24(6), 24(1)

AUTHOR: Brekhovskikh, L.M.

TITLE: On the Propagation of the Rayleigh Surface Waves Along a Rough Boundary of an Elastic Body (O rasprostranenii poverkhnostnykh releyevskikh voln vdol' nerovnoy granitsy uprugogo tela)

SOV/46-5-3-3/32

PERIODICAL: Akusticheskiy zhurnal, 1959, Vol 5, Nr 3, pp 282-289 (USSR)

ABSTRACT: This paper was presented at the IV-th All-Union Conference on Acoustics in 1958. The author deals with propagation of Rayleigh waves along a "rough" surface and calculates attenuation due to scattering on the non-uniformities of this surface. These non-uniformities are treated collectively and scattering on a single non-uniformity is not discussed. The heights of the non-uniformities are assumed to be small compared with the Rayleigh wavelength. It was found that, even if the non-uniformities were small, attenuation was strong at certain values of the space period of the non-uniformities. This can be seen clearly in Fig 2 where the results obtained for aluminium (curve 1), the earth's crust (curve 2) and steel (curve 3) are plotted; the ordinate represents γ, which is proportional to the attenuation coefficient, and the abscissa

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$x_3 = 0$ furnish the connection between the amplitudes A and B, i. e. the equation $2ip\beta B = (2p^2 - \varkappa^2)A$, and an equation for the determination of p and, consequently, also of the velocity of the Rayleigh-waves $(2p^2 - \varkappa^2)^2 - 4p^2\alpha\beta = 0$. The equation of the uneven surface is given in the form $x_3 = f(x_1, x_2)$. The solid is to take up the half-space $x_3 > x_3$. The following is further assumed: a) The depth of the uneven places is small against the length of the Rayleigh-wave. b) The surface has only slight inclinations. In this case it is best to solve the problem by the method of successive approximations on the assumption that in zero-th approximation an undamped surface wave propagates along a plane wave. At every point of the uneven surface a local system of coordinates x_1', x_2' and x_3' is introduced in such a manner that the x_3'-axis is directioned along the inner vertical to the surface. The directions of the axes x_1' and x_2' then differ only little from

24(4)
AUTHOR: Brekhovskikh, L. M., Corresponding Member, AS USSR

SOV/20-124-5-16/62

TITLE: On the Damping of Rayleigh-waves During Propagation Along an Uneven Surface (O zatukhanii releyevskikh voln pri rasprostranenii vdol' nerovnoy poverkhnosti)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 5, pp 1018-1021 (USSR)

ABSTRACT: A Rayleigh-wave is damped during propagation along an uneven surface by scattering on uneven places. The present paper gives a short report on the results obtained by calculating the damping coefficient. These results are of interest in seismology and acoustics, where ultrasonic Rayleigh waves are used. In the case of a plane boundary the potentials of the Rayleigh-wave are $\varphi = Ae^{ipx_1 - \alpha x_3}$, $\psi = Be^{ipx_1 - \beta x_3}$; here the factor $e^{-i\omega t}$ is always tacitly assumed and it holds that $\alpha^2 = p^2 - k^2$, $\beta^2 = p^2 - \varkappa^2$, $k^2 = \varrho\omega^2/(\lambda + 2\mu)$, $\varkappa^2 = \varrho\omega^2/\mu$. In this connection the rectangular system of coordinates x_1, x_2, x_3 is used. The boundary conditions on the free surface

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On the Damping of Rayleigh-waves During Propagation Along an Uneven Surface

SOV/20-124-5-16/62

The resulting damping coefficient δ is the sum of the partial damping coefficients. A diagram graphically shows the results obtained by calculating the damping coefficient for the earth crust, for steel, and for aluminum. There are 1 figure and 3 Soviet references.

ASSOCIATION: Akusticheskiy institut Akademii nauk SSSR (Acoustics Institute of the Academy of Sciences, USSR)

SUBMITTED: November 12, 1958

Card 4/4

the directions of the axes x_1 and x_2. If the tensions $\sigma_{3i}(0)$ disappear in zero-th approximation, there are tensions in this plane in first approximation, which have the same order of smallness as ζ. These additional minor tensions will cause scattered waves by which also the damping of the Rayleigh-waves is caused. The function $\zeta(x_1, x_2)$ is to be representable as a Fourier series: $\zeta = \sum_{m,n=-\infty}^{+\infty} \zeta_{mn} e^{i(mg_1 x_1 + ng_2 x_2)}$. To each pair of numbers there corresponds a scattered wave; the corresponding scalar potentials and vector potentials are given. For the determination of the damping coefficient of the Rayleigh-wave it is necessary to calculate the energy conveyed away from the boundary by the scattered wave in order then to compare it with the energy of the main wave. Also a "partial damping coefficient" is defined, which is due to the energy conveyed into the scattered wave with the number mn. Further, a (rather long) expression is written down for this partial damping coefficient δ_m for the most simple case of a onedimensional unevenness.

82725
S/046/60/006/003/001/012
B006/B063

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AUTHORS: Brekhovskikh, L. M., Yeliseyevnin, V. A.

TITLE: Wave Propagation in a Non-homogeneous Waveguide

PERIODICAL: Akusticheskiy zhurnal, 1960, Vol. 6, No. 3, pp. 284-291

TEXT: Special attention has been devoted in recent years to the propagation of electromagnetic and sound waves in natural waveguides over long distances. A theory of natural waveguides has also been developed, but only for homogeneous ones, i.e., waveguides whose properties remain unchanged along the line on which the waves propagate. Over distances between 1,000 and 10,000 km this assumption is hardly realized in nature. Real non-homogeneous waveguides offer a complicated problem which can be solved only by approximation methods. Exact solutions are only possible in very simple special cases. Such a case is studied in the present paper, and the exact solution is analyzed. The authors proceed from the assumption that the line of the waveguide is, for the major part, homogeneous, and that only a certain part, which is sufficiently distant from the wave source, has a transition zone of the length 2L, within which the properties of

Card 1/3

BREKHOVSKIKH, Leonid Maksimovich

Acceleration of about 1,000 g. Izobr.i rats. no.1:19-20 Ja '60. (MIRA 13:4)

1. Direktor Akusticheskogo instituta, chlen-korrespondent AN SSSR.

(Ultrasonic waves)

Wave Propagation in a Non-homogeneous Waveguide

82725

S/046/60/006/003/001/012
B006/B063

$dz/dx = \tan\chi = \sqrt{\left(\frac{1-a}{ch^2 z/H} + a - m^2\right)/(b\ thx/L + m^2)}$, where m is a function of the angle χ_0 which indicates the direction in which the ray is emitted from the source. (24) leads to equation (26) for the ray. Equation (24) is finally discussed. There are 3 figures and 6 references: 5 Soviet and 1 US.

ASSOCIATION: Akusticheskiy institut AN SSSR Moskva
(Institute of Acoustics of the AS USSR, Moscow)

SUBMITTED: May 25, 1960

Card 3/3

the waveguide may change. As usual, the wave field in the homogeneous part is given by the superposition of the normal waves. In the transition zone, the shape of the waves may change and the waves may be reflected partly or completely. Furthermore, 2L is assumed to be small as compared to the distance between the source and the transition zone, so that a divergence of the wave front in the horizontal direction within this zone is negligible. The line is assumed to be perpendicular to the transition zone. These assumptions make it possible to study the problem as a two-dimensional one. This two-dimensional problem is further specialized. The following relation is assumed to hold for the square of the wave number in the medium: $k^2(x,z) = k_o^2 \left[(1-a)/ch^2 \frac{z}{H} + b\ th\ \frac{x}{L} + a\right]$. If $0 < a < 1$, the axis of the waveguide is in the plane $z = 0$. Within the range $|x| \gg L$ the waveguide is homogeneous, and $|x| \ll L$ corresponds to the transition zone (Fig. 1). A differential equation is derived for the sound potential $\psi(x,z)$. It can be solved by separating the variables $[\psi(x,z) = X(x)Z(z)]$. Next, expressions are given for the reflection coefficient and the phase and group velocities. Finally, the problem is considered from the viewpoint of ray theory, and the following relation (24) is derived for the direction of the ray to the plane $z = 0$:

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which axis coincides with the level of the minimum velocity of propagation. In the tropical oceanic zones this level is at a depth of 1000 to 1500 m, and decreases with increasing latitude. In the north it is near the surface. In the atmosphere the natural wave guide is at a height of 15 to 30 km and extends in height over some 10 km. Although these wave guides are of different nature, the same physical rules nevertheless apply to them; the latter are in the following dealt with separately for oceans and the atmosphere, and are discussed in detail. First of all, the acoustic conditions of the oceans, which may be somewhat more easily analyzed, are dealt with on the basis of del Grosso's formula, which represents the velocity of sound as a function of temperature, salt content, and depth (hydrostatic pressure). For the Atlantic, for instance, the sound velocity minimum for a depth of 1500 m is at $35^{\circ}56'$ north latitude, $69^{\circ}00'$ west longitude - i.e. the axis of the sound channel is at this depth. The damping coefficient is $\alpha = 0.036\ f^{3/2}$, which is very small (f is the

S/053/60/070/02/008/016
B006/B007

AUTHOR: Brekhovskikh, L.

TITLE: The Long-range Propagation of Sound and Infrasoundwaves in Natural Wave Guides

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 2, pp 351-360 (USSR)

ABSTRACT: The present article is the reproduction of a lecture delivered at the 3. International Acoustics Conference held at Stuttgart (Western Germany) in September 1959. The author speaks about the propagation of sound in the oceans and in the atmosphere, which, thanks to the natural wave guides, may extend over long distances. Thus, the sound of an under-water explosion of several kilograms of trinitrotoluene may propagate over a distance of 5 - 6000 km. Natural wave guides are so-called sound channels, which are a result of the specific dependence of sound velocity on the vertical coordinate. The relative change in velocity is, in itself, not great (15% in the ocean, 30% in the air), but it is nevertheless responsible for the fact that sound waves are able to propagate over large distances. The most favorable conditions for propagation prevail when the sound source is near the axis of such a channel,

sequence of regular oscillations. Yu. L. Gazaryan and K. I. Balashov are mentioned. There are 11 figures and 12 references, 9 of which are Soviet.

frequency of sound in kc/sec). With f = 50 c.p.s., sound intensity under these conditions decreases to 1/10 only after 26000 km. For several simple cases the sound wave patterns are constructed and discussed. In the atmosphere the velocity of sound may be represented with sufficient accuracy by the formula $c(z) = 20.1\sqrt{T(z)}$ m/sec; $T(z)$ is the absolute air temperature at the altitude z. A $T(z)$-curve, which was drawn in the USSR by means of data supplied by meteorological rockets, is shown by figure 6. The temperature curve has two minima, one at a height of 15 and one at a height of 80 km, which means that two propagation velocity minima exist and thus also two wave guide levels. Figure 8 shows the corresponding sound wave pattern. The sound absorption coefficient is $\alpha = 30.1\ s/\lambda^2$, where λ denotes the wavelength and s, the free length of path. (At a height of 120 km $s \approx 60$ cm). In the last part of this paper the variations of the form of a sound impulse occurring at large distances are briefly dealt with. They consist essentially in the fact that a short-lived sound impulse (e.g. originating from an explosion) at a large distance occurs in the form of a longer

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B019/B077

Vertical Profile of Sound Propagation Velocity in the Ocean

when there are sharp deviations of the dc/dz gradient. The new method is advantageous through these parameters used to analyze accustic processes. The authors were able to determine two types of vertical distributions of the sonic velocity in a 10 degree square of the North-west Atlantic. The warm Gulfstream influences the first distribution type and can be divided into five layers. The cold Labradorstream influences the other distribution type and can be divided into four layers. Fig. 2 shows both distribution types. The authors thank V. Ya. Tolkachev, G. I. Merinova, N. P. Markova, and N. A. Smirnova for the calculations done. The Gosudarstvennyy okeanograficheskiy Institut (State Institute of Oceanography) is mentioned. Legend to Fig. 2: A is the first type of the velocity distribution and B the second. There are 2 figures and 4 Soviet references.

ASSOCIATION: Akusticheskiy institut Akademii nauk SSSR (Institute of Acoustics of the Academy of Sciences, USSR)

SUBMITTED: August 20, 1960

Card 2/3

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S/020/60/135/003/020/039
B019/B077

6.8000 (3201, 1099, 1162)

AUTHORS: Brekhovskikh, L. M., Corresponding Member of the AS USSR, Yevtushenko, V. A., Makarov, S. S., and Pisarenko, V. F.

TITLE: Vertical Profile of Sound Propagation Velocity in the Ocean

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 3, pp. 581-583

TEXT: The authors describe a new method of determining the sonic velocity in dependence of the depth of the ocean, using the so-called "characteristic points". The ocean depth is divided into a certain number of layers, taking their physical and chemical characteristics into account. Each curve which characterizes the mutual dependence of sonic velocity and ocean depth is approximated by a broken line, where the dc/dz gradient is constant within each individual layer (c is the sonic velocity, z is the ocean depth). The salient points of this curve are the characteristic points in the c-z plane, for which the mean depth and the sonic velocity are determined. By changing in time the curve c = c(z), a family of curves is obtained which describe the actual conditions much better especially

Card 1/3

BREKHOVSKIKH, L.M.

