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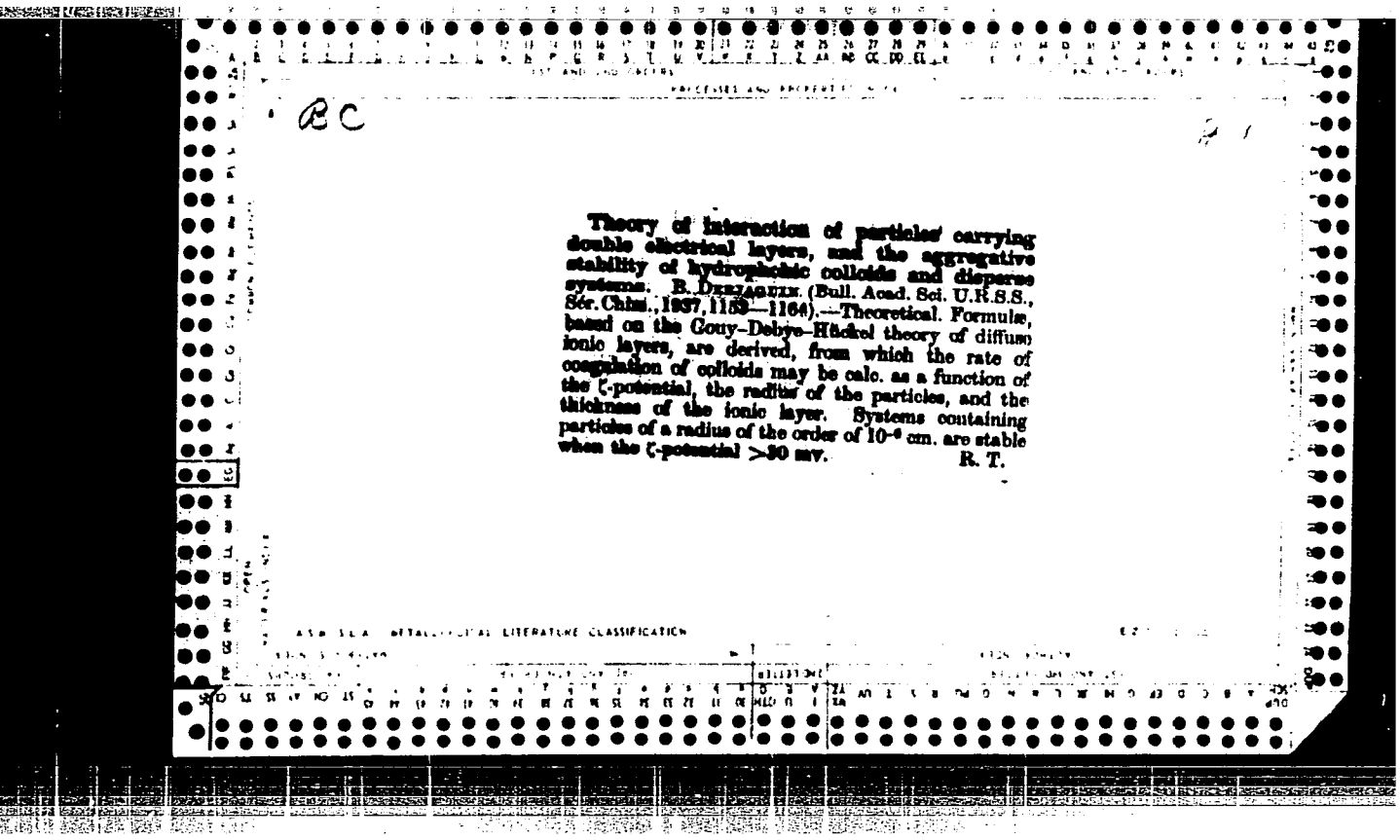

BC

Theory of interaction of particles carrying double electrical layers, and the aggregative stability of hydrophobic colloids and disperse systems. B. Deriaguin. (Bull. Acad. Sci. U.R.S.S., Sér. Chim., 1937, 1153—1164).—Theoretical. Formulæ, based on the Gouy–Debye–Hückel theory of diffuse ionic layers, are derived, from which the rate of coagulation of colloids may be calc. as a function of the ζ-potential, the radius of the particles, and the thickness of the ionic layer. Systems containing particles of a radius of the order of 10^{-6} cm. are stable when the ζ-potential >30 mv.

R. T.

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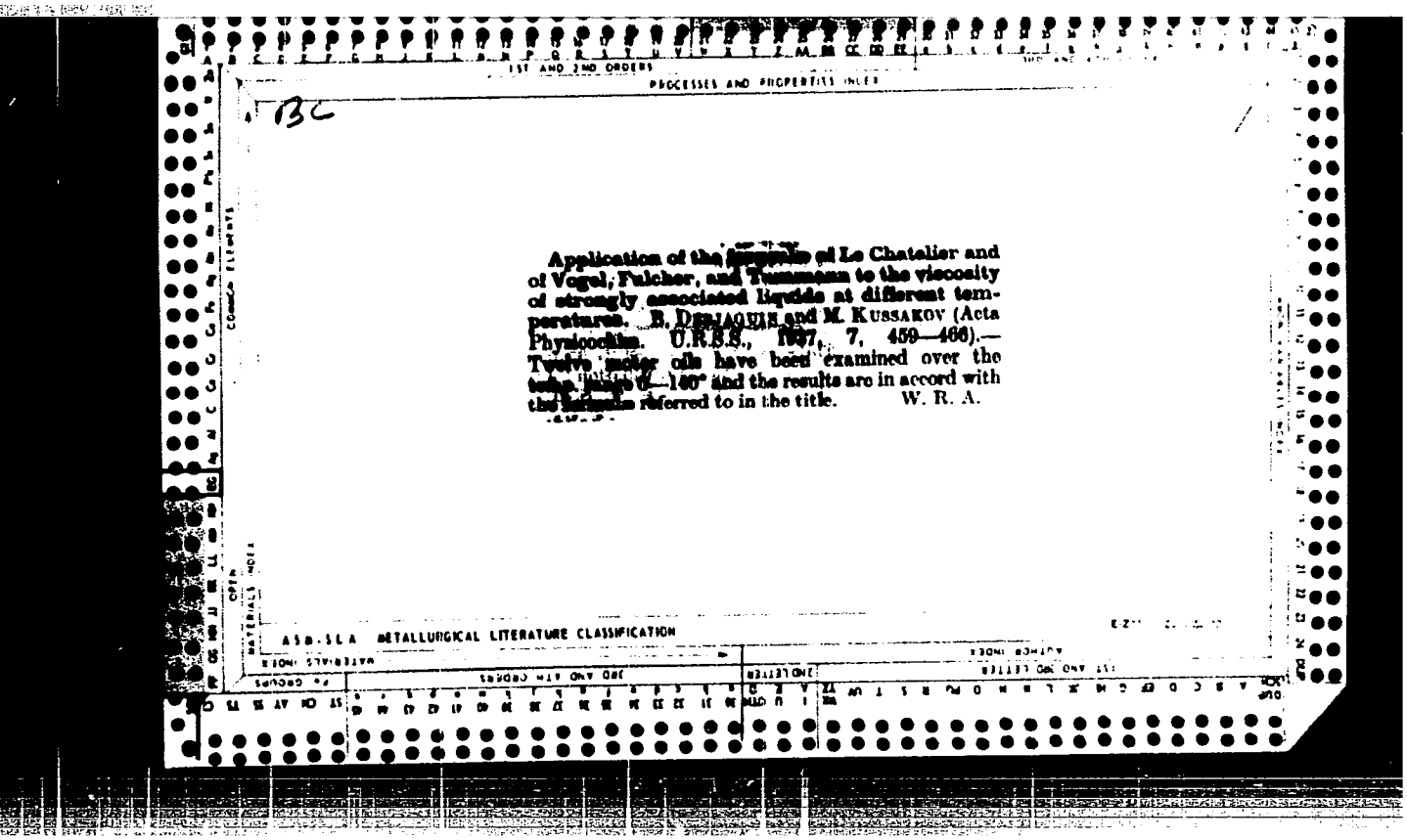

Application of the principle of Le Chatelier and of Vogel, Fulcher, and Tammann to the viscosity of strongly associated liquids at different temperatures. B. DERJAGUIN and M. KUSSAKOV (Acta Physicochim. U.R.S.S., 1937, 7, 459—466).— Twelve motor oils have been examined over the temperature range 0—180° and the results are in accord with the formulæ referred to in the title. W. R. A.

