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*Akad. Nauk. S.S.S.R.* 119, 745–8(1958).—Kazakov studied (1934–50) the marine-littoral origin of phosphorite deposits and tried to investigate the fundamental system $CaO$-$P_2O_5$-$NaCl$-$H_2O$ in the relation of the deposition of $P_2O_5$ and CaO as a function of the pH, starting from the $P_2O_5$ content of sea water. Shatskiĭ (1955) and Strakhov and Bushinskiĭ (1954) criticized the conclusions of Kazakov and emphasized that an examn. of the pptn. of apatite minerals is needed. Soly. detns. for the cryst. phases in the system $CaO$-$P_2O_5$-$H_2O$ were repeated for a const. NaCl content of 3.5% (at 20°). Considerably smaller vols. of the solns. were used than were used by Kazakov. The $P_2O_5$ contents dissolved as a function of pH, and the CaO contents of the solns. in equil. were found in a general agreement with Kazakov's data, but the graph representing CaO in soln. as a function of pH for various $P_2O_5$ concns. shows a striking contrast to Kazakov's conclusions. The CaO contents were much too low to correspond to the CaO in sea water. The apatite minerals in phosphorite minerals are characterized as (*1*) hydroxyapatite, $Ca_{10}P_6O_{24}(OH)_2$, which occurs in cavities of Podolian phosphorites, forming a continuous series of cryst. solns. with F apatite; (*2*) pure F apatite, $Ca_{10}P_6O_{24}F_2$, or F apatite mixed with carbonate-apatite, typical for the phosphorites of Kara Tau, the Siberian platform, and of the Balticum (all of these phosphorites show a certain metamorphism); (*3*) pure carbonate-apatite, $Ca_{10}P_6CO_{23}(OH)_2$, is only observed in Podolian phosphorites, (*4*) F carbonate apatite, $Ca_{10}P_6CO_{23}F_2$, was observed exclusively in phosphoritized wood, and a mixed F hydroxycarbonate-apatite in nodular phosphorites; (*5*) particularly interesting is the Na sulfate-apatite, $Ca_9NaSP_5O_{24}F_2$, mixed with carbonate-apatite in phosphorites of Seleuk, which occur in terrigenic carbonate sediments (Shatskiĭ, 1955). In the system $CaO$-$P_2O_5$-$NaCl$-$CO_2$-$H_2O$ the $P_2O_5$ content of the satd. solns. (at 20°) increases with increasing $HCO_3^-$ concn. This relation may explain the enrichment of phosphates in $HCO_3^-$-contg. marsh waters (cf. Gorshkova, *C.A.* 52, 10663*e*).

W. Eitel

**Microörganisms and the presence of syngenetic pyrite.** L. G. Love. *Quart. J. Geol. Soc. London* 113, 429–37, discussion, 437–40(1957) (Pub. 1958).—Pyrite granules ranging from about 2 to 30 μ in diam., found in certain beds of the Scottish Lower Carboniferous Oil Shale Group, have nonpyritous centers and a d. of 3.8–4.0 g./cc. compared to 4.8–5.1 g./cc. for normal pyrite. Isolation and treatment with $HNO_3$ reveals the presence of a hitherto unknown group of microfossils which may, through $H_2S$ production, have had an essential role in formation of the pyrite.

Donald L. Graf

**Properties of magnesite from the Talaya River deposits.** A. S. Berezhnoĭ. *Metody Issledovan. Mineral. Syr'ya, Vsesoyuz. Nauch.-Issledovatel. Inst. Mineral. Syr'ya* 1957, 122–9.—The magnesites, located in the Angara River basin in the Krasnoyarsk area, are of a coarse-grained yellowish white variety. They are found in the Proterozoic dolomites. Av. samples after ignition show MgO 97.5, $SiO_2$ 0.5, $Al_2O_3$ 0.5, $Fe_2O_3$ 0.6, and CaO 0.9%. Other properties: sp. gr. 2.99; average porosity 2%; compressive strength 740 to 1080 kg./sq. cm.; heat resistant to 2000°; grain size ranges from 0.5 to 3 mm. The caking qualities are somewhat inferior but can be easily improved by addns. The linear coeff. of expansion of pure sintered magnesite without addns. is $13.2 \times 10^{-6}$. Expts. are described on grinding, grading, sintering, and caking. Best sintering temp. is 1750°, or 1650° when addn. of ore (5%) is used. The study showed that the Talaya magnesite is a valuable raw material for manuf. of refractories.