Notes on acoustical activity in the United States. Akust. zhur. 7 no.1:109-114 '61. (MIRA 14:4)
(United States--Sound)

BREKHOVSKIKH, Leonid M.

"Waveguides in inhomogenous media."

report to be ~~presented~~ submitted for the Intl. Colloquium on the Propagation of Shocks in Heterogeneous Media, Nat. Center of Sci. Res. , Marseilles, France, 11-16 Sep 1961.

Inst. of Acoustics, Acad. Sci. USSR

BREKHOVSKIKH, L.M.

Sound reveals the mysteries of the ocean. Priroda 52 no.6:65-70 '63. (MIRA 16:6)

1. Akusticheskiy institut AN SSSR, Moskva; Chlen-korrespondent AN SSSR.
(Oceanographic research) (Echo sounding)

BREKHOVSKIKH, L. M. and MIKHALTSEV, I. Ye.

"Acoustics and oceanology"

report submitted for the 4th Intl. Congress of Acoustics, Copenhagen, Denmark, 21-28 Aug 1962.

Acoustical Institute of Sciences, of U.S.S.R., Moscow.

L 64314-65 EED(b)-3/EWT(1)/ETC(m) IJP(c) WW/MJW(BH)
ACCESSION NR: AP5013700 UR/0046/65/011/002/0148/0159

AUTHOR: Brekhovskikh, L. M. 55,44

TITLE: The average field in an underwater sound channel

SOURCE: Akusticheskiy zhurnal, v. 11, no. 2, 1965, 148-159

TOPIC TAGS: underwater acoustics, sound propagation, acoustic field

ABSTRACT: A distribution law, valid at sufficiently large distances, is found for the acoustic intensity in the cross section of an underwater sound channel. The main purpose of the investigation was to determine the acoustic intensity averaged over some region of space, with the fine interference structure smeared out. The theoretical analysis is based on the ray representation and consists of incoherent summation of the fields due to the individual rays or normal modes. The concept of a characteristic distance defining the acoustic intensity at specified levels of transmission and reception is

Card 1/2

BREKHOVSKIKH, L.M.

An asymptotic law governing wave propagation in natural wave guides. Akust. zhur. 10 no.1:114-116 '64.

(MIRA 17:5)

1. Akusticheskiy institut AN SSSR, Moskva.

BREKHOVSKIKH, L. M.

Role of acoustics in studying the ocean. Izv. AN SSSR. Fiz. atm. i okeana 1 no.10:1050-1064 O '65. (MIRA 18:10)

1. Akusticheskiy institut AN SSSR.

L 64314-65

ACCESSION NR: AP5013700

analyzed. The sound velocity profile is determined by piecewise linear approximation. Simple examples of sound channels are examined, and the averaged field in a two-channel system is determined. Orig. art. has: 7 figures and 33 formulas.

ASSOCIATION: Akusticheskiy institut AN SSSR, Moscow (Acoustics Institute, AN SSSR)

SUBMITTED: 09Jul64 ENCL: 00 SUB CODE: GP

NR REF SOV: 004 OTHER: 000

Card 2/2

L 40000-66

ACC NR: AP6006131

cient of 10^{-6}/m. 3) scattering of sound waves depends on the nature of the ocean bottom. Orig. art. has: 21 formulas, 15 figures.

SUB CODE: 08,20/ SUBM DATE: 25Jun65/ ORIG REF: 012/ OTH REF: 003

Card 2/2 11b

L 40000-66 EWP(1)/EWT(m)/EWP(w) IJP(c) WW/RM/GS/GS

ACC NR: AP6006131 (N) SOURCE CODE: UR/0362/65/001/010/1050/1064

AUTHOR: Brekhovskikh, L. M.

ORG: Acoustics Institute, Academy of Sciences, SSSR (Akusticheskiy institut, Akademiya nauk SSSR)

TITLE: Role of acoustics in ocean research

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 10, 1965, 1050-1064

TOPIC TAGS: ocean acoustics, sound wave, sound propagation, underwater sound equipment

ABSTRACT: Several parameters connecting acoustics and oceanology are discussed and analyzed for the purpose of determining the extent to which acoustical methods can be applied in oceanography. The following points are discussed: the investigation of sound-scattering layers, investigation of ocean bottoms, and the relation of a sound field to the hydrological features. A case where the sound velocity profile and the ocean depth are a function of x and y was investigated. An equation of sound pressure, as a function of the proper functions of a waveguide, was derived and solved using equations of geometrical acoustics. The data show that 1) for a charge of 300 g, an air bubble 1 mm in diameter at 100 m depth can be detected at a distance of 1 km; 2) for a frequency of $5 \cdot 10^3$ cps, a layer located at 400 m depth has a scattering coeffi-

Card 1/2 UDC: 551.463.2

ACC NR: AP6032074 (N) SOURCE CODE: UR/0362/66/002/009/0970/0980

AUTHOR: Brekhovskikh, L. M. 25

ORG: Acoustics Institute, Academy of Sciences, SSSR (Akademiya nauk SSSR. Akusticheskiy institut)

TITLE: Underwater sound waves in the ocean generated by surface waves

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 2, no. 9, 1966, 970-980

TOPIC TAGS: sound wave, hydrodynamics, surface wave, ~~ocean wave~~

ABSTRACT: It is shown that interacting surface waves can generate sound waves in a volume of fluid. The theory of this phenomenon is based on the solution of hydrodynamic equations, taking nonlinear terms into account. Calculations are given for two harmonic surface waves as well as for the continuous spectrum waves. The direction properties of radiated sound waves and their statistical characteristics are considered. It is possible that an essential part of low-frequency ambient noise in the ocean is due to this phenomenon, though the definite conclusions could be hardly made at the present time because of the lack of data on the sea surface-wave spectra. Orig. art. has: 56 formulas.

SUB CODE: 08/ SUBM DATE: 11Apr66/ ORIG REF: 004/ OTH REF: 006

Card 1/1 hdc UDC: 551.463.288

L 07875-67 EWT(1) GW

ACC NR: AP6029537 (A, N) SOURCE CODE: UR/0046/66/012/003/0374/0376

AUTHOR: Brekhovskikh, L. M.

ORG: Acoustic Institute, AN SSSR, Moscow (Akusticheskiy institut AN SSSR)

TITLE: Surface waves in a solid body

SOURCE: Akusticheskiy zhurnal, v. 12, no. 3, 1966, 374-376

TOPIC TAGS: surface wave, Rayleigh wave, curved profile, boundary problem, mathematic analysis, wave equation

ABSTRACT: A mathematical analysis of surface waves in a solid body was made. Convex boundaries contain surface waves which are different from Rayleigh waves, having shear components confined to curved boundaries and longitudinal components similar to Rayleigh waves. Calculations were made on solid cylinders of radius R, assuming that the wave function does not depend on the y coordinate--the direction along the cylinder axis. Two cases were considered. In the first, the displacement u was parallel to y ($u_y \equiv u$), while in the second, u lay in the rv plane, where r and v are the polar coordinates in the plane normal to the k axis. Wave equations, in complex form, are given for both cases and were solved by introducing Airy functions. The boundary condition for the first case was $u = 0$. The depths of wave penetration were calculated

Card 1/2 UDC: 534.231.1-16

L 07875-67
ACC NR: AP6029537

and the surface wave velocity was found greater than the shear wave velocity. The boundary condition $r = R$ applied to the second case. Here, the solution of the Airy equations showed that the waves had a phase velocity greater than the shear wave velocity. Furthermore, these waves had two components: a) a shear component confined to the curved boundary and penetrating deeply; b) a Rayleigh type longitudinal component. Some calculations were made for the case of a heterogeneous solid. All of the mathematical results could be applied to the spherical case if R is designated as the radius of the sphere. Orig. art. has: 17 formulas.

SUB CODE: 20,12/ SUBM DATE: 18Apr66/ ORIG REF: 004

Card 2/2 bo

L 06238-67 EWT(1) IJP(c) GW

ACC NR: AP6029538 (A,N) SOURCE CODE: UR/0046/66/012/003/0376/0379

AUTHOR: Brekhovskikh, L. M.

ORG: Acoustics Institute AN SSSR, Moscow (Abusticheskiy institut AN SSSR)

TITLE: Generation of sound waves in a liquid by surface waves

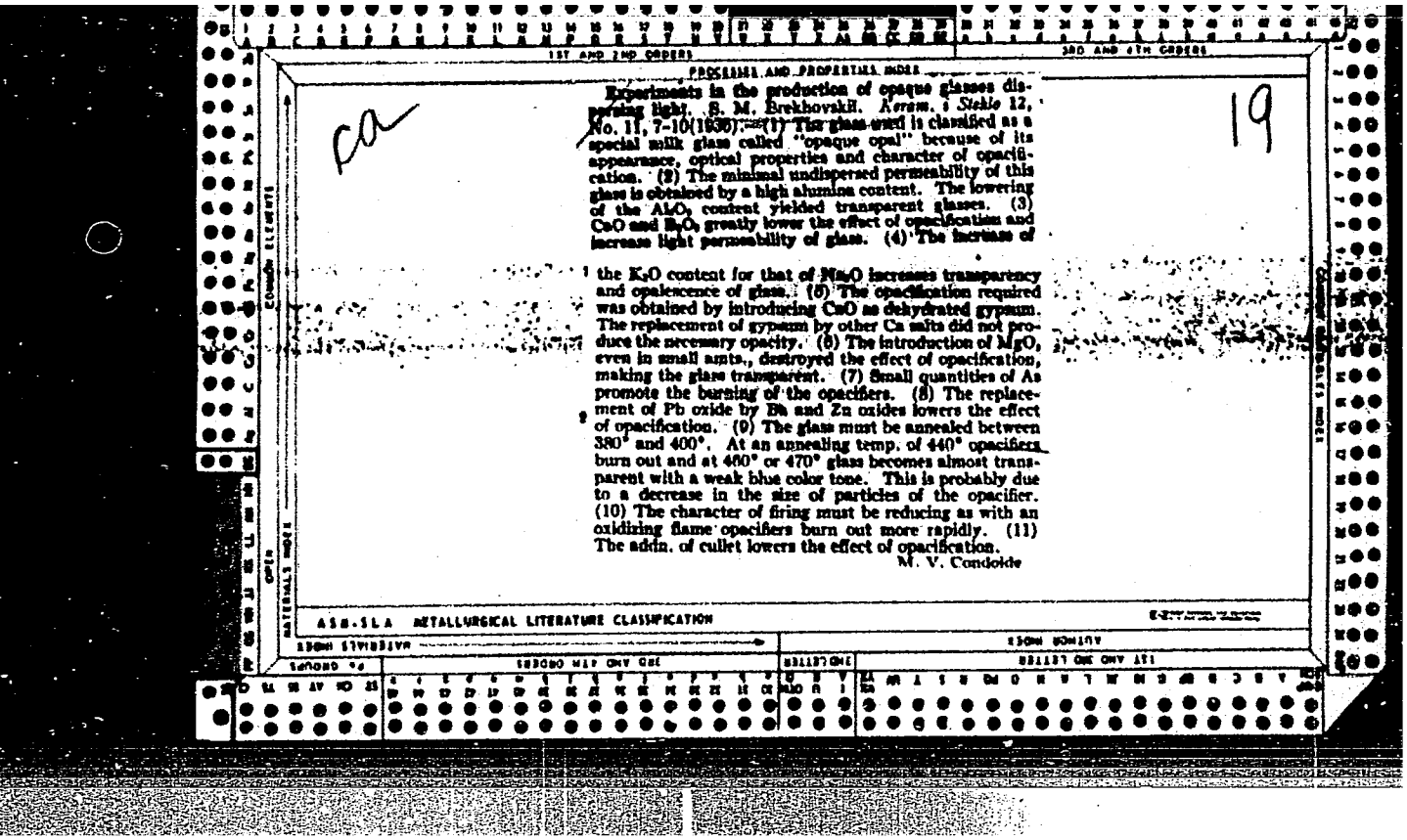
SOURCE: Akusticheskiy zhurnal, v. 12, no. 3, 1966, 376-379

TOPIC TAGS: gravitation wave, sound wave, surface tension, sound propagation, acoustic noise

ABSTRACT: An effort is made to fill certain gaps in the theory of the propagation of sound waves of substantial amplitude generated by the nonlinear interaction of surface waves. The author investigates the generation of sound waves by surface waves with a continuous spectrum, taking into account the effect of surface tension. The formulated theory indicates that a certain portion of observed underwater sounds in the ocean may be due to surface phenomena. In order to confirm this, it is necessary to investigate the two-dimensional spectrum of surface disturbances which have not been studied to any appreciable extent in the past. Rough estimates show that acoustic noises in the ocean produced by surface disturbances may be quite substantial at certain frequencies and may be further amplified by reflection from the ocean bottom. Orig. art. has: 13 formulas.