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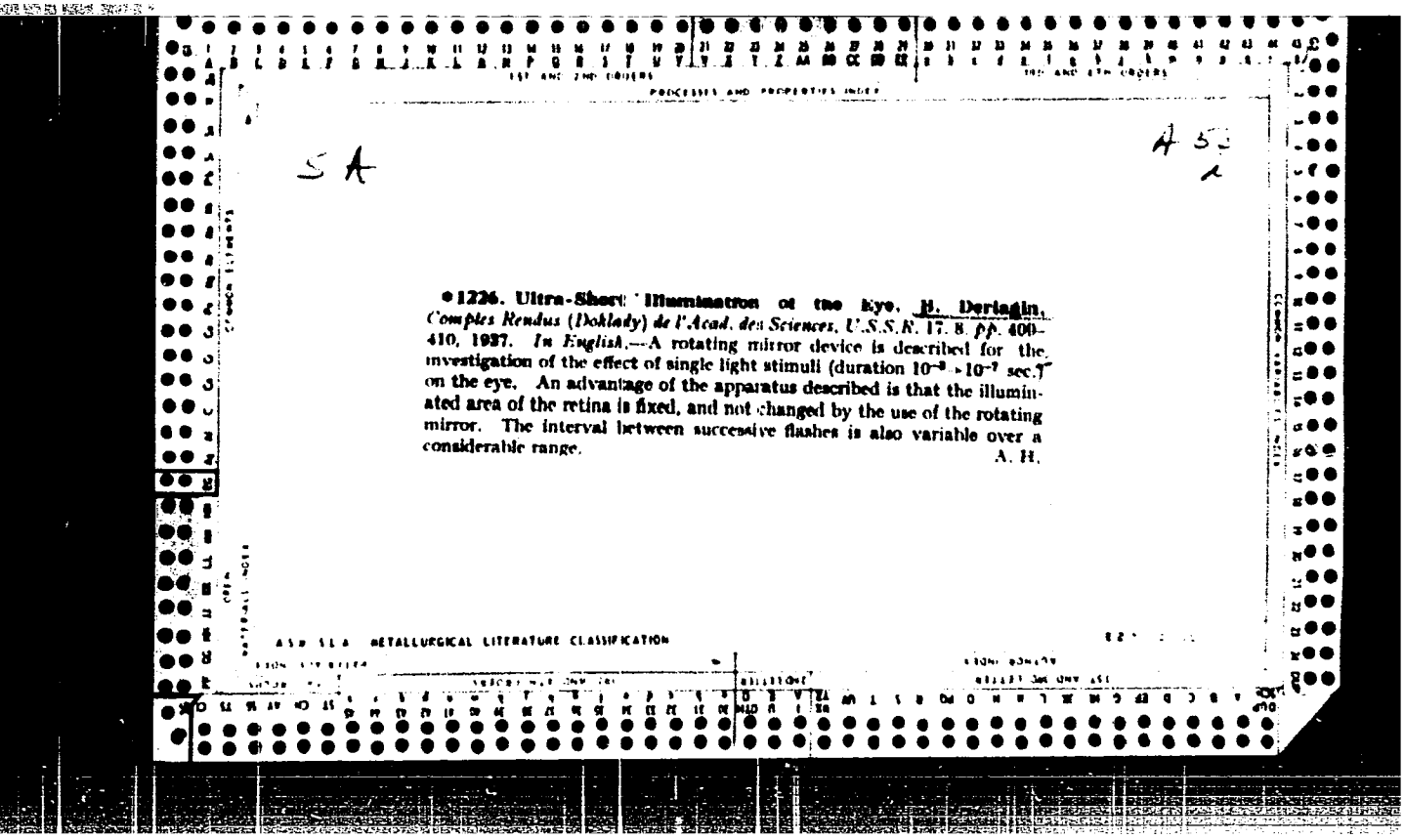

5A

4 53
2

●1226. **Ultra-Short Illumination of the Eye.** H. Deriagin. *Comptes Rendus (Doklady) de l'Acad. des Sciences, U.S.S.R.* 17. 8. pp. 409–410, 1937. *In English.*—A rotating mirror device is described for the investigation of the effect of single light stimuli (duration 10^{-6} - 10^{-7} sec.) on the eye. An advantage of the apparatus described is that the illuminated area of the retina is fixed, and not changed by the use of the rotating mirror. The interval between successive flashes is also variable over a considerable range.

A. H.

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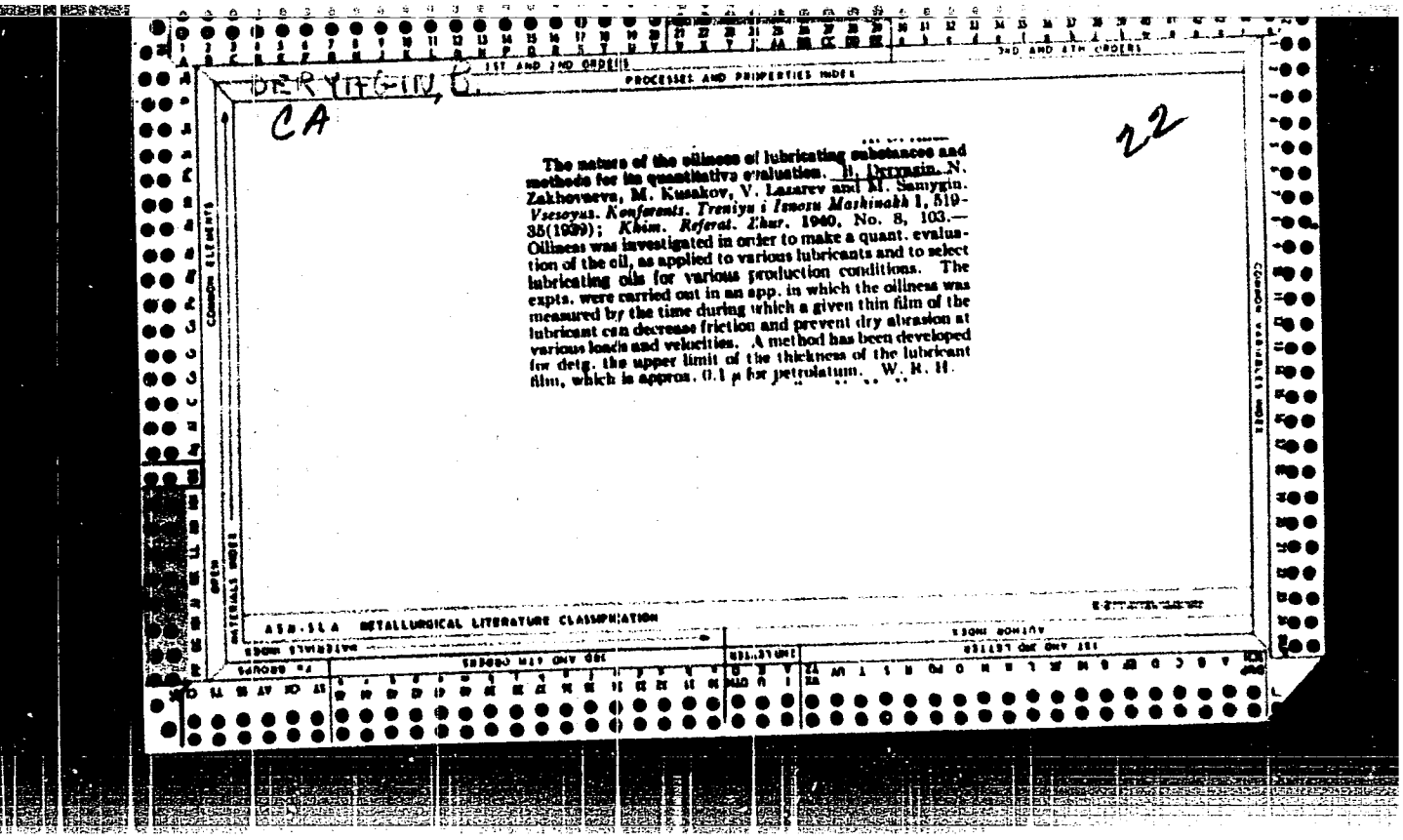