B. N. Daniloff

**Sodium uranospinite.** E. V. Kopchenova and K. V. Skvortsova. *Proc. Acad. Sci. U.S.S.R., Sect. Geol. Sci.* 114, 529–31(1957) (English translation).—See *C.A.* 52, 989*c*.

B. M. R.

**Arshinovite—a new metacolloidal variety of zircon.** E. G. Razumnaya, G. A. Smelyanskaya, K. G. Korolev, and G. V. Pokul'nis. *Metody Issledovan. Mineral. Syr'ya, Vsesoyuz. Nauch.-Issledovatel. Inst. Mineral. Syr'ya* 1957, 45–50.—A peculiar zircon mineral was found in 1955 in northern Kazakhstan and later in other localities in sedimentary and igneous rocks. The new mineral was formed by coagulation from gels; as dehydration proceeded the mineral crystd. and acquired its present properties. The mineral is characterized by the scarcity or absence of well-developed cryst. form. Detailed microradiographic examn. showed that the mineral is radioactive and possesses interesting optical properties. Three varieties were observed, differing in morphological characteristics and phys. properties. The 1st one is found in phosphorites in finely divided form. It is soft and is of variable color and transparency; $n$ is 1.650–1.660 for the transparent variety and 1.664–1.700 for the semitransparent variety. It is isotropic. x-rays showed extremely fine structures; this variety may, therefore, be called metacolloidal. The 2nd variety occurs in the form of small rounded crystals several μ in diam. This microcryst. variety is regarded as the later stage of crystn. of the primary colloidal mineral. $n$ is 1.680–1.730; the interference color gray. It is assocd. with phosphate-bearing tuffs and tuffites. The 3rd variety consists of aggregates of bipyramidal crystals 0.01–0.03 mm. long. $n$ is 1.800; the interference colors are up to orange or red. It occurs in the cementing material of phosphate-bearing sandstones and conglomerates. Chem. analyses showed the following approx. compns. in wt. % for 1 sample of variety (1), one of variety (2), and 2 of variety (3), resp.: $ZrO_2$ 49.3, 55.12, 51.4, 57.1; $HfO_2$ —, 0.5, 0.1, 0.3; $SiO_2$ 24.7, 29.8, 25.6, 28.3; $H_2O$ 8.5, 5.7, 10.5, 5.4; U 0.6, 0.4, 0.5, 0.4. All varieties contain small amts. of $Al_2O_3$, $Fe_2O_3$, $K_2O$, and $Na_2O$. All are sol. in $HNO_3$; the 3rd variety is also sol. in dil. HCl. Known zircons are insol. The cryst. structure shows that the mineral is a variety of zircon, yet its morphological, phys., and chem. characteristics are different from those of zircon. It is also different geologically in that it is not related to any intrusive activity while zircon is a typical magmatic product. All this permits the conclusion that the mineral is a new, previously unknown variety of zircon. Because of its distinctive properties the authors urge its recognition as a new mineral, and propose to name it "arshinovite" in honor of the distinguished Russian geologist and mineralogist, V. V. Arshinov.

B. N. Daniloff

**Hydromagnesian minerals in the Aktovrak hyperbasic rock massif.** V. P. Eremeev. *Trudy Inst. Geol. Rudnykh Mestorozhdeniĭ. Petrog., Mineral. i Geokhim.* No. 10, 29–40 (1957).—The Aktovar massif is one of the largest serpentinized peridotite intrusions in western Tuva. Hydromagnesial veins are encountered filled with comparatively rare minerals, such as artinite, hydromagnesite, alpha-kerolite, dolomite, and calcite. These minerals were formed during late post-magmatic period by deposition from CaO- and MgO-rich solns. which entered through open cracks in the intrusion body. The action of Mg-rich solns. on calcite veins caused replacement of the calcite and formation of artinite. It can be assumed that the kerolite is a secondary mineral derived from dolomite.