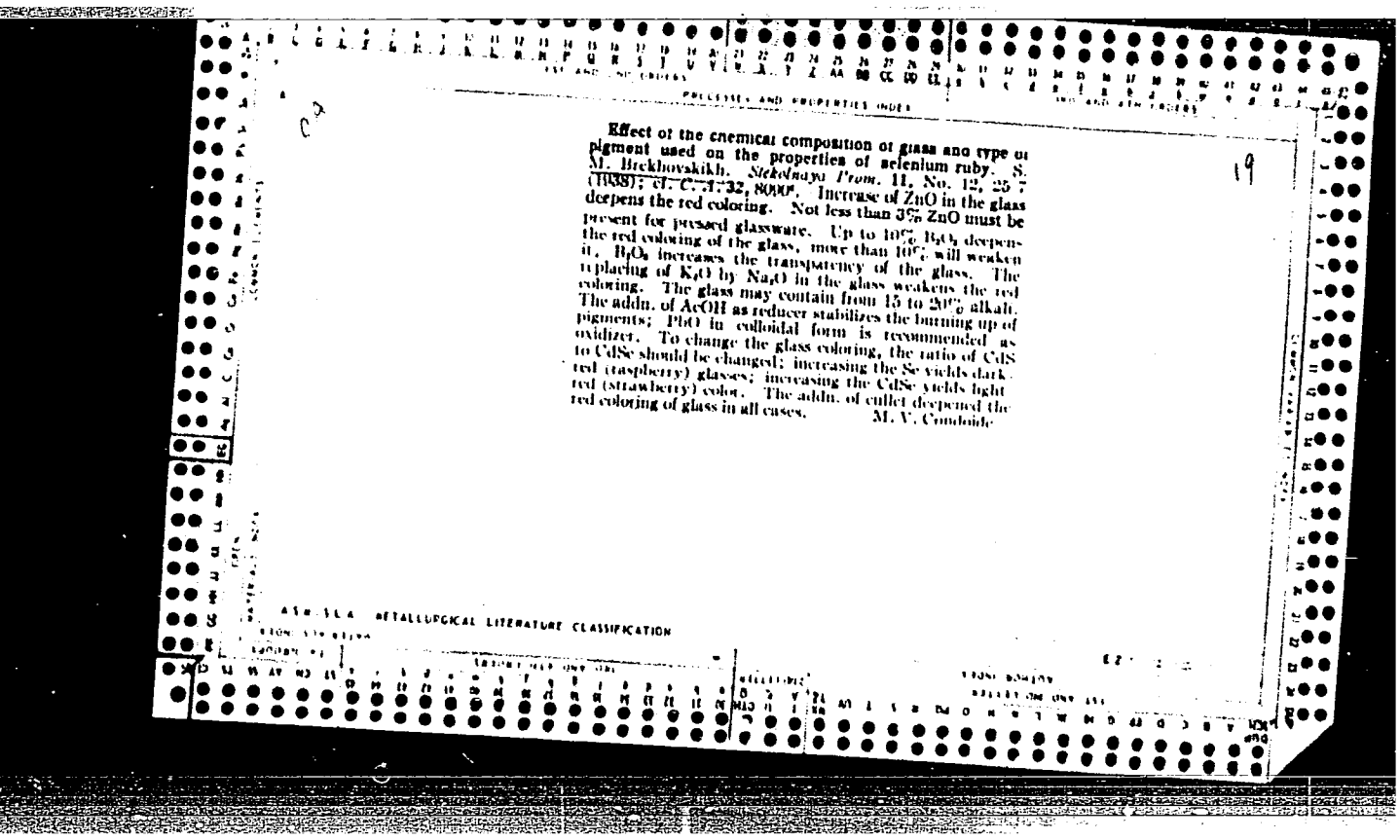
SUB CODE: 20/ SUBM DATE: 28Mar66/ ORIG REF: 002/ OTH REF: 006

Card 1/1 UDC: 524.23:532.594



Experiments in the production of opaque glasses dispersing light. S. M. Brekhovskii. *Keram. i Steklo* 12, No. 11, 7-10(1936). (1) The glass used is classified as a special milk glass called "opaque opal" because of its appearance, optical properties and character of opacification. (2) The minimal undispersed permeability of this glass is obtained by a high alumina content. The lowering of the Al_2O_3 content yielded transparent glasses. (3) CaO and B_2O_3 greatly lower the effect of opacification and increase light permeability of glass. (4) The increase of the K_2O content for that of Na_2O increases transparency and opalescence of glass. (5) The opacification required was obtained by introducing CaO as dehydrated gypsum. The replacement of gypsum by other Ca salts did not produce the necessary opacity. (6) The introduction of MgO, even in small amts., destroyed the effect of opacification, making the glass transparent. (7) Small quantities of As promote the burning of the opacifiers. (8) The replacement of Pb oxide by Ba and Zn oxides lowers the effect of opacification. (9) The glass must be annealed between 380° and 400°. At an annealing temp. of 440° opacifiers burn out and at 460° or 470° glass becomes almost transparent with a weak blue color tone. This is probably due to a decrease in the size of particles of the opacifier. (10) The character of firing must be reducing as with an oxidizing flame opacifiers burn out more rapidly. (11) The addn. of cullet lowers the effect of opacification.

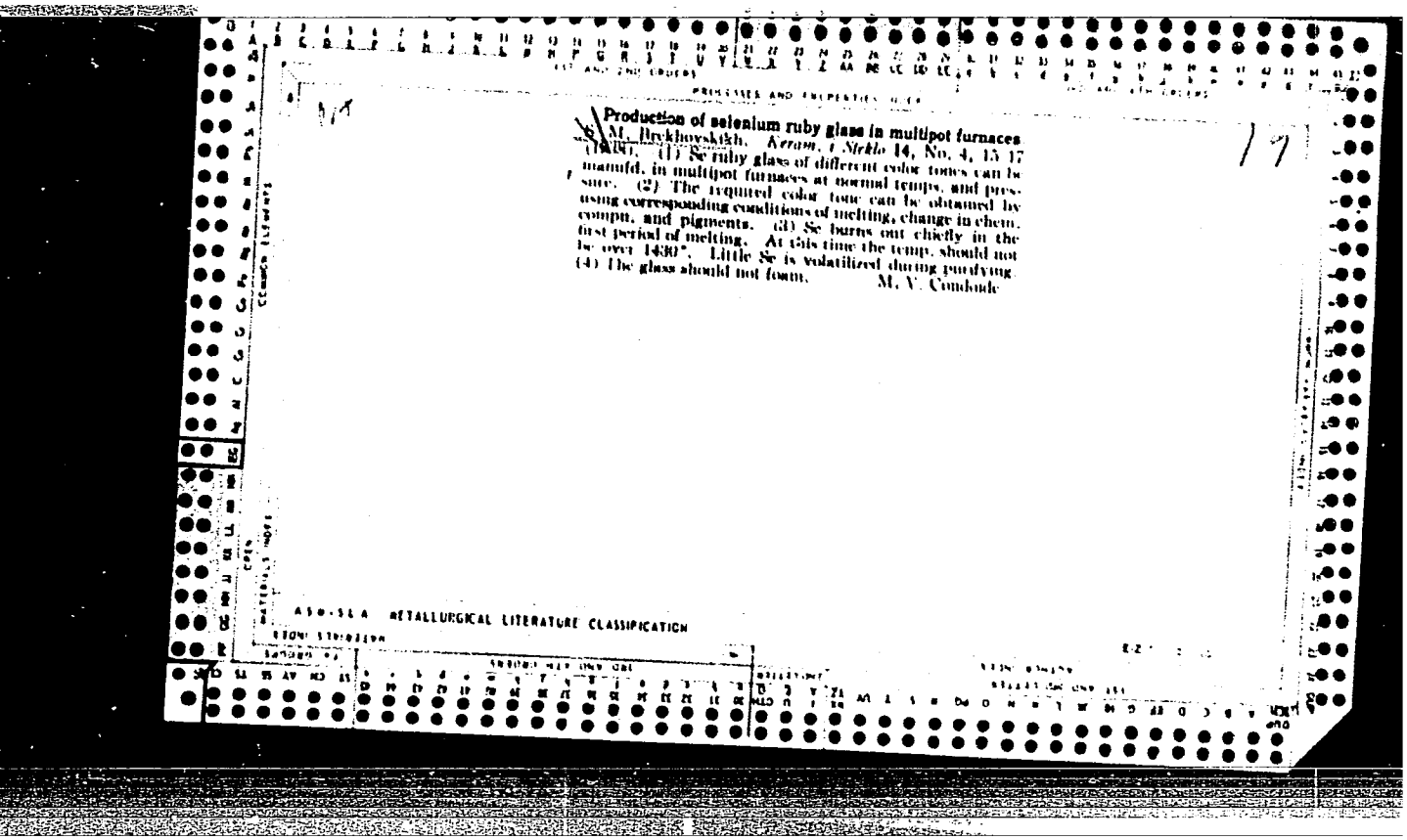
M. V. Condoide



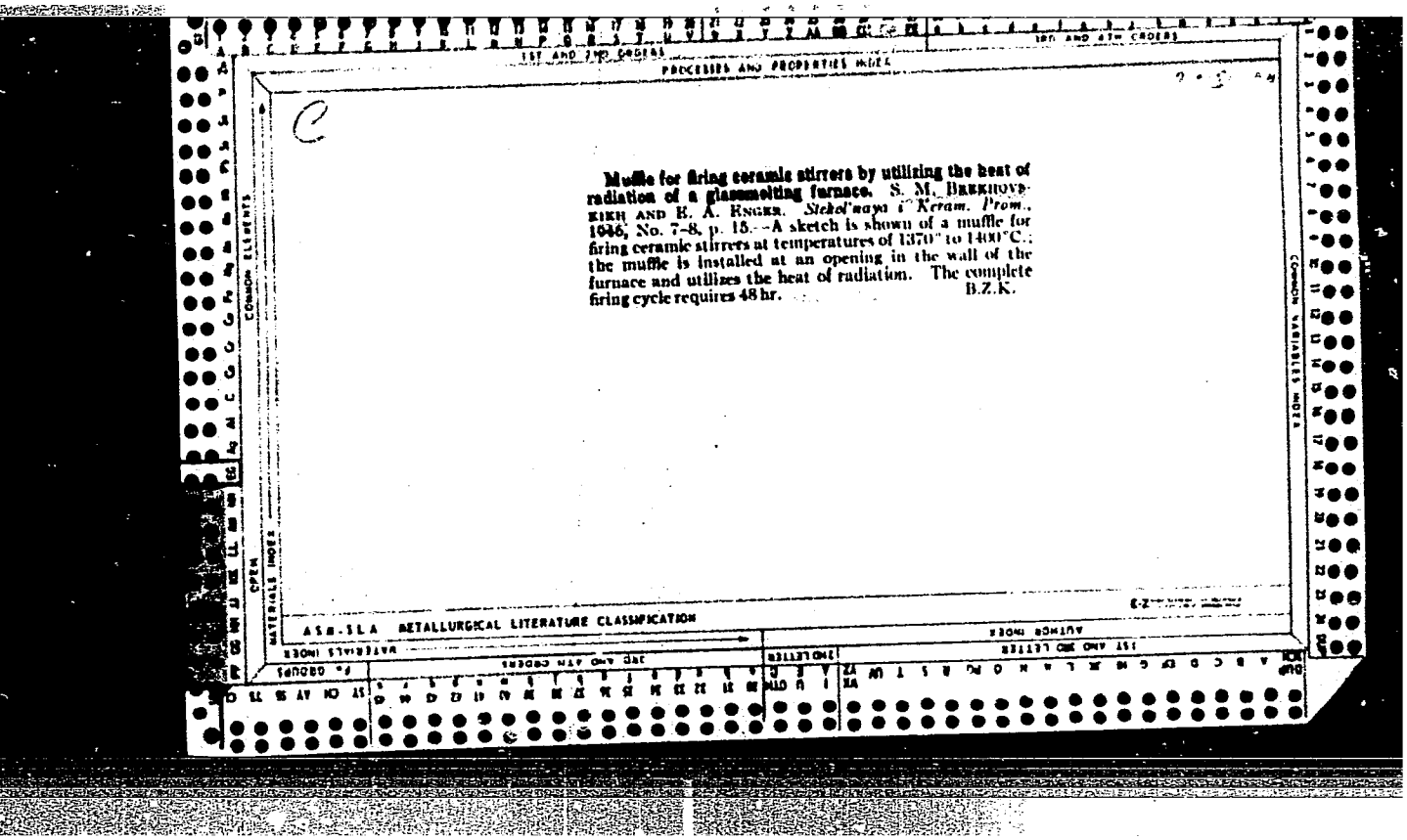
Effect of the chemical composition of glass and type of pigment used on the properties of selenium ruby. S. M. Brekhovskikh. *Steklnaya Prom.* 11, No. 12, 25-7 (1938); cf. C. 1932, 8000. Increase of ZnO in the glass deepens the red coloring. Not less than 3% ZnO must be present for pressed glassware. Up to 10% B_2O_3 deepens the red coloring of the glass, more than 10% will weaken it. B_2O_3 increases the transparency of the glass. The replacing of K_2O by Na_2O in the glass weakens the red coloring. The glass may contain from 15 to 20% alkali. The addn. of AcOH as reducer stabilizes the burning up of pigments; PbO in colloidal form is recommended as oxidizer. To change the glass coloring, the ratio of CdS to CdSe should be changed; increasing the Se yields dark red (raspberry) glasses; increasing the CdSe yields light red (strawberry) color. The addn. of cullet deepened the red coloring of glass in all cases.