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DERYAGIN, B. V.

Theory of nondissolving volume (i. e., of the negative adsorption). B. Deryagin. *Colloid J.* (U. S. S. R.) 5, 287-91(1939).—A relation between the nondissolving vol. and the potential of adsorption forces is deduced and discussed. J. J. Bikerman

Theory of nondissolving volume. II. B. V. Deryagin. *Colloid J.* (U. S. S. R.) 5, 606-11(1939); cf. *C. A.* 33, 8408[1].—With Fokker's theory of the structure of surface layers and the Gibbs adsorption theorem as a basis a relation is derived between the "nondissolving" vol. and the concn. of the substance the neg. adsorption of which is measured. The expts. used for checking the theory give a curve of a predicted shape but an impossible value for the const. involved (vol. of the solute in the soln.). J. J. Bikerman

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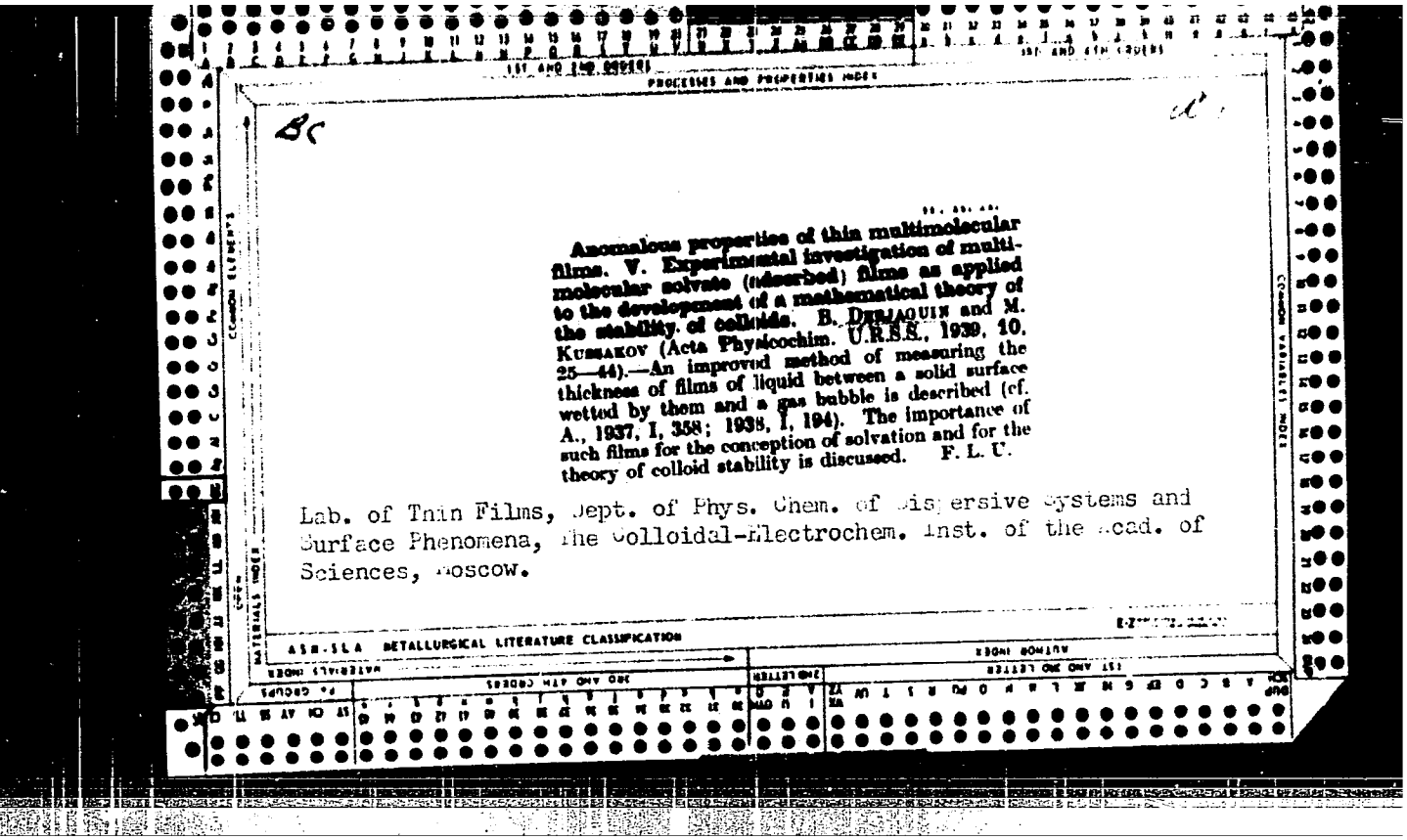

Anomalous properties of thin multimolecular films. V. Experimental investigation of multimolecular solvate (adsorbed) films as applied to the development of a mathematical theory of the stability of colloids. B. DERJAGUIN and M. KUSSAKOV (Acta Physicochim. U.R.S.S., 1939, 10, 25—44).—An improved method of measuring the thickness of films of liquid between a solid surface wetted by them and a gas bubble is described (cf. A., 1937, I, 358; 1938, I, 194). The importance of such films for the conception of solvation and for the theory of colloid stability is discussed. F. L. U.

Lab. of Thin Films, Dept. of Phys. Chem. of Dispersive Systems and Surface Phenomena, The Colloidal-Electrochem. Inst. of the Acad. of Sciences, Moscow.

