 lakes investigated is given, including drawings of the geol. formations and phase diagrams of the substances present, as well as the temp. and d. measurements, and chem. analyses of their water (ions HCO_3^-, SO_4^{--}, Cl^-, Br^-, $B_4O_7^{--}$, Ca^{++}, Mg^{++}, K^+; salts $Ca(HCO_3)_2$, $CaSO_4$, Na_2SO_4, $MgSO_4$, $MgCl_2$, NaCl, KCl, NaBr, $Na_2B_4O_7$) and coeffs. of metamorphisation, $K_{II} = Na_2SO_4/MgSO_4$ and $K_{VX} = MgSO_4/MgCl_2$. Coeffs. of K content, K_K = (wt. % K/wt. % Σ salts)·10^3, varying from 1.30 to 16.3, coeffs. of Br content, K_{Br} = wt. % Br/wt. % Σ salts, varying from 0.0 to 20.9, and coeffs. of B content, K_B = (wt. % B_4O_7/wt. % Σ salts)·10^3, varying from 0.07 to 5.98 are also given for all the lakes, as well as the quantity NaCl/Σ salts, which varies from 0.34 to 0.99. The lakes appear to be suitable for the development of salt industry. R. D.

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

BERGMAN, A.G.; BANASHEK, Ye.I.

Ternary reciprocal system of sodium and barium fluorides and chlorides. Izv.Sekt.fiz.-khim.anal. 22:196-206 '53. (MLRA 7:5)

1. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova Akademii nauk SSSR. (Fluorides) (Chlorides) (Systems (Chemistry))

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

RASSONSKAYA, I.S.; BERGMAN, A.G.

Melting diagrams of the ternary systems K_2SO_4-K_2CrO_4-KNO_3 and Na_2SO_4-Na_2CrO_4-$NaNO_3$. Zhur. Obshchey Khim. 23, 7-13 '53. (MLRA 6:3)
(CA 47 no.13:6238 '53)

1. Institut obshchey i neorganicheskoy khimii, Akademiya nauk S.S.S.R., Moscow.

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6

RASSONSKAYA, I.S.; BERGMAN, A.G.

Diagonal sections of the quaternary reciprocal system of sodium and potassium fluorides, chlorides, and chromates. Zhur.Obshchey Khim. 23, 14-20 '53. (MLRA 6:3)
(CA 47 no.14:6751 '53)

1. Inst.Gen. and Inorg. Chem., Acad. Sci., Moscow.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204910018-6"

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