M. V. Condaide

ASM-TLA METALLURGICAL LITERATURE CLASSIFICATION



Production of selenium ruby glass in multipot furnaces
M. Brykhovskikh. *Keram. i Steklo* 14, No. 4, 15-17 (1985). (1) Se ruby glass of different color tones can be manufd. in multipot furnaces at normal temps. and pressure. (2) The required color tone can be obtained by using corresponding conditions of melting, change in chem. compn. and pigments. (3) Se burns out chiefly in the first period of melting. At this time the temp. should not be over 1430°. Little Se is volatilized during purifying. (4) The glass should not foam.
M. V. Condrade



Muffle for firing ceramic stirrers by utilizing the heat of radiation of a glassmelting furnace. S. M. Brekhovskikh and R. A. Engel. *Steklo i Keram. Prom.*, 1946, No. 7–8, p. 15.—A sketch is shown of a muffle for firing ceramic stirrers at temperatures of 1370° to 1400°C.; the muffle is installed at an opening in the wall of the furnace and utilizes the heat of radiation. The complete firing cycle requires 48 hr. B.Z.K.

C1

New method of drying sulfate. S. M. Ilyukhovskikh. *Stekło i Keram.* 6, No. 8, 17(1949).— The sulfate is dried in an 8.25 × 0.95 m. drum rotating at 4–5 r.p.m. and equipped with angles inside by means of which the sulfate is moved in the drum. The drum is preheated with generator gas to 550 to 600°; the atm. within the drum is reducing. The sulfate is charged in small amts. until the outgoing gases drop to 150°; below 150° the moist sulfate sticks to the walls. The sulfate leaves the drum at 90 to 100° with a moisture not over 1.5% compared with initial content of 30%. After 1 to 1.5 hrs. of operation, the inlet and receiving section of the drum must be cleaned with specially designed shovels. Cleaning requires 10 to 12 min. before the operation can be resumed. The output of the drum is 13 tons of sulfate per day. B. Z. Kamich

BREKHOVSKIKH, S.M.; PORTUGALOV, D.I.

Glass - Testing

Method of determining the quality of technical sheet glass, Stek. i ker., 9, No. 8, 1952.

9. Monthly List of Russian Accessions, Library of Congress, November 1952 1953, Uncl.

1. BREKHOVSKIKH, S. M.

2. USSR. (600)

4. Glass manufacture

7. Valuable textbook ("Manufacture of polished glass." B. S. Temkin. Reviewed by S. M. Brekhovskikh.) Stek. i ker., 9, no. 10, 1952.

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

1. BREKHOVSKIKH, S. M.

2. USSR (600)

4. Glass manufacture

7. For order in technical processes in the glass industry enterprises., Stek. i. ker., 9, no. 10, 1952.

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

1. BREKHOVSKIKH, S.M.

2. USSR (600)

4. Glass Manufacture

7. Production of "Stalinit" glass. (results of discussion on the exchange of outstanding experience). Stek. i ker. 9 no.12, 1952

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

BREKHOVSKIKH, S.M.[reviewer]; VEYNBERG, K.L.; KOSSOY, B.S.; NOL'KEN, M.P.; REZNIKOV, M.I. [authors].

Useful manual ("Glass manufacturing plant equipment." K.L.Veinberg, B.S.Kossoi, M.P.Nol'ken, M.I.Reznikov. Reviewed by S.M.Brekhovskikh). Stek.i ker. 10 no.12:27-29 D '53. (MLRA 6:11)
(Glass manufacture) (Veinberg, K.L.) (Kossoi, B.S.)

BREKHOVSKIKH, Serafim Maksimovich; FRADKIN, David Arkad'yevich; ISLANKINA, T.F., redaktor; DMITRIYEVA, R.V., tekhnicheskiy redaktor.

[Modern techniques in the manufacture of glass] Sovremennaia tekhnika stekol'nogo proizvodstva. Moskva, Izd-vo "Znanie," 1955. 31 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii, Ser. 4, no.10). (MLRA 8:5)
(Glass manufacture)

BREKHOVSKIKH, S.M.

Conference on electric furnace processes for the manufacture of glass. Stek.i ker. 14 no.6:30-31 Je '57. (MLRA 10:7)
(Glass furnaces)

BREKHOVSKIKH, S.M.

BREKHOVSKIKH, S.M.

Glass with a high content of bismuth and lead. Stek.i ker. 14 no.8:1-4 Ag '57. (MIRA 10:10)

(Glass manufacture--Chemistry)

BREKHOVSKIKH, S.M.

BREKHOVSKIKH, S.M.

Commercial glasses in the Soviet Union. Stek.i kar.14 no.10:7-11 O '57. (MIRA 10:12)

(Glass manufacture)

BREKHOVSKIKH, S. M.

AUTHOR: Brekhovskikh, S. M.

72-1-3/13

TITLE: Resistance of Industrial Glass Against the Effect of Gamma Rays (Ob ustoychivosti promyshlennykh stekol k vozdeystviyu gamma - luchey).

PERIODICAL: Steklo i Keramika, 1956, Nr 1, pp. 10-14 (USSR)

ABSTRACT: The main part of industrial glass becomes colored under the effect of gamma rays, neutrons, alpha- and beta-particles. The nature and intensity of coloring depends on the composition of the glass as well as on the dosage of radiation, but not upon the nature of radiation. Industrial glass usually allow gamma rays and fast neutrons to pass through them easily and assume a color throughout their entire thickness. Alpha- and beta-particles penetrate in a very small degree into the glass, and therefore the latter is colored only to a very low depth. According to the gamma-quantum energy their interaction processes with the glass develop in different ways, which is described in detail. The transition of silicon from the ion- into the atomic state is apparently the main reason for the coloring of glass under the effect of radioactive radiation. The

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coloring of glasses under the effect of radiation is a reversible process. The coloring intensity of glass increases with an increasing dosage of radiation, but every glass has its boundary value, the surpassing of which entails no further increase of the intensity of coloring. Fig. 1 shows the modification of the light transparency of a glass which is especially resistant against gamma radiation, in dependence on the radiation dose. The author carried out investigations concerning the resistibility of various types of glass used for industrial purposes. The light transparency of glasses was determined before and after irradiation by means of a photoelement, the curves of spectral absorption were obtained on a quartz spectrophotometer C Φ .

The color characteristic of the glasses was determined by means of a three-colored colorimeter. R. A. Levinson and I. N. Berezhnaya assisted in this work. The results obtained by these irradiation tests are shown in form of a table. Figs. 2 and 3 show the modifications of the integral light transparency of the glasses in dependence on the

irradiation dose, and figs. 4-8 show the curves of the spectral absorption of the glasses to be investigated. It is assumed that the investigation of the transparency spectra of the glasses before and after irradiation may serve as a new effective method for the investigation of glass structure. There are 8 figures, 1 table, and 1 Slavic references.

AVAILABLE: Library of Congress

BREKHOVSKIKH, S.M.

Author: Olyan

For the Industry of Ceramics - a Progressive Technology (Keramicheskoy promyshlennosti - peredovuyu tekhnologiyu).

Steklo i Keramika, 1958, Nr 2, pp. 46-47 (USSR)

A technical conference of the functionaries of the [illegible] took place in Khar'kov in December 1957, which was organized by the Ukrainian Administration of the Scientific-Technical Society of the building material industry and the Ministry of Building Materials industry of the Ukrainian SSR. The conference was attended by functionaries of the works producing ceramics in the Ukrainian SSR, the Russian Federation, the Economic Councils of Stalino and Kharkov, the state-controlled offices for Economic Planning of the USSR and RSFSR, and the Ukrainian SSR, the Building- and Building Materials Department of the TsK KPU and of the Scientific Research and Planning Institutes. The results obtained in the Ukrainian Ceramic Industry and prospects for the future were discussed. Particular attention was paid to the utilization of progressive [illegible] in the industry as well as to the introduction of [illegible] high-efficiency equipment, and a progressive technology.

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Ukrainian SSR) delivered a report on the work and the [illegible] of the ceramics industry.

2.) A.A.Kopeykin (Director of the NIIstroykeramiki) spoke about the work carried out by his institute. He was reproached for talking too much about future plans and too little about work already completed.

3.) A.A.Grebennik (Head of the PKB NIIstroykeramiki), whose report, was criticized for the same reasons as Kopeykin.

4.) Dudnik (TsKB MPSM Ukrainian SSR, Khar'kov) spoke about the introduction of new equipment and assembly lines.

5.) N.I.Dikerman (Chief Engineer of the Administration of the Mosstroymaterialy) stated that the efficacy of the brick charging devices for tunnel kilns at present no longer corresponds to the increased efficiency of the kilns.

6.) A.N.Lyutenko (Chief Engineer of the Administration of the Economic Council, Khar'kov) spoke about production reserves of plants.

7.) S.M.Beluga (Chief Engineer of the Matlakh Tile Works, Khar'kov) spoke about the mechanization of production.

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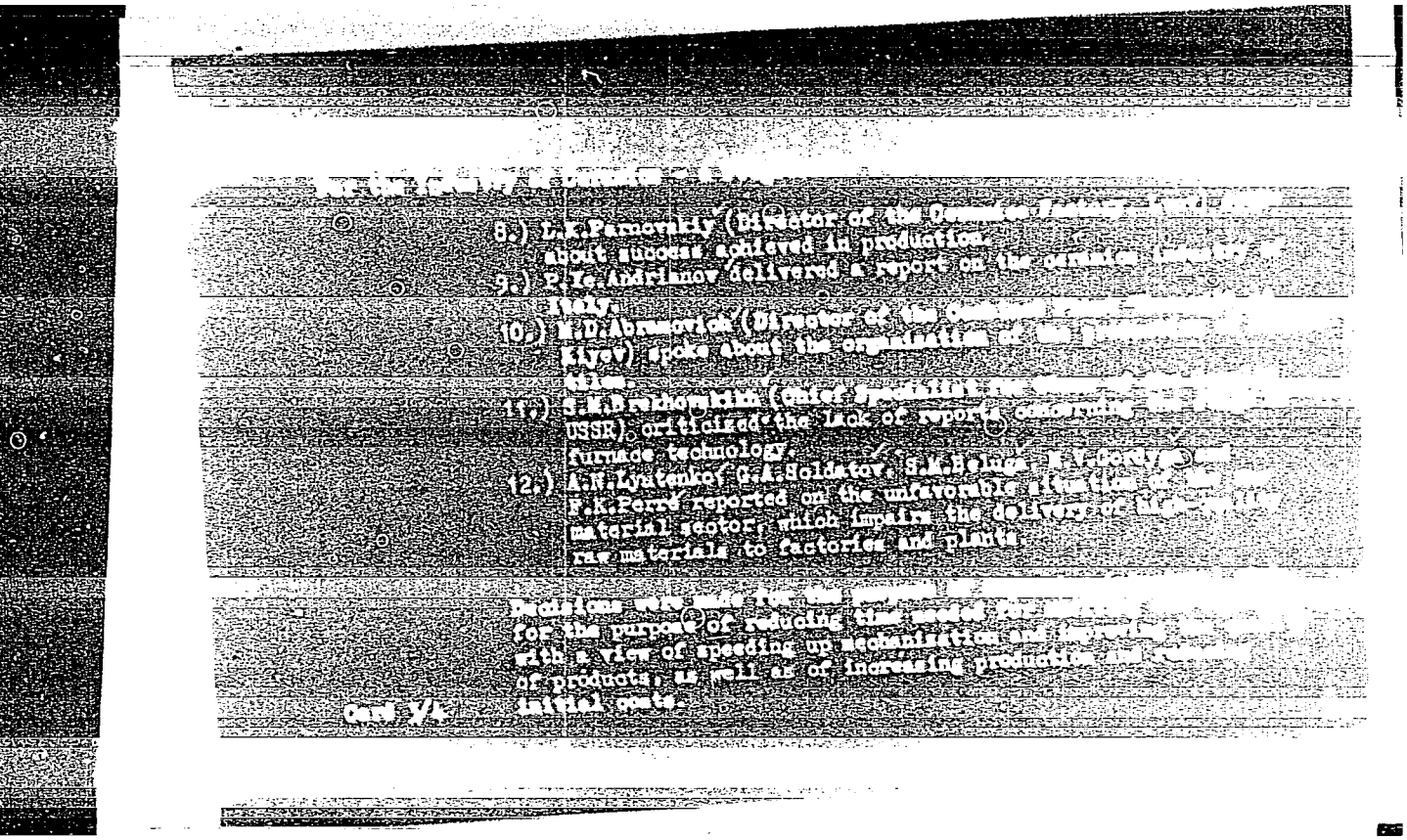

PHASE I BOOK EXPLOITATION SOV/3763

Bezborodov, M.A., N.M. Bobkova, S.M. Brekhovskikh, N.N. Yermolenko, E.E. Mazo, and Ye. A. Poray-Koshits

Diagrammy stekloobraznykh sistem (Diagrams of Vitriform Systems) Minsk, Redaktsionno-izdatel'skiy otdel BPI imeni I.V. Stalina, 1959. 313 p. Errata slip inserted. 1,500 copies printed.