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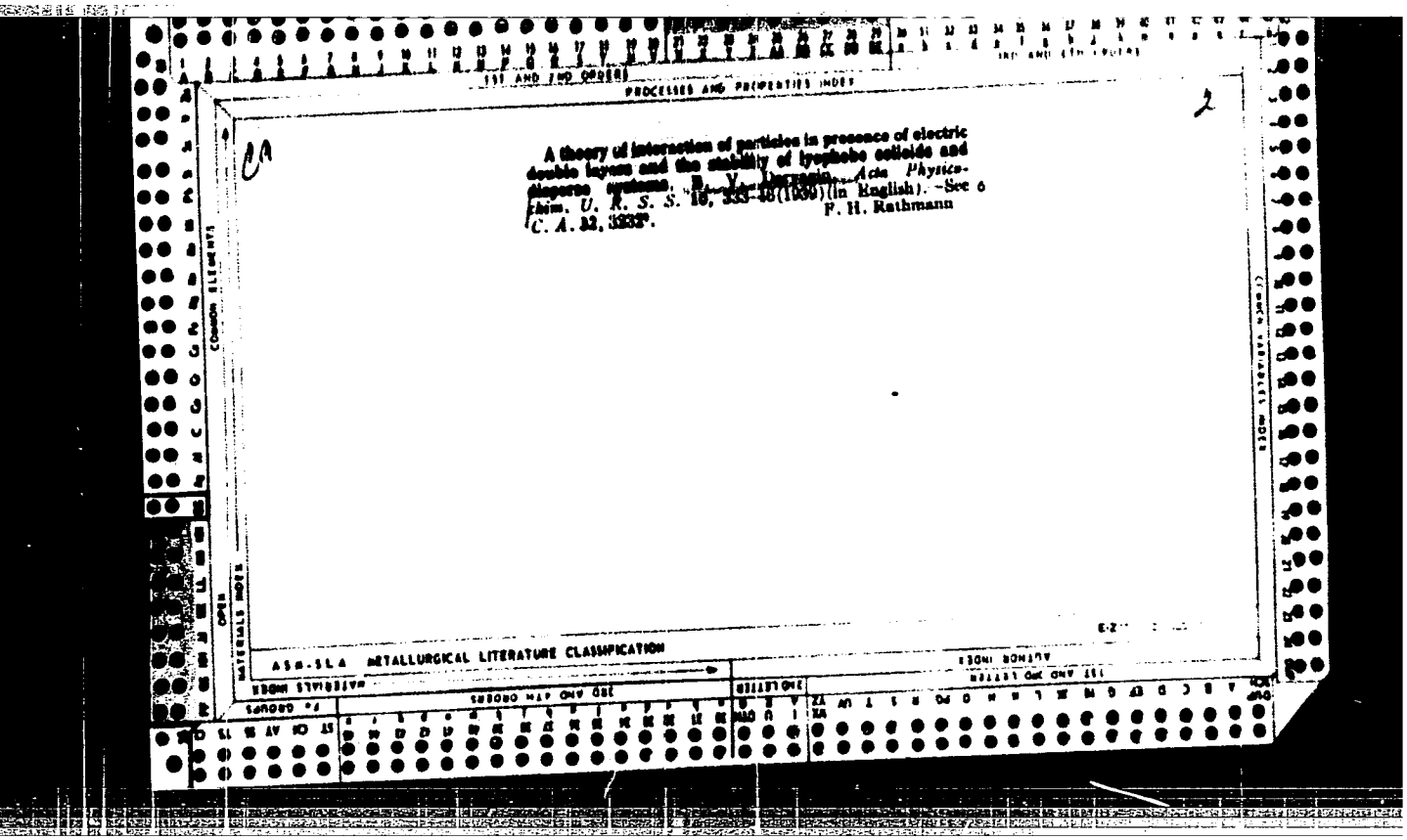

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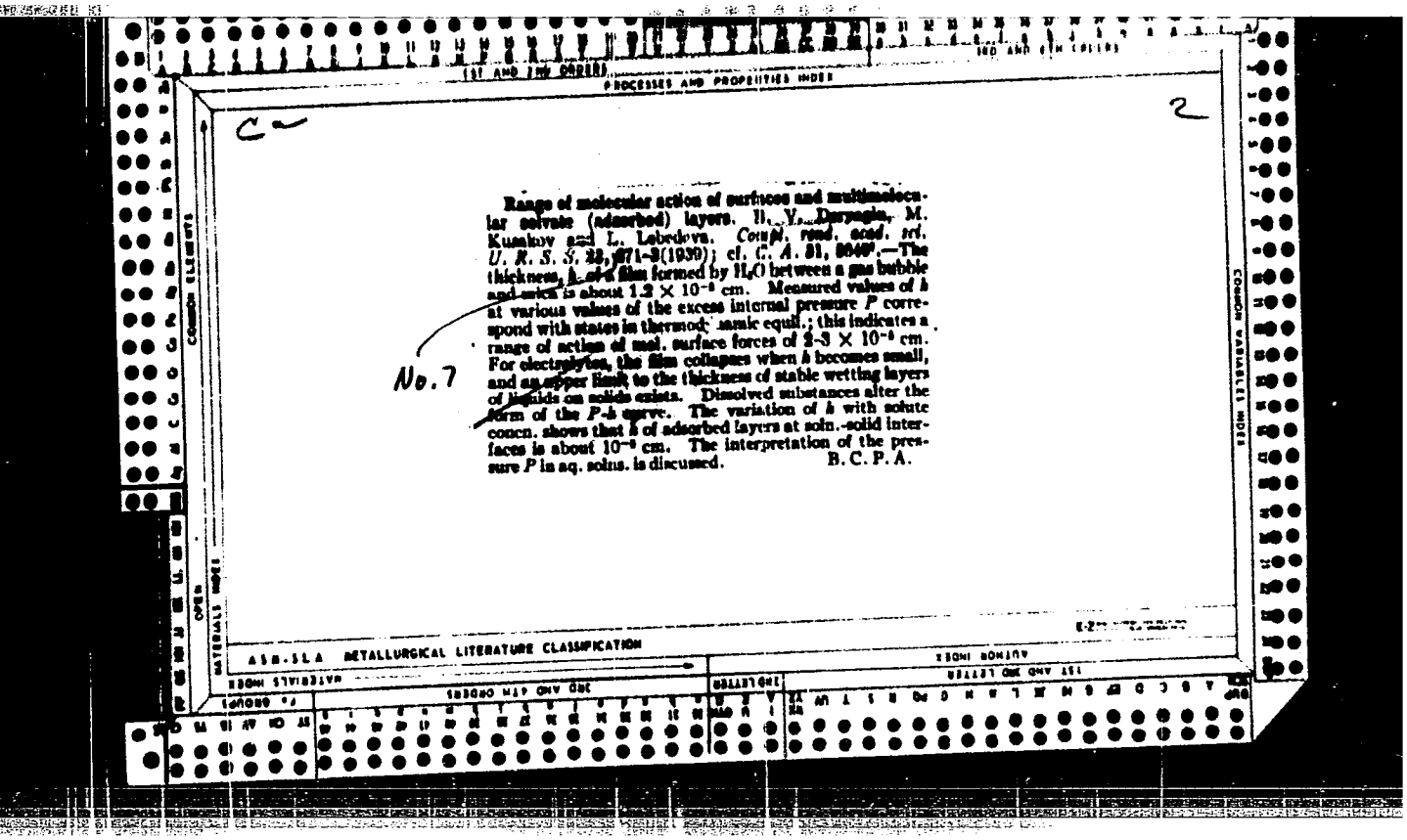
1ST AND 2ND ORDERS



PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

C

2

No. 7

Range of molecular action of surfaces and multimolecular solvate (adsorbed) layers. B. V. Deryagin, M. Kusakov and L. Lebedeva. *Compt. rend. acad. sci. U. R. S. S.* 23, 671-3(1939); cf. *C. A.* 31, 5040[9].—The thickness, h, of a film formed by H_2O between a gas bubble and mica is about 1.2×10^{-5} cm. Measured values of h at various values of the excess internal pressure P correspond with states in thermodynamic equil.; this indicates a range of action of mol. surface forces of $2\text{-}3 \times 10^{-5}$ cm. For electrolytes, the film collapses when h becomes small, and an upper limit to the thickness of stable wetting layers of liquids on solids exists. Dissolved substances alter the form of the P-h curve. The variation of h with solute concn. shows that h of adsorbed layers at soln.-solid interfaces is about 10^{-5} cm. The interpretation of the pressure P in aq. solns. is discussed. B. C. P. A.