B. N. Daniloff

**Two types of carbonate concretions of the Russian plain.** D. A. Vital. *Doklady Akad. Nauk S.S.S.R.* 115, 975–7 (1957).—The main components of the carbonate concretions are $CaCO_3$ and $FeCO_3$; $MgCO_3$ and $CaCO_3$ are present in a reverse ratio, e.g. the more is of one, the less is of the other one. All of them belong to the siderite group.

T. C.

**Details of asbestos formation in carbonate rocks of the Vangyrsk district in the Ural Mts.** G. F. Kuleshov. *Zapiski Vsesoyuz. Mineral. Obshchestva* 87, 373–9(1958).—The asbestos deposits occur in Proterozoic or Lower-Cambrian cryst. schists with calcareous and tuffaceous layers included, further in dolomitized limestones. Intrusions of diabase and granite, and a hematite ore deposit is related to the metamorphic sediments. The best asbestos fibers are found in the limestone country rock with a slight schistosity, in contact with talc-chlorite schists contg. steatite lenses. In the neighborhood of the asbestos veins the limestone is changed to a dense fine-cryst. dolomite contg. pennine, pyrite, and serpentine; chem. analyses of the carbonate rocks are given. The asbestos occurs in irregularly fissurated rocks, or in subparallel arrangement of the cracks filled with carbonate + asbestos, of a few mm. to 40 cm. in thickness and 4 to 8 m. in length. The mineral paragenesis is characterized by columnar carbonate portions (calcite, dolomite, aragonite), surrounded by fibrous asbestos, partly of rigid to brittle, partly of good elastic quality. Quartz, magnetite, and hematite are scarce accessories. The asbestos is a typical amphibole, in 2 modifications, one with parallel extinction, $\gamma = 1.620$; the other with an extinction angle $c:\gamma = 12$ and $\gamma = 1.606$ to 1.609; $\alpha = 1.579$ to 1.600. They are, therefore, of the character of anthophyllite and actinolite in their optical consts. but the chem. compn. calcd. from the analyses shows the 1st amphibole to be a tremolite high in CaO. Trace elements are V, Be, Ti, and Cu. An unusually long-fibrous asbestos (up to 30 cm.) is rather easily cleavable.

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Most of the asbestos is acid-resistant (soly. 5.5% to 6.8%); in weathered portions it is rather much decompd. by dil.HCl (14.3 to 30.4% sol.). The quality is about the same as that of the anthophyllite from Sysert. A comparison of the chem. analyses of the anthophyllite asbestos with other amphibole asbestos types is given. W. Eitel

**The solubility of calcium carbonate at higher temperatures.** Janine Rasumny (École normale supér., Paris). *Ann. inst. hydrol. et climatol.* 27, 147–151(1956)(Pub. 1958).—Samples of rock powder that passed a 0.5-mm. sieve were extd. with distd. water in a Soxhlet app. for 7 days. The obtained ext. from different carbonate rocks contained Ca in p.p.m.: marble 92.4, dolomite 85, aragonite 110, Barremian limestone 115, Urgonian limestone 105. S. Miholic

**Mineralogy and petrography of the Kara Bogaz Gol Gulf salt deposits.** V. A. Vakhrameeva. *Trudy Vsesoyuz. Nauch.-Isledovatel. Inst. Galurgii* 32, 67–86(1956).—Deposits of rock salt (halite), glauberite [$Na_2Ca(SO_4)_2$], and mixed salts, intercalated by layers of carbonate-gypsum rocks in the Kara-Bogaz Gol Gulf, were formed during 2 rises and 3 falls of the Caspian Sea level. The carbonate-gypsum series consist mainly of gypsum, either intercalated by, or mixed with, dolomite and magnesite. These were deposited during the periods of max. rise of the sea. The glauberite series is hard rocks contg. crystals of glauberite with small quantities of carbonate. This glauberite was deposited when the brine started to thicken in one of the following ways: seasonal deposition from the brine either by direct pptn., or by rapid crystn. of metastable $CaSO_4$, or by the reaction between dispersed gypsum and $Na_2SO_4$ soln.; early diagenetic changes of mirabilite (Glauber salt) and Na syngenite [$Na_2Ca(SO_4)_2.2H_2O$]; pptn. from soln. contained previously in the underlaying carbonate-gypsum rocks. Halite occurs in layers more or less pure, or is mixed with astrakanite [$Na_2Mg(SO_4)_2.4H_2O$] and epsomite ($MgSO_4.7H_2O$). During the max. drying out period in the Kara Bogaz Gol, deposition took place in the following order: halite, astrakanite, and sometimes epsomite. Astrakanite was formed also by diagenetic processes. 5 references. V. B.