Sponsoring Agencies: Minsk. Belorusskiy politekhnicheskiy institut. and BSSR. Ministerstvo vysshego, srednego spetsial'nogo i professional'nogo obrazovaniya.

Ed. (Title page): M.A. Bezborodov, Academician, BSSR Academy of Sciences, Doctor of Technical Sciences; Ed. (Inside book): N.V. Kapranova; Tech. Ed.: P.T. Kuz'menok.

PURPOSE: This book is intended for chemists, scientists, and engineers dealing with vitriform systems.

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Diagram of Vitriform Systems SOV/3763

COVERAGE: The materials contained in this book on vitriform systems were compiled by the Scientific Research Laboratory of Glass and Silicates of the Belorussian Polytechnic Institute and the Laboratory of the Physical Chemistry of Silicates of the Belorussian Academy of Sciences. The book surveys all literature on the properties of vitriform systems available up to 1958. All vitriform systems are presented with "composition-property" diagrams. Figures 1 through 5 provide a graphic summary of the present state of knowledge of the properties of various vitriform systems. The systems are presented diagrammatically in increasing order of complexity. One-component to eight-component systems are treated. This survey shows that to date 177 systems have been studied and 568 "composition-property" diagrams have been constructed. Chapter I was written by Ye.A. Poray-Koshits. References accompany individual chapters.

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JA/dwm/gmp
7-26-60

BREKHOVSKIKH, Serafim Maksimovich; KITAYGORODSKIY, I.I., prof., doktor tekhn.nauk, nauchnyy red.; GLADYSHEVA, S.A., red.; GILENSON, P.G., tekhn.red.

[Glass abroad; manufacture and use] Steklo za rubezhom; proizvodstvo i primenenie. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit.materialam, 1960. 287 p. (MIRA 14:3)

(Glass)

ORekhovskikh, S. M.

AUTHOR: Syritskaya, Z. M.

S/072/60/000/03/021/023
B003/B008

TITLE: 3rd All-Union Conference on the Vitreous State

PERIODICAL: Steklo i keramika, 1960, Nr 3, pp 43-46 (USSR)

ABSTRACT: The 3rd All-Union Conference on the Vitreous State was held in Leningrad at the end of 1959. It was organized by the Institut khimii silikatov AN SSSR (Institute of the Chemistry of Silicates AS USSR), Vsesoyuznoye khimicheskoye obshchestvo imeni D. I. Mendeleyeva (All-Union Chemical Society imeni D. I. Mendeleyev) and Gosudarstvennyy opticheskiy institut imeni S. I. Vavilova (State Optical Institute imeni S. I. Vavilov). More than 100 reports on the structure of glass, investigation methods of the vitreous state, the mechanism of vitrification and physicochemical and technical properties of glasses were delivered. The Conference was opened by Academician A. A. Lebedev. . . . .

At the 7th meeting, 6 reports dealt with glasses as semi-conductors, 9 with the coloring of glasses and the influence of radiation and 4 reports with technical properties of glasses. . . . . V. V. Vargin and T. I. Veynberg, "Coloring of Glasses in Connection With Their Structure". N. I. Vlasova, Ye. I. Galant, A. A. Kefeli, "Absorption Spectrum of the Co^{2+} Ion as Indicator for the Coordination of Boron and Aluminum in Glasses". V. P. Danilov and N. V. Berbash reported on the change of the spectral absorption of glasses of simple composition under the influence of gamma rays. G. O. Karapetyan reported on the influence of the structure of glasses on spectral and chemical properties of the Cer-ions. N. P. Orlov reported on the role of the admixtures and the crystalline state of the lattice in the coloring of quartz glass by gamma radiation. L. M. Blyumen and R. L. Shuster reported on the physicochemical nature of pore formation in silicate melts (foam glass, ceramsite). Ye. V. Yermolayeva reported on physico-chemical investigations of melts of refractory oxides in a state of equilibrium. I. F. Ponomarev, "The Importance of the Vitreous Phase in the Formation of the Ceramic Body and the Cement Clinker". V. A. Presnov reported on the physico-

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chemical fundamentals of the fusing of glass and metal. The 8th meeting dealt with physical chemistry and mechanical properties of glass. K. S. Yevstrop'yev, G. M. Bartenev and S. K. Dubrovo made comprehensive reports. A. A. Appen reported on the fundamental structural parameters which determine the properties of the glass. A. V. Gladkov, V. A. Zatobyl'skaya, V. V. Tarasov reported on research results of the polymeric structure of inorganic glasses. L. I. Demkina reported on peculiarities of the expansion of oxides in silicate glasses. V. G. Slavyanskiy reported on the subject: "The Energy of Covalent Bonds in Glass and Their Role in the Process of the Viscous Flux". Z. M. Syritskaya reported on physico-chemical properties of aluminophosphate glasses. Yu. A. Shmidt reported on the dependence of the properties of alkali silicate glasses on the composition. Z. N. Shcheglova reported on: "Investigation of the Dependence of the Optical Properties of Phosphate Glasses on the Composition". A. K. Yakhind reported on the subject: "The Periodic System and the Optical Constants of Glass". K. S. Aslanova reported on: "Mechanical Properties of Glass Fibers". G. M. Bartenev, A. S. Yeremeyeva made a report on the mechanical properties of inorganic glasses in the anomalous interval and on their structure. Ya. I. Kozlovskaya reported on the elastic properties of glasses and on the influence of the composition of the glasses on their mechanical

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properties. A. V. Abramyan reported on the subject: "Leaching of Molten Glasslike Basalts by Aqueous Solutions of Acids and the State of the Oxides in the Structure of Glass Basalts". S. M. Brekhovskikh and V. N. Sezorova reported on synthesis and investigation of hafnium silicate glasses. S. K. Dubrovo reported on physicochemical properties of gallium silicate glasses. V. A. Dubrovskiy and T. S. Dubrovskaya reported on the surface film forming on calcium-sodium glass in the acidic, neutral and basic medium. The following persons reported at the final meeting: V. F. Kokorina on the influence of the alkaline earth oxides on the chemical stability of glasses in a humid atmosphere; L. Ya. Mazelev on vitrification and properties of borate glasses; B. P. Nikol'skiy, Ye. A. Materova and V. V. Moiseyev on the reaction of electrode glasses with solutions. Doctor Vogel and Roetger spoke as guests from Eastern Germany. Academician N. V. Belov, M. A. Bezborodov, I. I. Kitaygorodskiy, and E. K. Keler also spoke at the final meeting.

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81149

S/072/60/000/07/07/020
B015/B008

15.2120

AUTHOR: Brekhovskikh, S. M.

TITLE: Ways for the Increase of the Mechanical Strength of Glass

PERIODICAL: Steklo i keramika, 1960, No. 7, pp. 24 - 28

TEXT: Four methods for the increase of the mechanical strength of glass are used at present: hardening, chemical treatment of the surfaces, formation of a crystalline structure in the glass, and bonding the glass with synthetic materials. The method of heat treatment alone is used practically at present. The following considerations on the possible changes of the structure and strength of glass are mentioned next: thermal neutron bombardment of glass; high-energy proton bombardment; gamma irradiation; introduction of inorganic molecules into glasses; formation of glasses with a content of metals in atomic state; high-pressure treatment of glass, the experiments by N. N. Mikhaylov (Ref. 4) being mentioned; orientation of the glass structure under the influence of external forces; strengthening of the glass through ion exchange; introduction of organic molecules into glasses; formation of inorganic polymers.

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81149

Ways for the Increase of the Mechanical Strength of Glass

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B015/B008

The author states finally that the physical chemistry of glass must be more closely linked with theoretical studies of organic and inorganic polymers as well as with solid-state physics. There are 3 references, 2 of which are Soviet.

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15.2120,21.6200,24.6820

77211
SOV/89-8-1-5/29

AUTHOR: Brekhovskikh, S. M.

TITLE: Color and Transparency Changes of Glasses Exposed to γ -Rays From Co^{60} and to Nuclear Reactor Rays

PERIODICAL: Atomnaya energiya, 1960, Vol 8, Nr 1, pp 37-43 (USSR)

ABSTRACT: The author first presents some examples of effects of γ -radiation of selective and integral transparency of USSR-made glass samples. Changes of glass color. Figure 1 shows typical curves of spectral transparency for press-produced glass Nr 10 (1a), polished rolled glass PG (1b), and the green glass Nr 18 (1c). Transparency changes in glass. Figure 5 shows typical curves of total transparency versus exposure. Terminology. To fill the existing gap, the author introduces the following terminology: As an index of stability (K_{st}), he defines the logarithm of the dose (D_{st}) after which the glass begins visibly to darken, i.e., $K_s = \log D_s$. Visible darkening is defined as a

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Color and Transparency Changes of Glasses Exposed to γ-Rays From Co^{60} and to Nuclear Reactor Rays

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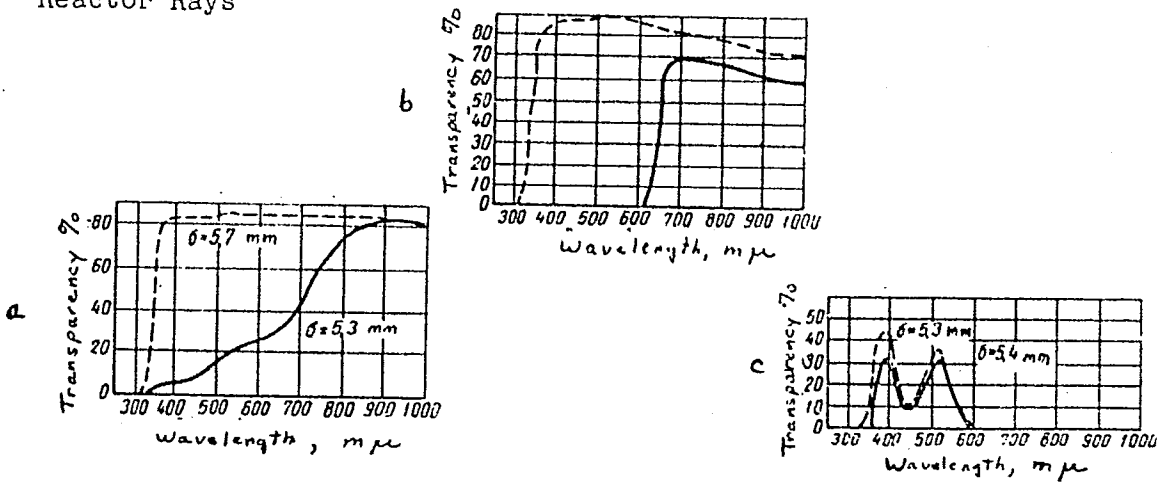

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Fig. 1. Curves of spectral transparency of glasses: ----- before exposure; _____ after a 10^6R irradiation.

Color and Transparency Changes of Glasses Exposed to γ-Rays From Co^{60} and to Nuclear Reactor Rays

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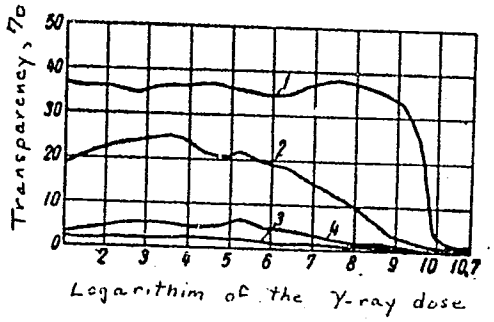

Fig. 5. Transparency variation of colored glasses during exposure: (1) blue-green glass SCh by Chernyatinsk plant; (2) green glass 5A/3 by "Krasnyy luch" plant; (3) red glass SKOG by Chernyatinsk plant; (4) red glass K4/2 (selenium ruby) by "Krasnyy luch."