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AUTHOR INDEX

1ST AND 2ND LETTER

3RD AND 4TH ORDERS

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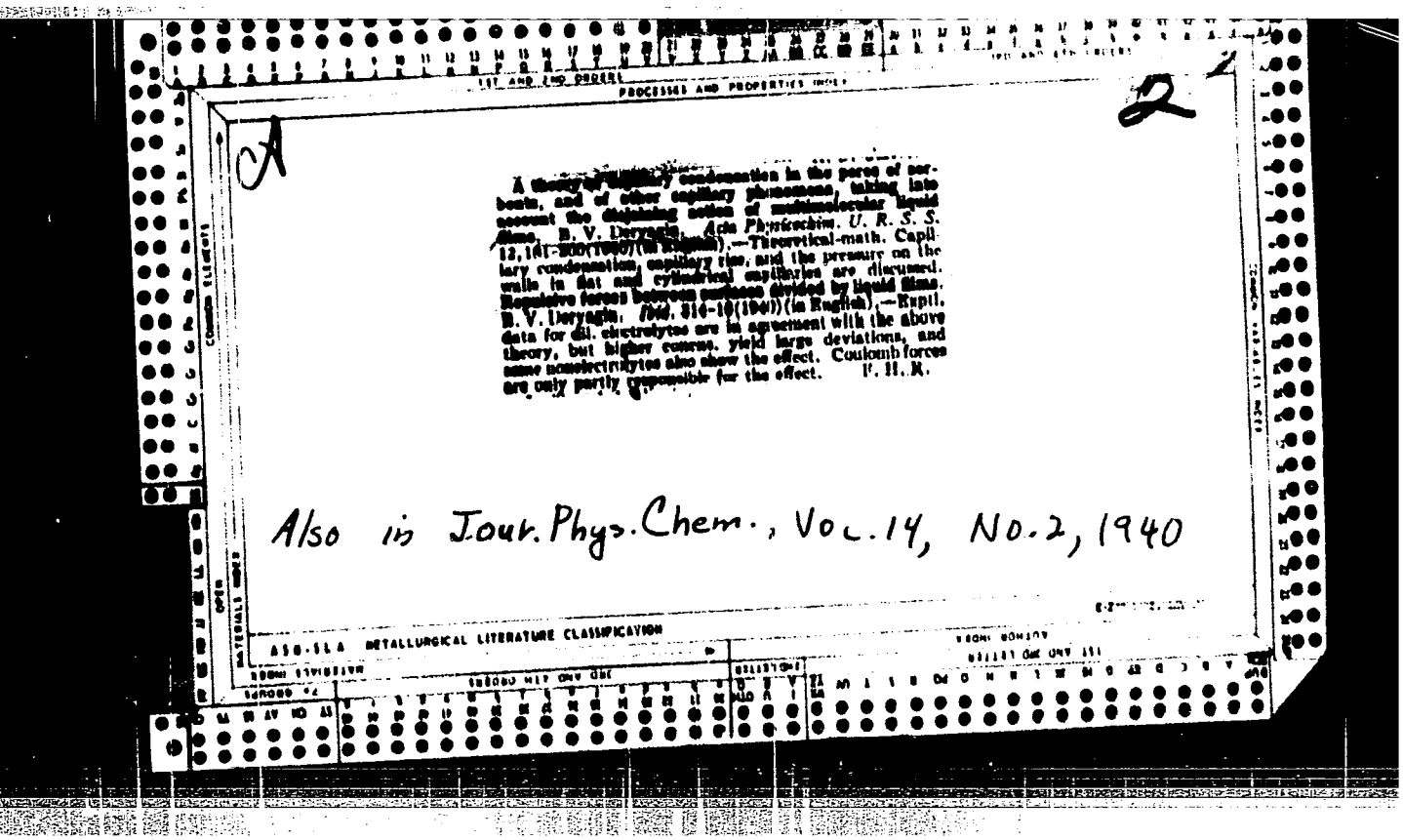

A

2

A theory of capillary condensation in the pores of sorbents, and of other capillary phenomena, taking into account the disjoining action of multimolecular liquid films. B. V. Deryagin. *Acta Physicochim. U. R. S. S.* 12, 181-200(1940)(in English).—Theoretical-math. Capillary condensation, capillary rise, and the pressure on the walls in flat and cylindrical capillaries are discussed. Repulsive forces between surfaces divided by liquid films. B. V. Deryagin. *Ibid.* 314-18(1940)(in English).—Expil. data for dil. electrolytes are in agreement with the above theory, but higher concns. yield large deviations, and some nonelectrolytes also show the effect. Coulomb forces are only partly responsible for the effect. P. H. K.

Also in Jour. Phys. Chem., Vol. 14, No. 2, 1940

A58-51A METALLURGICAL LITERATURE CLASSIFICATION

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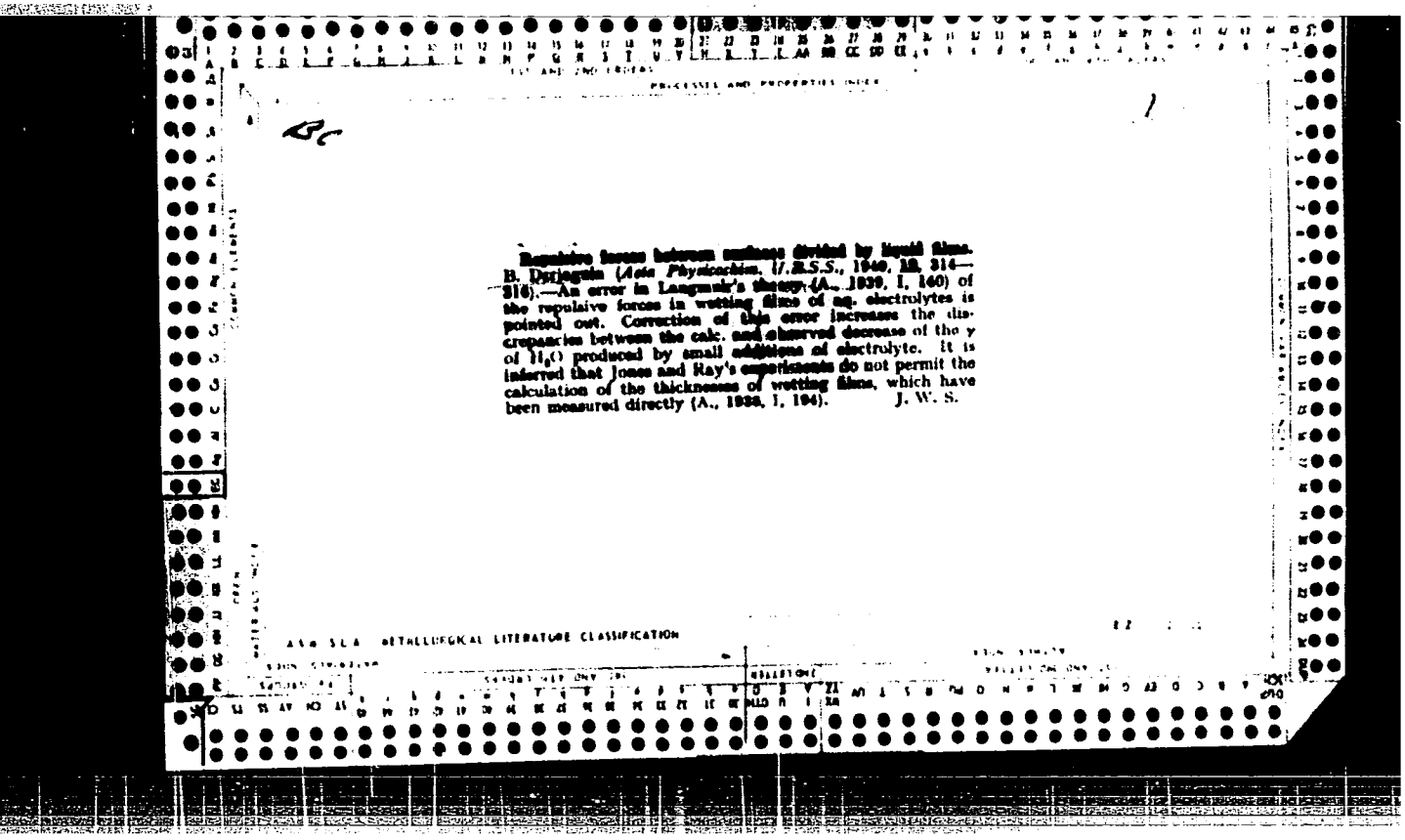