**Optical calcite deposits in Park and Sweet Grass counties, Montana.** W. C. Stoll and Frank C. Armstrong. *U.S. Geol Survey, Bull.* No. 1042-M, 431–79(1958).—The calcite occurs as thick massive veins, as branching smaller veins, or as stockworks of veinlets. Some veins are several thousand feet long and up to 20 feet wide. The crystals formed in vugs and are mostly rhombohedrons and scalenohedrons, and were probably deposited by hot springs similar to the present springs in the area. W. L. Cheesman

**Thenardite and mirabilite in Lake Marfovka.** A. M. Ponizovskiĭ, S. D. Shargorodskiĭ, S. M. Stavrov, and N. M. Vladimirova. *Dopovidi Akad. Nauk Ukr. R.S.R.* 1958, No. 6, 651–3(Russian summary).—Thenardite crystn. was discovered in Lake Marfovka (Crimea) in the summer of 1957. In connection with changes in the meteorological conditions in autumn, the thenardite ($Na_2SO_4$) was converted into mirabilite ($Na_2SO_4.10H_2O$). The lake bottom was covered with a 2–3-mm. layer of mirabilite. Druses of large crystals, 7–8 cm. in length and up to 1.5 cm. wide, were discovered in some parts of the lake. The chem. analysis of the lake brine and salts showed the presence of NaCl, $MgSO_4$, $Na_2SO_4$, $CaSO_4$, $Ca(HCO_3)_2$, and an undissolved residue. T. Cheron

**Structure of vanadinite.** J. Trotter and W. H. Barnes (Natl. Research Council Can., Ottawa). *Can. Mineralogist* 6, 161–73(1958).—Crystals from the Apache Mine near Globe, Arizona, were studied. Vanadinite is hexagonal, space group $P6_3/m$, with $a$ 10.331, $c$ 7.343 ± 0.001 A., d. 6.816 g./ml., Z = 2. Two-dimensional Fourier syntheses show the structure to be like that of fluorapatite. Each Cl is surrounded by 6 Pb with Pb-Cl distance 3.17 A. The VO4 groups are isolated tetrahedra with V-O 1.76 and 1.72 A. Each Pb is surrounded by 9 O at 2.47, 2.57, and 2.76 A. Michael Fleischer

**Formation mechanism of ferritungstite.** B. S. Khristoforov. *Zapiski Vsesoyuz. Mineral. Obshshestva* 84, No. 1, 90–5(1955).—Three chem. analyses of ferritungstites and the soly. of Fe and Mn salts is studied. K. finds that during weathering the Fe content of ferritungstites increases and the Mn content decreases. On the basis of the analyses the formula is written $Fe_2O_3.WO_3.nH_2O$ rather than with $6H_2O$. The presence of considerable amts. of Mn in all samples is emphasized. A. Volborth

**Parallel growths of xenotime and zircon from Drahonin.** Petr Černy (Masaryk Univ., Brno, Czech.). *Publs. fac. sci. univ. Masaryk* No. 376, 27–40(1956)(English summary); cf. *C.A.* 51, 4221*b*.—Parallel growths from a pegmatite are described. The xenotime is uniaxial, pos., $n\ \omega$ 1.721. Qual. spectrographic analyses are given of zircon, xenotime, and spessartite garnet. Michael Fleischer