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3-5% reduction of transparency. D_{sat} is the dose of radiation after which there is not much change in color of the sample, and the corresponding saturation index is defined as $K_{sat} = \log D_{sat}$. Meaning is also given to T_M, the transparency after D_{sat} is reached. The coefficient of the darkening intensity Q is defined as $Q = \frac{\tau_o}{\tau}$, where τ_o is transparency coefficient before exposure, and τ after a dose of 10^6 R (which is considered to be sufficient for all practical purposes). The values of the above parameters for a number of Soviet glasses are given in Table 2. All measurements were done on polished samples of 5 ± 0.1 mm thickness and 30 mm diameter. Spectral investigations were performed on the SF-4 quartz spectrometer, and the integral transparency measurements on the three-color calorimeter VEI.

Color and Transparency Changes of Glasses Exposed to γ -Rays From Co^{60} and to Nuclear Reactor Rays

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Table 2. Values of coefficients characterizing behavior of glass exposed to radiation.

Glass brand	Darkening intensity Q	Stability K_{st}	Saturation K_{sat}	
Window glass OG by Gor'kyy plant	2,6	4	10	7,1
Polished (rolled) glass PG by Gusev plant	2,24	4	8,3	12,8
Glass Nr 10 (colorless) for press products by "Krasnyy luch" plant	3,38	4	10	6,2
Opal glass Nr 14 by "Krasnyy luch" plant	4,25	3,9	8	0
Opal glass OPLS by Chernyatinsk plant	3,98	3,9	8	0
Blue (cobalt) glass Nr 17 by "Krasnyy luch" plant	1,26	10	10,7	0
Blue-green glass SSh by Chernyatinsk plant	1,04	8,5	10,5	0
Green glass SA/3 by "Krasnyy luch" plant	1,04	3,7	10,5	0
Green glass Nr 18 by "Krasnyy luch" plant	1,05	5,7	10,5	1,4
Red (selenium ruby) glass K4/2 by "Krasnyy luch" plant	1,0	5,3	9,7	0,3
Red (copper ruby) glass SKSG by Chernyatinsk plant	1,88	7,3	9,3	0
Orange (cadmium) glass OS-6 without НАВОДКА by Chernyatinsk plant	1,53	3,6	10,2	0
Orange (cadmium) glass OS-6 with НАВОДКА by Chernyatinsk plant	1,0	4,5	10,2	0
Red (selenium ruby) glass KS-1 by Chernyatinsk plant	1,22	7,8	9,5	0,0
Red (selenium ruby) glass K3/2 by "Krasnyy luch" plant	1,07	8	9,5	0,0

*Abstractor's Note: It is difficult to establish the exact meaning of the word "НАВОДКА". Possible translations of the word are as follows: foil, focusing, laying, direct laying.

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The table in the appendix gives the chemical composition of some of the glasses listed in Table 2.

Chemical composition of glasses (weight, %)

Oxides	Brand Name									
	№ 10	PG	IG3/2	S-1	№ 18	SP/3	SKSG	№ 14	№ 17	№ 13
SiO_2	72,26	73,5	63,47	71	68,14	72,47	73,72	59,86	73,0	74,19
R_2O_3	0,32	1,0	—	—	0,23	0,33	—	10,46	0,24	0,20
CaO	8,4	9,0	—	—	9,31	8,58	7,94	0,78	8,22	0,34
MgO	0,15	3,3	—	—	0,24	0,14	3,76	0,19	0,25	0,24
Na_2O	17,63	13,2	2,64	16,0	11,11	13,76	11,7	9,11	16,3	14,7
K_2O	1,24	—	12,44	—	0,27	—	1,75	2,71	0,92	6,5
B_2O_3	—	—	2,88	2,0	—	3,23	—	0,69	1,07	—
ZnO	—	—	15,81	11,0	—	—	—	—	—	—
AlF_3	—	—	1,66	—	—	—	—	3,10	—	—
NaF	—	—	1,41	—	—	—	—	2,64	—	—
PbO	—	—	—	—	—	—	—	10,4	—	—
CoO	—	—	—	—	—	—	—	—	0,24	—
BaO	—	—	—	—	—	—	—	—	—	2,73
Se (metal)	—	—	1,59	0,3	—	—	—	—	—	—
CdS	—	—	4,32	0,07	—	—	—	—	—	—
CuO	—	—	—	—	1,3	1,9	—	—	—	—
Cr_2O_3	—	—	—	—	0,35	0,11	—	—	—	—
Sn (metal)	—	—	—	—	—	—	0,5	—	—	0,7
Cu_2O	—	—	—	—	—	—	0,2	—	—	0,2

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Color and Transparency Changes of Glasses Exposed to γ -Rays From Co^{60} and the Nuclear Reactor Rays

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SOV/89-8-1-5/29

The author found that replacing cations of large ionic radius by those of smaller ionic radius increases the stability of the glass. Some of the glasses listed in Table 2 have a high K_{st} and low Q, but they still lose their transparency in the visible region after a dose of $9\text{-}10^{10}$ R. Nevertheless, the author did not find any sign of decay which, according to Formon (see ref), occurs after a dose close to 10^{10} R. Increase of glass stability against irradiation effects. The author claims that the character and intensity of color changes of glass depends on the type of glass and the exposure dose, but not on the type of radiation. Any type of radiation generates in the glass free electrons and excited atoms. Ions which can exchange valence are then responsible for the color change; e.g.,

$$V^{3+} \text{ (green)} + e^- \longrightarrow V^{2+} \text{ (rose-colored)}$$

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$$Ce^{4+} \text{ (colorless)} + e^- \rightarrow Ce^{3+} \text{ (colorless)}.$$

In the latter case absorption bands lie in the ultraviolet region. Stability is enhanced by the presence of ions Cr^{3+}, Mn^{4+}, As^{5+}, Sb^{5+}, and Fe^{3+}. Important work in this field, both theoretical and experimental, was done by V. V. Vargin and his collaborators in the State optical institute. Protective glasses containing large amounts of lead oxides are already quite stable. For glasses with 69.5% weight of lead oxide Q = 1.48 cm^{-1} after 10^6 R. Lead glasses can still be improved by addition of As and Sb, where the ionic transitions $As^{3+} \rightarrow As^{5+}$ and $Sb^{3+} \rightarrow Sb^{5+}$ consume more energy than $Ce^{4+} \rightarrow Ce^{3+}$. A decrease in ionic radius is also helpful. On the basis of the preceding investigation, the author produced a glass US-4 with (% weight) SiO_2 (71.5), R_2O_3 (1.5), CaO (8.5), MgO (1.5), Na_2O (17.0),

and elementary sulphur (1.2) on top of the 100%. Fig. 7 represents curves for US-4 whose K_{st} = 5, K_{sat} = = 10.7, Q = 1.0. Transparency of this glass after $5 \cdot 10^{10}$ R equals 27.7%, substantially more than any other sample. Color changes in glass are reversible and can be reversed by heating or exposure to sunlight or luminiscent lamps. Some glass samples were cemented together using polivinilbutiral, which showed excellent stability toward γ-rays. It did not change after doses of 10^7 R. However, after 10^8 R the layer started showing bubbles. G. Ya. Vasil'yev and Yu. Ya. Zhelezova helped during the experiments. There are 3 tables; 7 figures; and 5 references, 1 Soviet, 2 German, 2 U.S. The U.S. referencss are: L. Monk, Nucleonics, 10, Nr 11, 52 (1952); G. Formon, J. Opt. Soc. America, 41, 337 (1951).

SUBMITTED: November 17, 1958

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Color and Transparency Changes of Glasses Exposed to γ -Rays From Co^{60} and the Nuclear Reactor Rays

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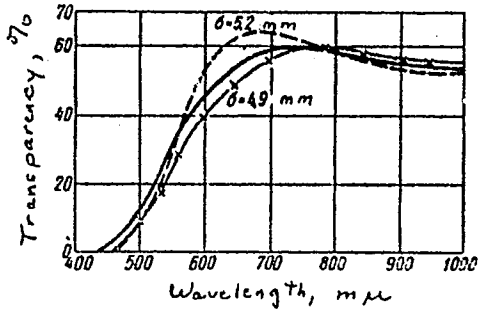

Fig. 7. Spectral transparency of experimental glass US-4: ------ prior to exposure; _____ after exposure to a dose of 10^6 R; -x-x-x after exposure to $3 \cdot 10^8$ R.

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BREKHOVSKIKH, S. M.

PHASE I BOOK EXPLOITATION SOV/4578

Minsk. Belorusskiy politekhnicheskiy institut

Khimiya, tekhnologiya i istoriya stekla i keramiki (The Chemistry, Technology, and History of Glass and Ceramics) Minsk, Red.-izd. otdel BPI imeni I. V. Stalina, 1960. 138 p. (Series: Its: Sbornik nauchnykh trudov, vyp. 86) 1,200 copies printed.

Sponsoring Agencies: Ministerstvo vysshego, srednego spetsial'nogo i professional'nogo obrazovaniya BSSR; Belorusskiy politekhnicheskiy institut imeni I. V. Stalina.

Editorial Board: N. N. Yermolenko, Candidate of Technical Sciences, I. S. Kachan, and L. K. Petrov; Ed.: N. V. Kapranova; Tech. Ed.: S. A. Pesina.

PURPOSE: This book is intended for chemists and physicists interested in the composition, structure, and properties of glass and ceramics.

The Chemistry, Technology, and History (Cont.) SOV/4578

COVERAGE: The articles contained in this collection deal with methods of studying the properties of various glass and ceramic compositions and the technology of glass and ceramics manufacture. The last two articles treat the history of silicate chemistry. No personalities are mentioned. References follow the articles.

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THE PHYSICAL CHEMISTRY OF SILICATES

The Chemistry, Technology, and History (Cont.) SOV/4578

THE CHEMISTRY AND TECHNOLOGY OF GLASS

Card 3/6

BUTT, Lev Mikhaylovich; POLLYAK, Vera Vasil'yevna. Prinimala uchastiye POTOTSKAYA, G.V. BREKHOVSKIKH, S.M., nauchnyy red.; GLADYSHEVA, S.A., red.izd-va; OSENKO, L.M., tekhn.red.

[Technology of glass] Tekhnologiia stekla. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit.materialam, 1960. 417 p. (MIRA 13:12)

(Glass manufacture)

15.2120

27752
S/058/61/000/007/046/086
A001/A101

AUTHORS: Brekhovskikh, S.M., Cheremisinov, V.P.

TITLE: Investigating the structure of borate-lead and borate-bismuth glasses by means of infrared spectroscopy

PERIODICAL: Referativnyy zhurnal. Fizika, no. 7, 1961, 199, abstract 7D67 (V sb. "Stekloobrazn. sostoyaniye". Moscow-Leningrad, AN SSSR, 1960, 219 - 222, Discus., 238 - 242)

TEXT: The authors investigated infrared absorption spectra of powders and films of borate-lead glasses containing 39-90.8% by weight of PbO and two borate-bismuth glasses with 87.3 and 91.3 weight % of Bi_2O_3. In the spectrum of the glass with 39 weight % of PbO an essential change, as compared with the spectrum of boron oxide, was discovered which indicated the appearance of a new compound in it. The boron oxide band is present in all glasses, which is enhanced with increasing PbO content; it indicates the preservation in them of molecular aggregates of boron oxide. In spectra of borate-bismuth glasses the same, in basic features, pattern is observed as in corresponding borate-lead glasses.
[Abstracter's note: Complete translation]

N. Tudorovskaya

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S/081/62/000/002/068/107
B150/B101

AUTHOR: Brekhovskikh, S. M.

TITLE: Investigation of the system CdO - BaO - B_2O_3 in the vitreous state

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 2, 1962, 378, abstract 2K239 (Sb. nauchn. tr. Belorussk. politekhn. in-t, no. 86, 1960, 48 - 60)

TEXT: Investigation of the system CdO - BaO - B_2O_3 in the vitreous state was carried out for the synthesis of neutron-absorbing glasses. It was shown that in the system CdO - B_2O_3 it is possible to obtain transparent glasses from fusions containing up to 91.5% by wt. of CdO ($5CdO \cdot B_2O_3$). In the binary system BaO - B_2O_3 transparent glasses are obtained containing up to 68% by wt. of BaO ($5BaO \cdot 6Ba_2O_3$). In the ternary system CdO-BaO-B_2O_3 transparent glasses were obtained which contained up to 80% by wt. of CdO, and glasses with up to 70% by wt. of BaO. It is presumed that the Cd

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Investigation of the system...

atoms, like the Pb and Bi atoms, can behave like lattice-formers. BaO may be considered in some glasses as an oxide, forming in the presence of B_2O_3 the complex structural lattice of glass. Melting point of the glasses is 1100 - 1150°C. [Abstracter's note: Complete translation.]

Card 2/2

BREKHOVSKIKH, S.M.

PHASE I BOOK EXPLOITATION SOV/5915

Vsesoyuznoye soveshchaniye po steklobrazovaniyu. 3d, Leningrad, 1959.