Repulsive forces between surfaces divided by liquid films. B. Deriagin (*Acta Physicochim. U.R.S.S.*, 1940, **12**, 314—316).—An error in Langmuir's theory (A., 1939, I, 140) of the repulsive forces in wetting films of aq. electrolytes is pointed out. Correction of this error increases the discrepancies between the calc. and observed decrease of the γ of H_2O produced by small additions of electrolyte. It is inferred that Jones and Ray's experiments do not permit the calculation of the thicknesses of wetting films, which have been measured directly (A., 1938, I, 194). J. W. S.

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BC

A-1

Theory of capillary condensation and other capillary phenomena taking into consideration the disjoining effect of multimolecular liquid films. B. Derjaguin (*J. Phys. Chem. Russ.*, 1940, **14**, 137–147). – Because of the disjointing effect of thin films (cf. A., 1940, I, 144) capillary condensation may cause swelling of the solvent. This effect is also involved in the capillary rise in slits and cylindrical capillaries.

J. J. B.

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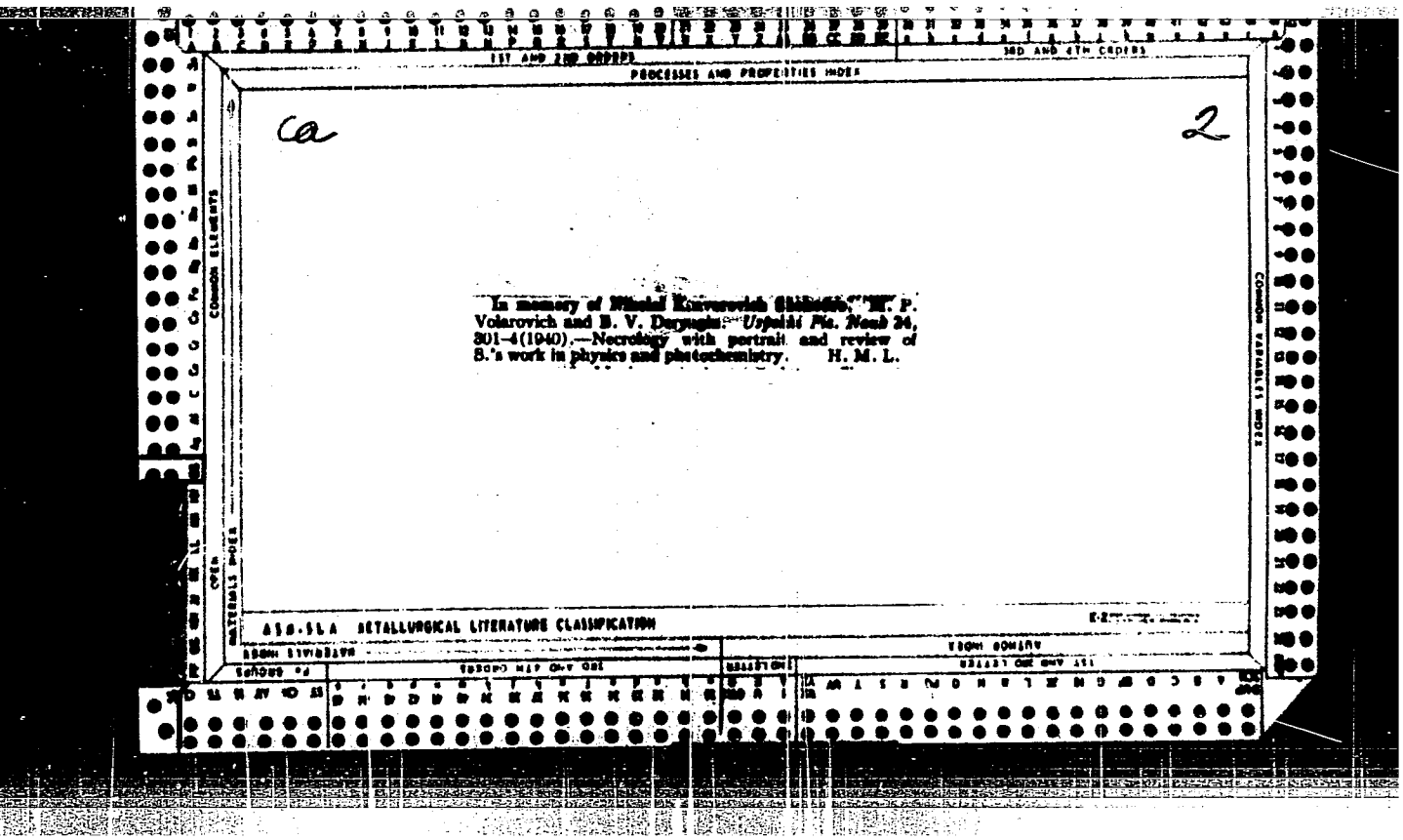