**The relation between coeruleolactite, planerite, turquoise, alumochalcosiderite, and chalcosiderite.** Emil Fischer (Humboldt-Univ., Berlin). *Beitr. Mineral. u. Petrog.* 6, 182–9(1958).—X-ray powder diagrams and chem. analyses indicate that coeruleolactite, planerite, turquoise, alumochalcosiderite, and chalcosiderite are structurally and chemically closely related. The general formula is $M^{++}M_6^{+++}(OH)_8(XO_4)_4.4\text{-}5H_2O$, where $M^{++}$ = Ca, Cu, Mg, Fe; $M^{+++}$ = Al, Fe; and X = P, As. The white coeruleolactite of Katzenellenbogen appears to be composed of five parts of a pure Ca-Al phosphate corresponding to turquoise and one part of an Alhydroxide. Variations in the $d$ values and intensities of Debye-Scherrer lines are conditioned through the partial replacement of the bivalent, trivalent, and perhaps the quinquevalent ions among one another. Planerite from the Tschornaja River, coeruleolactite from Chester County, Pa., and Katzenellenbogen are Ca-rich and Cu-poor turquoise. Turquoise from Mühlleithen, Chorassen (Persia), Kings River (U.S.A.), and Jordansmuhl (Silesia) are almost pure Cu turquoise; that from Ölsnitz in Vogtland is intermediate. Alumochalcosiderite from Vogtland in a solid soln. of turquoise and chalcosiderite. The chalcosiderates examd. contain some $Al_2O_3$ and $Fe_2O_3$. The As content in turquoise and chalcosiderite of Mühlleithen is too slight to have an appreciable influence on the lattice dimensions. George H. Chase

**Preliminary note on kimzeyite, a new zirconium garnet.** Charles Milton and Lawrence V. Blade (U.S. Geol. Survey, Washington, D.C.). *Science* 127, 1343(1958).—A new garnet, contg. >10% $ZrO_2$, was found assocd. with monticellite, magnetite, perovskite, apatite, and other minerals in the Kimzey calcite quarry at Magnet Cove, Ark. The cell edge is $a_0$ = 12.46 A. The garnet in thin section is isotropic, with $n_D$ = 1.95. Walter R. Averett

**Sodium sulfate deposits in U.S.S.R.** A. I. Dzens-Litovskiĭ. *Trudy Vsesoyuz. Nauch.-Isledovatel. Inst. Galurgii.* 32, 87–101(1956).—$Na_2SO_4$ in the U.S.S.R. occurs in 4 mineral species: thenardite, $NaSO_4$ (the most important mineral); mirabilite (Glauber salt), $Na_2SO_4.10H_2O$; astrakanite, $Na_2SO_4.MgSO_4.4H_2O$ (abundant in lake deposits); and glauberite, $CaSO_4.Na_2SO_4$. All these minerals occur in 3 main geol. types of deposits: deposits of former geol. periods, buried under a cover of sedimentary rocks or of weathering products; sea deposits, inner seas whose water may serve as $Na_2SO_4$ raw material (Caspian and Aral sea); lake deposits, recent lakes, which ppt. $Na_2SO_4$ either permanently or periodically. There are also 3 types of deposits of hydrogeol. orgin, i.e. types of sulfatic water and brines: underground, carstic, and intercryst. (fossil brines). The geographical distribution of the $Na_2SO_4$ deposits is very irregular. The main industrial deposits are found in western Siberia and in the Caspian, Aral, and Balkhash districts. Deposits of local significance are found on the Caucasus, in the Lower Volga valley, in the Minusinsk basin, and Dauria. At present natural $Na_2SO_4$ is exploited only from deposits of the lake and hydrogeol. (intercryst.) type. Exploitation of other deposits (Siberia, Middle Asia, Carpathian Promontory) is also planned for the near future. 32 references. V. Boskovitz

**Natural alums of San Juan: their chemical composition.** Luis Rovira. *Ind. y quim.* (Buenos Aires) 18, 504–8, 515, 520(1958).—The alum deposits of San Juan are often assocd. with magnesian deposits; in many instances pickeringites were derived from $MgSO_4$. The most important deposits are those of Tontal and Quebrada de la Alumbrera. About 171 mines were listed in 1946. Most of the alum occurs in surface deposits, pockets, and veins. Various types of host rocks are found, but the principal type in the zone of Tontal is aluminiferous schists. An analysis of a typical gang is (by weight) loss on heating to 1100° 13.38, $SiO_2$ 51.88, $Al_2O_3$ 20.64, $Fe_2O_3$ 9.21, NiO 0.046, $P_2O_5$ 0.72, Mn 0.16,O CaO 0.40, MgO 1.63, alkalies and undetd. 1.63%. A phys. analysis of the gang: liquid limit 52.40; plasticity index 18.10; contraction limit 26.6; contraction relation 1.69; volumetric change 51; lineal contraction 12.80. A representative analysis of the various alums indicates a probable compn. of $Al_2(SO_4)_3$ 27–36, $MgSO_4$ 10–22%, and more widely