Steklobrazovaniye nestoyanstva; trudy Tret'yego vsesoyuznogo soveshchaniya Leningrad. 16-20 noyabrya 1959 (Vitreous State; Transactions of the Third All-Union Conference on the Vitreous State, Held in Leningrad on November 16-20, 1959) Moscow, Izd-vo AN SSSR, 1960. 534 p. Errata slip inserted. 3,200 copies printed. (Series: Its: Trudy)

Sponsoring Agencies: Institut khimii silikatov Akademii nauk SSSR. Vsesoyuznoye khimicheskoye obshchestvo imeni D.I. Mendeleyeva and Gosudarstvennyy ordena Lenina opticheskiy institut imeni S.I. Vavilova.

Editorial Board: A.I. Avgustinik, V.P. Barabanovskiy, M.A. Berborov, O.K. Botvinkin, V.V.Vargin, A.G. Vlasov, K.S. Yevstrop'yev, A.A. Lebedev, M.A. Ksheveyev, V.S. Molchanov, R.L. Myuller, Ye.A. Porai-Koshits, Chairman, N.A. Toropov, V.A. Florinskaya, A.K. Tekhilidi; Ed. of Publishing House: I.V. Suvorov; Tech. Ed.: V.T. Bocharov.

PURPOSE: This book is intended for researchers in the science and technology of glasses.

COVERAGE: The book contains the reports and discussions of the Third All-Union Conference on the Vitreous State, held in Leningrad on November 16-19, 1959. They deal with the methods and results of studying the structure of glasses, the relation between the structure and properties of glasses, the nature of the chemical bond and glass structure, and the crystallochemistry of glass. Fused silica, mechanism of vitrification, optical properties and glass structure, and the electrical properties of glasses are also discussed. A number of the reports deal with the dependence of glass properties on composition, the tinting of glasses and radiation effects, and mechanical, technical, and chemical properties of glasses. Other papers treat glass semiconductors and ash borosilicate glasses. The Conference was attended by more than 300 delegates from Soviet and East German scientific organizations. Among the participants in the discussions were N.V. Solomin, Ye. V. Kuvshinskiy, S.M. Petrov, A.N. Lazarev, D.I. Golib, O.P. Mchedlov-Petrosyan, G.P. Mikhaylov, S.M. Kuznetsov, E.V. Degtyareva, G.V. Lerh, A.V. Shatilov, M.T. Floshchinskiy, A.Ya. Kuznetsov, E.V. Degtyareva, G.V. Byurganovskaya, A.A. Kolenov, M.M. Skornyakov, P.Ye. Bokiy, F.K. Keller, Ya.A. Kunetsov, V.P. Pozdnev, R.S. Shevelevich, Z.G. Pinsker, and O.S. Molchanova. The final session of the Conference was addressed by Professor I.I. Kitaygorodskiy, Honored Scientist and Engineer, Doctor of Technical Sciences. The following institutes were cited for their contribution to the development of glass science and technology: Gosudarstvennyy opticheskiy institut (State Optical Institute); Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry, AS USSR), Fizicheskiy institut AN SSSR (Physics Institute AS USSR), Fiziko-tekhnicheskiy institut AN SSSR (Physicotechnical Institute AS USSR), Institut fiziki AN BSSR, Minsk (Institute of Physics, Academy of Sciences, Belorusskaya SSR, Minsk), Laboratory of Physical Chemistry of Silicates of the Institut obshchey i neorganicheskoy khimii AN BSSR, Minsk (Institute of General and Inorganic Chemistry, Academy of Sciences, Belorusskaya SSR, Minsk), Institut vysokomolekulyarnykh soyedineniy AN SSSR (Institute of High Molecular Compounds, AS USSR), Gosudarstvennyy institut stekla (State Institute for Glass), Gosudarstvennyy institut elektrotekhnicheskogo stekla (State Institute for Electrical Glass), Sibirskiy fiziko-tekhnicheskiy institut, Tomsk (Siberian Physicotechnical Institute, Tomsk), Leningradskiy gosudarstvennyy universitet (Leningrad State University), Moskovskiy khimiko-tekhnologicheskiy institut (Moscow Institute of Chemical Technology), Leningradskiy tekhnologicheskiy institut im. Lensoveta (Leningrad Technological Institut imeni Lensoveta), Belorusskiy politekhnicheskiy institut Minsk (Belorussian Polytechnic Institute, Minsk), Novocherkasskiy politekhnicheskiy institut (Novocherkassk Polytechnic Institute), and Sverdlovskiy politekhnicheskiy institut (Sverdlovsk Polytechnic Institute). The Conference was sponsored by the Institute of Silicate Chemistry AS USSR (Acting Director - A.S. Golib), the Vsesoyuznoye khimicheskoye obshchestvo im. D.I. Mendeleyeva (All-Union Chemical Society Institut imeni Mendeleyev), and the Gosudarstvennyy ordena Lenina opticheskiy institut imeni S.I. Vavilova (State "Order of Lenin" Optical Institute imeni S.I. Vavilov). The 15 resolutions of the Conference include recommendations to organize a Center for the purpose of coordinating the research on glass, to publish a new periodical under the title "Fizika i khimiya stekla" (Physics and Chemistry of Glass), and to join the International Committee on Glass. The Conference thanks A.A. Lebedev, Academician, Professor of Physics and Mathematics, Member of the editori; Ya.A. Porai-Koshits, Doctor of Physical Sciences, Member of the Organizational Committee, and N.L. Myuller, Doctor of Chemical Sciences, Member of the Organizational Committee and Chairman of the Organization of Committee. The editorial board thanks G.M. Barenev, N.V. Vol'kenshteyn, L.I. Denkina, D.P. Dobychin, S.M. Dubrovo, V.A. Ioffe, and E.T. Kolesnikova. References accompany individual reports.

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BREKHOVSKIKH, S.M.; BORISOV, B.I.

Glass facing materials. Stek. i ker. 18 no. 1:5-8 Ja '61.
(MIRA 14:1)
(Glass construction)

BREKHOVSKIKH, S.M.; SAVITSKIY, M.R.

Reviewing the standard for window glass. Stek. i ker. 18 no.6: 7-8 Je '61. (MIRA 14:7)

(Glass--Standards)

S/072/61/000/009/001/001
B105/B226

AUTHOR: Brekhovskikh, S. M.

TITLE: Prospects for the use of radioactive isotopes and nuclear radiations in the glass industry

PERIODICAL: Steklo i keramika, no. 9, 1961, 20 - 23

TEXT: The present paper describes the ever increasing use of isotopes and nuclear radiations in industry, agriculture, building, and in various fields of scientific research. At present, more than 200 radiation sources of 14 radioactive isotopes are being produced in series, which are almost not used in the glass industry. V. I. Shelyubskiy and Ts. A. Karchmar determined the homogeneity of the glass charge from the content of the natural radioactive K^{40} isotope which emits 1.3-Mev electrons and has a half-life of $1.3 \cdot 10^9$ years. The Institut stekla (Glass Institute) elaborated the research method. V. A. Dubrovskiy investigated the flow of the metal in the tank furnace using a metal labelled by the Ca^{45} iso-

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tope. In the Kuznetskiy metallurgicheskiy kombinat (Kuznetsk Metallurgical Combine), the Makeyevskiy metallurgicheskiy kombinat (Makeyevka Metallurgical Combine), and the zavod "Azovstal'" ("Azovstal'" Works), the wear of walling of open-hearth furnaces is radiometrically controlled. Fe^{59} and Ca^{45} serve as indicators. In the Works KIP of Khar'kovskiy sovnarkhoz (Khar'kov sovnarkhoz) a radioactive pulp densitometer of the type ИПП(IPP) has been designed for the use of Cs^{137} for measuring densities in the range of 1 to 2.1 g/cm^3. In flotation plants these methods can be used for the preparation of sand for glass works. They also make it possible to automatize the work of the classification mill in the Saratovskiy zavod (Saratov Works), Gusevskiy zavod (Gusevo Works), and zavod "Proletariy" (Works "Proletariy"). The humidity of concrete, gravel, and sand can be determined by recording the absorption intensity of gamma radiation, the error being $<2\%$ of humidity (according to A. I. Yakovlev). In the glass industry both devices of the type ИВН-1 (IVN-1) and the unit "Нейтрон" ("Neytron") can be employed. V. I. Spitsyn found out that the radiochemical activation of the surface of solid bodies accelerates the adsorption processes

and isotopic exchange. The device of the type БТП-1 (BTP-1) can be used for measuring the thickness of coatings on glass. The Vsesoyuznyy nauchno-issledovatel'skiy institut poligraficheskoy promyshlennosti (All-Union Scientific Research Institute of Printing Industry) developed such a device. It is made use of in the I Obraztsovaya tipografiya imeni Zhdanova Moskovskogo gorodskogo sovnarkhoza (First Model Printing Press imeni Zhdanov of Moscow City sovnarkhoz), and in the tipografiya "Krasnyy proletariy" (Printing Press "Krasnyy proletariy"). The device of the type ВНИМС-58 (VNIMS-58) serves for determining the content of rare elements in glass and raw material. Tu^{170} is used as primary radiation source. The device is equipped with a photomultiplier of the type ФЭУ-1С (FEU-1S). The Moskovskiy filial instituta Orgenergostroy (Moscow Branch of the Institute Orgenergostroy) developed the radioactive defectoscope of the type РДБ-2 (RDB-2). The clogging of pipes is determined by the indicator of the type ИРП (IRP) which records differences in density. A more detailed knowledge about the glass structure was gained by the study of electron-paramagnetic resonance and nuclear quadrupole- and nuclear magnetic resonance of glasses irradiated by gamma- and X-rays. Thermoluminescence spectra may be used for

Prospects for the use of....

S/072/61/000/009/001/001
B105/B226

detecting microheterogeneities in irradiated glasses. There are 7 figures and 8 references: 6 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: I. Peyshes, Silikat Industry No. 7, 1952; P. I. Jones. Atomic Energy Res. No. 3056, 1959.

Card 4/4

24,3500 1160 22192
15.2120 also 1035
1138 S/048/61/025/004/041/048
B117/B209

AUTHORS: Brekhovskikh, S. M. and Shapovalova, N. F.

TITLE: Study of the photoluminescence and of scintillations of silicate glass

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizioheskaya, v. 25, no. 4, 1961, 541-542

TEXT: The present paper has been read at the 9th Conference on Luminescence (Crystal Phosphors). The authors wanted to develop glass types with such a scintillating power as to be suited as γ-detectors in scintillation counters. Cerium was used as an activator, because in silicate glass it gives rise to only a blue and a light-blue luminescence which lies in the range of the highest sensitivity of the photomultipliers that are most used in engineering. Two-component silicate glasses were synthetized with lithium and sodium in order to study the effect of elements of the first group upon the light yield. In a comparison of the luminescence of these glasses under the action of ultraviolet rays lithium was found to raise the light yield by more than the six-fold by shifting it to the

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short-wave region. The luminescent properties of sodium silicate glass change only slightly even when a third component is introduced. When sodium glass was α-irradiated from Cm, the scintillation effect was so poor that it was covered by the photomultiplier background. The high light yield of lithium silicate glass remained nearly unchanged when manganese-, calcium-, or barium oxide were introduced as a third component. The scintillation of these glasses in the case of α-irradiation was 1.5 ÷ 3% as referred to NaI(Tl). Since γ-sensitive glass must contain a considerable amount of heavy oxides, the authors produced glasses with 50% and more of BaO. However, in this manner a high light yield could not be attained, neither in luminescence nor in scintillation. Glass of the types C 3-56 (SZ-56) and 3-56-8 (Z-56-8) displayed good luminescent properties and were suited for γ-detectors (Table). When these glasses were excited with scattered γ-rays from a Co^{60} source, their scintillating efficiency (referred to NaI(Tl) crystals) was 2%, and 3% in the case of α-irradiation. These studies lead to the following conclusions: Lithium, as one of the main components, has a favorable effect upon the light yield of luminescence. An equivalent exchange of oxides in the basic composition has a relatively weak influence on spectrum and

Study of the photoluminescence ...

intensity of luminescence. The light yield in the glasses concerned is considerably reduced by Sb, Ge, As, Ta, and Tl, and is completely extinguished by Cd, Bi, Pb, and Ti. The change in acidity of the glass is the decisive factor for the light yield. The latter decreases considerably with the acidity, and the peak in the luminescence curve is shifted into the long-wave region (390 mμ → 470 mμ). The luminescence spectra are closely related to the transmission spectra; the maximum in the luminescence spectra of all glass types coincides with the transmission maximum. The glass types examined may be used as γ-detectors in scintillation counters. [Abstracter's note: Essentially complete translation.] There is 1 table.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy institut stekla pri Gosplane RSFSR (State Scientific Research Institute of Glass at the Gosplan RSFSR)

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Study of the photoluminescence ...