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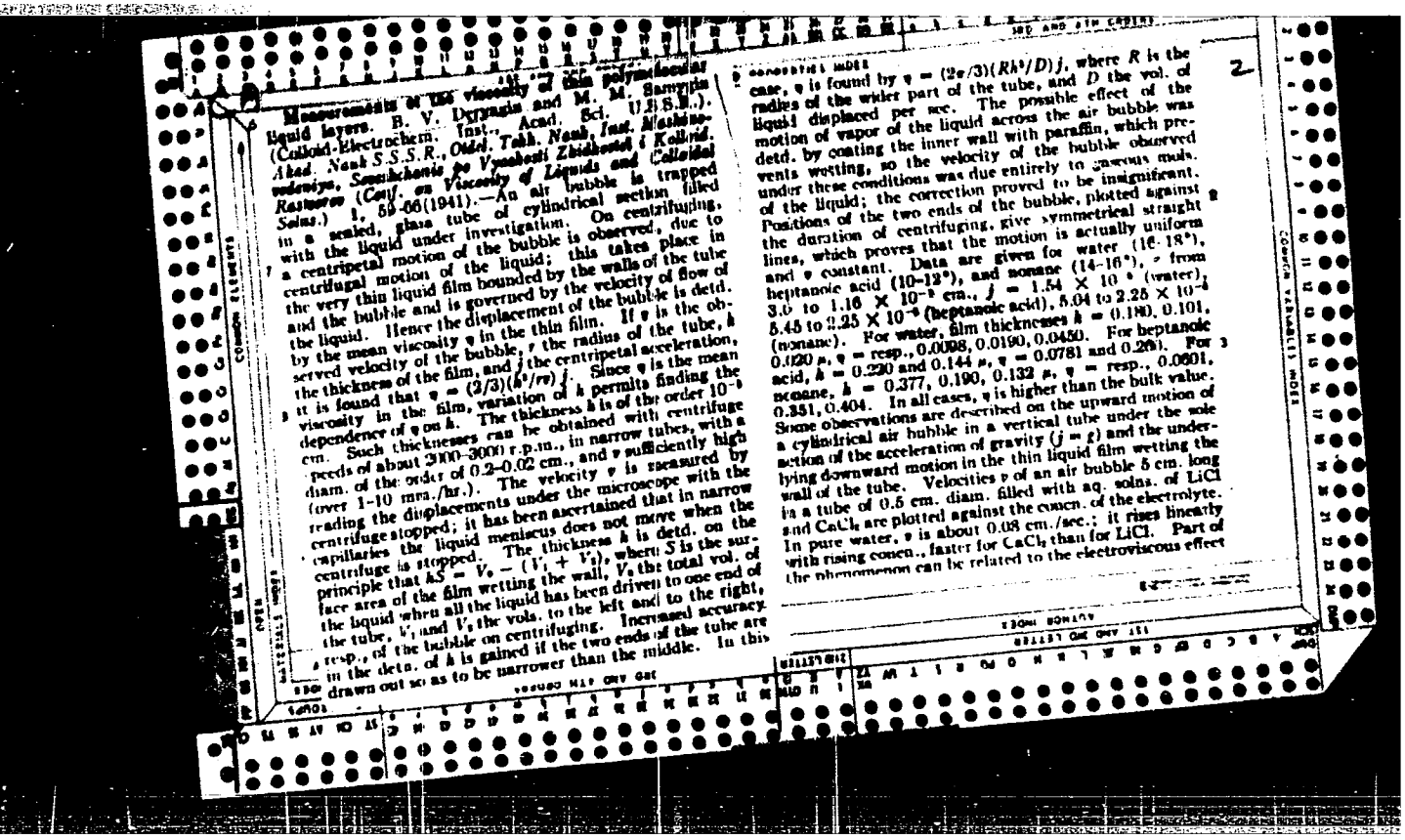

Measurements of the viscosity of thin polymolecular liquid layers. B. V. Deryagin and M. M. Samygin (Colloid-Electrochem. Inst., Acad. Sci. U.S.S.R.). *Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk, Inst. Mekhanicheskoi Obrabotki Poleznykh Iskopaemykh, Soveshchanie po Vyazkosti Zhidkostei i Kolloid. Rastvorov (Conf. on Viscosity of Liquids and Colloidal Solns.)* **1**, 59-66 (1941).—An air bubble is trapped in a sealed, glass tube of cylindrical section filled with the liquid under investigation. On centrifuging, a centripetal motion of the bubble is observed, due to centrifugal motion of the liquid; this takes place in the very thin liquid film bounded by the walls of the tube and the bubble and is governed by the velocity of flow of the liquid. Hence the displacement of the bubble is detd. by the mean viscosity η in the thin film. If v is the observed velocity of the bubble, r the radius of the tube, h the thickness of the film, and j the centripetal acceleration, it is found that $\eta = (2/3)(h^2/rv)j$. Since η is the mean viscosity in the film, variation of h permits finding the dependence of η on h. The thickness h is of the order 10^{-5} cm. Such thicknesses can be obtained with centrifuge speeds of about 2000–3000 r.p.m., in narrow tubes, with a diam. of the order of 0.2–0.02 cm., and v sufficiently high (over 1–10 mm./hr.). The velocity v is measured by reading the displacements under the microscope with the centrifuge stopped; it has been ascertained that in narrow capillaries the liquid meniscus does not move when the centrifuge is stopped. The thickness h is detd. on the principle that $hS = V_0 - (V_1 + V_2)$, where S is the surface area of the film wetting the wall, V_0 the total vol. of the liquid when all the liquid has been driven to one end of the tube, V_1 and V_2 the vols. to the left and to the right, resp., of the bubble on centrifuging. Increased accuracy in the detn. of h is gained if the two ends of the tube are drawn out so as to be narrower than the middle. In this case, η is found by $\eta = (2\sigma/3)(Rh^3/D)j$, where R is the radius of the wider part of the tube, and D the vol. of liquid displaced per sec. The possible effect of the motion of vapor of the liquid across the air bubble was detd. by coating the inner wall with paraffin, which prevents wetting, so the velocity of the bubble observed under these conditions was due entirely to gaseous mols. of the liquid; the correction proved to be insignificant. Positions of the two ends of the bubble, plotted against the duration of centrifuging, give symmetrical straight lines, which proves that the motion is actually uniform and η constant. Data are given for water (16–18°), heptanoic acid (10–12°), and nonane (14–16°), η from 3.0 to 1.16 × 10^{-3} c.g.s., j = 1.54 × 10^{4} (water), 5.45 to 2.25 × 10^{-4} (heptanoic acid), 5.04 to 2.25 × 10^{-4} (nonane). For water, film thicknesses h = 0.180, 0.101, 0.020 μ, η = resp., 0.0098, 0.0190, 0.0450. For heptanoic acid, h = 0.220 and 0.144 μ, η = 0.0781 and 0.201. For nonane, h = 0.377, 0.190, 0.132 μ, η = resp., 0.0601, 0.351, 0.404. In all cases, η is higher than the bulk value. Some observations are described on the upward motion of a cylindrical air bubble in a vertical tube under the sole action of the acceleration of gravity ($j = g$) and the underlying downward motion in the thin liquid film wetting the wall of the tube. Velocities v of an air bubble 5 cm. long in a tube of 0.5 cm. diam. filled with aq. solns. of LiCl and $CaCl_2$ are plotted against the concn. of the electrolyte. In pure water, v is about 0.08 cm./sec.; it rises linearly with rising concn., faster for $CaCl_2$ than for LiCl. Part of the phenomenon can be related to the electroviscous effect