S/048/61/025/004/041/048
B117/B209

Legend to the Table: Chemical composition of SZ-56 and of Z-56-8 glass.
1) glass; 2) oxide content, % by weight; 3) over 100%.

1) Стекла	2) Содержание окислов, вес. %				3) Сверх 100%	
	Li_2O	SiO_2	BaO	Al_2O_3	CeO_2	NH_4F
СЗ-56	6,43	77,14	16,43	Сверх 100% 3	0,8	2,0
З-56-8	9,68	64,81	18,21	7,29	0,8	2,0

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15 2120

24823
S/081/61/000/011/022/040
B103/B202

AUTHORS: Brekhovskikh, S. M., Sesorova, V. N.

TITLE: Synthesis and study of the properties of hafnium silicate glasses

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 11, 1961, 360, abstract 11K310(11K310). (Sb. "Stekloobrazn. sostoyaniya". M.-L., AN SSSR, 1960, 444-446 Diskus. 446.)

TEXT: Hf is an analog to Zr and Ti. The chemical stability, thermal resistance, softening temperature, density and refractive index of glass are increased when Hf is introduced into it. The maximum possible HfO_2 content in the silicate glasses at melting temperatures of 1600 - 1650°C is 32 - 35 wt %. [Abstracter's note: Complete translation.]

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BREKHOVSKIKH, S.M.

Prospects for the use of radioactive isotopes and nuclear emissions in the glass industry. Stek.i ker. 18 no.9:20-23 S '61. (MIRA 14:10)
(Glass manufacture) (Radioisotopes--Industrial applications)

BREKHOVSKIKH, S. M., SIDOROV, T. A. and CHUBKINA, N. I.

"Structure and Properties of Germanium Glasses"

report presented at the Sixth International Congress on Glass, 8-14 Jul 62, Wash, D.C.

Research Institute of Glass, Moscow

BREKHOVSKIKH, S. M.; GRINSHTEYN, Yu. L.; LANDA, L. M.; CHUBAKINA, N. I. 3

"The effect of nuclear radiations on the structure and phase transitions in sitals."

report submitted for 4th All-Union Conf on Structure of Glass, Leningrad, 16-21 Mar 64.

BREKHOVSKIKH, S. M.; VIKTOROVA, Yu. N.; ZELENTSOV, V. V.; ZELENTSOVA, S. A. 3

"Effect of some oxides on silicon-oxygen sceleton of oxygeneous glasses."

report submitted for 4th All-Union Conf on Structure of Glass, Leningrad, 16-21 Mar 64.

43248

15.2120

S/844/62/000/000/114/129
D207/D307

AUTHORS: Brekhovskikh, S. M., Vereshchinskiy, I. V., Grishina, A. D., Zelentsova, S. A., Revina, A. A. and Tykachinskiy, I. D.

TITLE: Electron paramagnetic resonance in irradiated glasses of various compositions

SOURCE: Trudy II Vsesoyuznogo soveshchaniya po radiatsionnoy khimii. Ed. by L. S. Polak. Moscow, Izd-vo AN SSSR, 1962, 660-667

TEXT: The purpose of the work was to prepare a glass for making test tubes and ampoules used in EPR studies of irradiated substances; such glass must not given an apppreciable EPR signal after being subjected to an ionizing radiation. The basic glass composition was $3SiO_2.0.5Al_2O_3.0.75CaO.0.2MgO$, which was varied by additions of Na_2O, K_2O, Li_2O, BaO, CeO_2, or Fe_2O_3, by altering the proportions of CaO or MgO, and by replacing 20 wt.% SiO_2 with the same

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amount of B_2O_3. Samples were prepared from quartz sand and from materials of 'pure' and 'analytically pure' grades, in corundum crucibles heated to 1450 - 1570°C. The glasses were irradiated with 800 kev electrons at the rate of 10^{21} ev.cm^{-2}.hour^{-1} at room temperature, or with 80 kev x rays (10^{17} ev.cm^{-3}.sec^{-1}) at 77 - 320°K. The spectra were recorded with an apparatus based on ЭПР-2 (EPR-2) of the Institut khimicheskoy fiziki (Institute of Chemical Physics). It was found that in some cases there was no correlation between coloring and generation of paramagnetic centers by electrons and x rays. The addition of Fe_2O_3 or CeO_2 reduced the EPR signal intensity of the irradiated glasses, while the other additives either raised the original signal intensity (Al_2O_3 or alkali oxides together with B_2O_3) or produced an additional peak (B_2O_3 alone or BaO). Annealing of irradiated glasses reduced the concentration of paramagnetic centers produced by second irradiation. Using this information a glass of unstated composition, named 'A', was prepared, which gave no noticeable EPR signal after irradiation and was,

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therefore, suitable for making test tubes used in radiation chemistry. The work on EPR and x ray irradiation was carried out in the Laboratoriya radiatsionnoy khimii (Radiation-Chemistry Laboratory), directed by Doctor of Chemical Sciences N. A. Bakh, who took a direct part in the discussion of the results. There are 8 figures and 2 tables.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut stekla (All-Union Scientific Research Institute for Glass); Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry, AS USSR); Institut elektrokhimii AN SSSR (Institute of Electrochemistry, AS USSR)

32369
S/072/62/000/001/002/003
B105/B110

152120

AUTHORS: Brekhovskikh, S. M., Borisova, I. I.

TITLE: Stability of metallic oxide films on glass to the effect of ionizing radiation

PERIODICAL: Steklo i keramika, no. 1, 1962, 4 - 6

TEXT: The radiation stability was investigated for metallic oxide films on glass which impart new properties to the glass: a predetermined electrical conductivity, selective light permeability, reflection, increased mechanical strength, chemical stability, hydrophobic nature. The aerosol-base films were mostly prepared by spraying-on solutions or salt vapors at temperatures close to the softening temperature of the glass. The radiation-optical stability was investigated for metallic oxide films developing during the pyrolysis of acetates of cadmium, cobalt and nickel, nitrates of lead and silver, chlorides of aluminum, vanadium, bismuth, iron, manganese, copper, strontium, titanium, chromium, zinc, and zirconium. The films were applied onto refractory 13-B(13-v) glass which contained 0.6% by weight of cerium oxide and was not discolored by γ-rays of Co^{60} (doses

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Stability of metallic oxide...

of up to 10^5 - 10^6 r). The glass is noticeably colored at 10^7 and $6.8 \cdot 10^7$ r, and its transparency decreases from 86.7% to 70.7 and 48.4%, respectively. The effect of γ-rays on the electrical conductivity of metallic oxide coatings was also determined, window glass also being used as a base. The films were applied at glass temperatures of 650 - 850°C, and irradiated by means of Co^{60} with 10^3, 10^5, and $6.8 \cdot 10^7$ r, neither color nor transparency of any specimen changing at 10^3 and 10^5 r, with the exception of the coating developing during pyrolysis of silver nitrate. Discoloring and decrease in transparency set in during irradiation with $6.8 \cdot 10^7$ r. Investigations with higher radiation doses (10^9 - 10^{10} r) and research into the stability of films to γ-neutron irradiation are mentioned as being of interest. There are 2 tables and 8 referendes: 7 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: Y. Paymal, M. Bonnaud, P. Clerc. J. Am. Cer. Soc. 43, no. 8, 1960.

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Stability of metallic oxide...

Table 2. Spectral light permeability of silver nitrate coatings.
Legend: (a) Wavelength in mμ; (b) spectral light permeability; (c) before irradiation; (d) after irradiation.

(a) Длина волны в мμ	(b) Спектральное светопропускание			(a) Длина волны в мμ	(b) Спектральное светопропускание		
	(c) до облучения	после облучения (d)			(c) до облучения	после облучения (d)	
		$10^4 p$	$10^5 p$			$10^4 p$	$10^5 p$
320	0	0	0	520	55,0	46,0	51,0
340	0	0	0	550	57,5	47,2	52,8
350	7,0	6,1	5,1	600	59,3	49,0	54,5
360	23,0	20,6	17,9	650	61,0	50,0	55,1
370	37,0	32,0	29,2	700	60,0	48,5	53,0
380	44,0	38,5	36,9	750	59,0	48,1	53,5
390	47,0	40,5	41,0	800	57,2	47,3	53,0
400	48,1	42,0	43,0	850	55,0	46,0	51,0
420	48,9	42,0	44,2	900	54,0	44,0	47,3
440	47,5	41,0	44,0	950	52,8	42,9	47,4
460	49,0	41,1	45,2	1000	52,0	42,0	46,0
480	53,0	44,8	49,0	1100	52,0	42,0	46,0
500	54,0	45,0	49,2				

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L 15176-63 EWT(1)/EWP(q)/EWT(m)/BDS/ES(s)-2 AFFTC/ASD/ESD-3/SSD
Pt-4/Pq-4 WH

ACCESSION NR: AR3003334 S/0058/63/000/005/E012/E012

SOURCE: RZh. Fizika, Abs. 5E72

AUTHOR: Brekhovskikh, S. M.; Demishev, G. K.; Butovich, L. N.

TITLE: Change of elastic and dielectric properties of glass induced by gamma irradiation

CITED SOURCE: Steklo. Byul. Gos. n.-i. in-ta stekla, no. 3(116), 1962, 14-17

TOPIC TAGS: gamma irradiation, glass, elastic property, dielectric property,

TRANSLATION: When glass is irradiated with gamma rays, an increase is observed in the modulus of longitudinal elasticity E and in the shear modulus μ. This can be attributed to the healing of the defects of the glass structure by the diffusion of the modifier atoms. Annealing has a similar influence on the change in the elastic parameters. The tangent of the angle of the dielectric losses and the dielectric constant also increase during the irradiation process. This is probably connected, like the coloring of the specimens upon irradiation, with ionization processes in the glass. O. Mazurin

DATE ACQ: 17Jun63 SUB CODE: PH ENCL: 00

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S/072/63/000/004/002/005
A051/A126

AUTHORS: Brekhovskikh, S. M., Candidate of Technical Sciences, Grinshteyn, Yu. L., Engineer

TITLE: Glass production under the action of gamma rays

PERIODICAL: Steklo i keramika, no. 4, 1963, 9 - 10

TEXT: A study of optical property changes in glass, under the action of Co^{60} gamma radiation, was made. The effect of the gamma rays on the kinetics of glass manufacturing processes was investigated. The degree of purification of the molten glass was taken as the criterion for evaluating the rate of the processes occurring in the molten mass. A five-component industrial glass (in % by weight): 71.3 SiO_2, 15.5 Na_2O, 7 CaO, 4.3 MgO, 2.0 Al_2O_3, was investigated. It was found that the gamma radiation has an effect only on the processes which occur in the first stages of the production (during the first 20 min in the experiments), and which are accompanied primarily by the emission of gas. One of these processes is said to be the possible acceleration of thermal dissociation of carbonates included in the composition of the mass, since under the effect of

Glass production under the action of gamma rays

S/072/63/000/004/002/005
A051/A126

the radiation internal heating of the micro-volume of the substance takes place owing to the interaction of the freed electrons with atom and ion shells. A study of the mass activation with preliminary gamma irradiation is recommended as it is thought to be important for the production of new types of glass. There are 3 figures.

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L 10522-63 EWP(q)/EWT(m)/BDS--AFFTC/ASD--Pq-4--WH

ACCESSION NR: AP3000392 S/0072/63/000/005/0016/0017

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TITLE: Radiation stability of foamed glass

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TOPIC TAGS: foamed glass, composition, service temperature, mechanical strength, radiation stability, radiation, foaming agent

ABSTRACT: The radiation resistance of two types of foamed glass has been studied. The first type was prepared from 90 to 95% alkali window glass (71.5% SiO_2, 1 to 1.5% Al_2O_3, 7.5 to 8% CaO, 3 to 3.5% MgO, 15% Na_2O) and 10 to 5% Al_2O_3, TiO_2, or ZrO_2, with the addition of 0.5 to 1% SiC or carbon black, or 4% MnO as foaming agents. The second type was prepared from 70 to 80% nonalkali barium glass (60.5% SiO_2, 14.6% Al_2O_3, 16.2% CaO, 8.7% BaO, + 2% Fe) and 30 to 20% Cr_2O_3 or ZrO_2, with the addition of 0.5 to 1% SiC or carbon black. The approximate service temperature of the glasses is 600 to 800C; the highest compressive strength, 31.7 to 74.4 kg/cm^2, is exhibited by specimens produced with use of SiC. The glasses were irradiated with thermal neutrons for 84 hrs (total flux about 10^{18} neutron·cm^{-2})

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and subjected to compression tests. The tests showed that the mechanical strength of the specimens remained almost unchanged. It was concluded that foamed glasses from alkali window glass and TiO_2 or ZrO_2 and from nonalkali barium glass with Cr_2O_3 or ZrO_2 are resistant to radiation and can be used as heat-resistant thermal insulation in equipment exposed to gamma-neutron radiation.

ASSOCIATION: none

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