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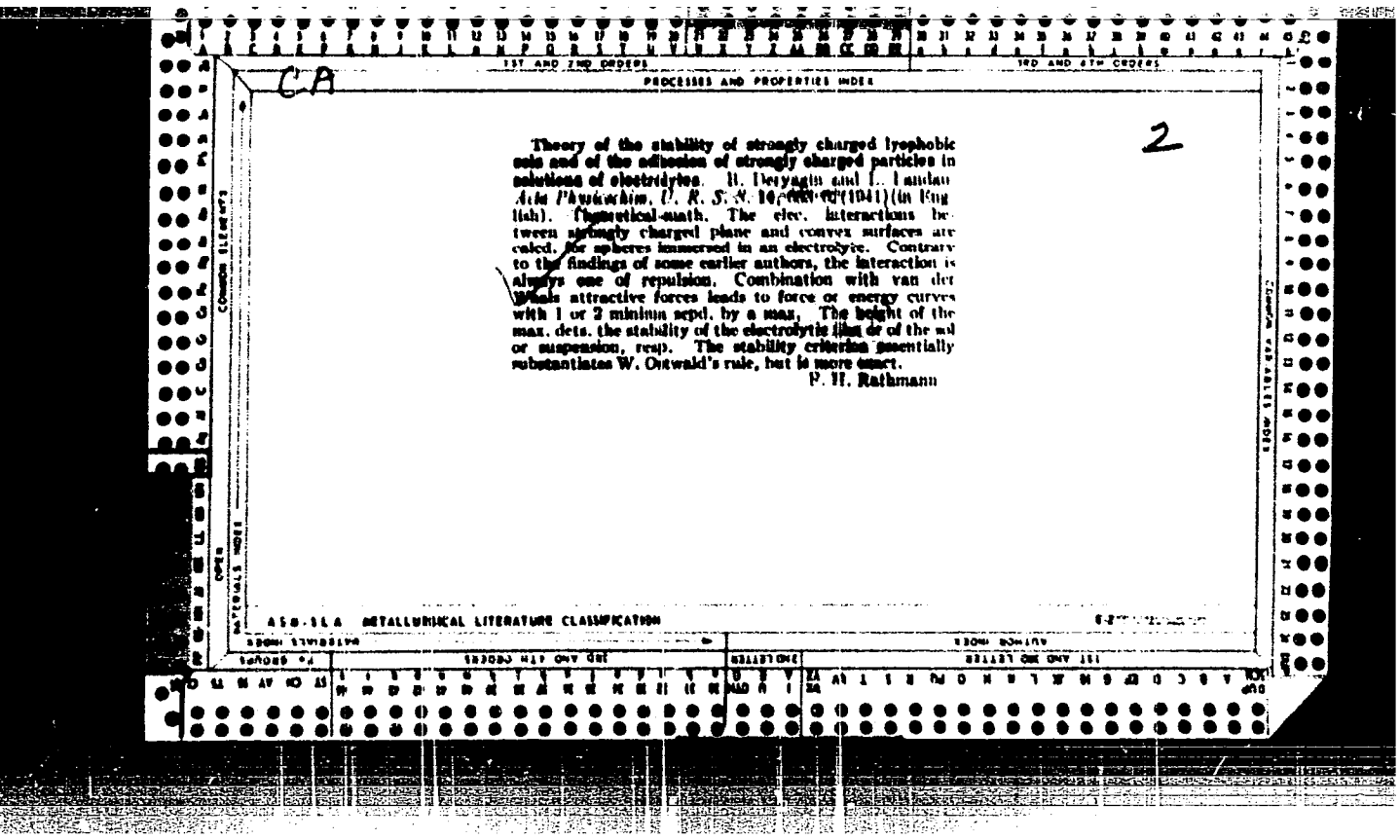

CA

PROCESSES AND PROPERTIES INDEX

2

Theory of the stability of strongly charged lyophobic sols and of the adhesion of strongly charged particles in solutions of electrolytes. B. Deryagin and L. Landau. *Acta Physicochim. U. R. S. S.* 14, [illegible] (1941) (in English). Theoretical-math. The elec. interactions between strongly charged plane and convex surfaces are calcd. for spheres immersed in an electrolyte. Contrary to the findings of some earlier authors, the interaction is always one of repulsion. Combination with van der Waals attractive forces leads to force or energy curves with 1 or 2 minima sepd. by a max. The height of the max. dets. the stability of the electrolytic [illegible] or of the sol or suspension, resp. The stability criterion essentially substantiates W. Ostwald's rule, but is more exact.

P. H. Rathmann

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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Thermo-osmosis at ordinary temperatures and its analogy with the thermomechanical effect in helium II. B. Derjaguin and G. Sidorenkov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, [illegible], 622–626).—Thermo-osmotic behaviours at ordinary temp. of H_2O, 0·1N-NaCl, MeOH, iso-C_5H_{11}·OH, AcOH, and CCl_4 have been investigated; they are similar to the flow of He II. A theoretical treatment is developed.
W. R. A.

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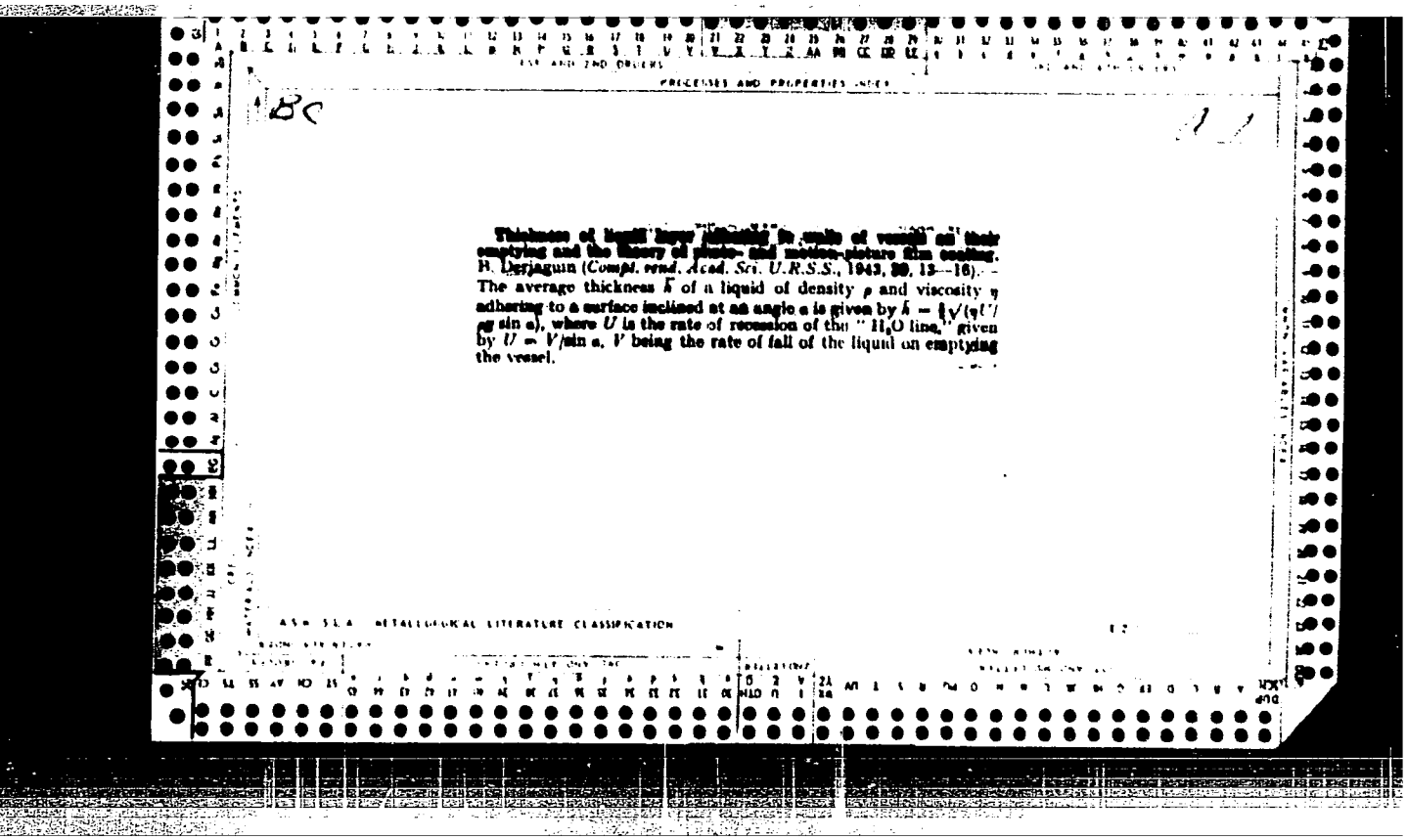

Thickness of liquid layer adhering to walls of vessels on their emptying and the theory of photo- and motion-picture film coating. B. Derjaguin (*Compt. rend. Acad. Sci. U.R.S.S.*, 1943, **39**, 13—16). — The average thickness $\bar{h}$ of a liquid of density ρ and viscosity η adhering to a surface inclined at an angle α is given by $\bar{h} = \frac{1}{2}\sqrt{(\eta U/\rho g \sin \alpha)}$, where U is the rate of recession of the "H_2O line," given by $U = V/\sin \alpha$, V being the rate of fall of the liquid on emptying the vessel.

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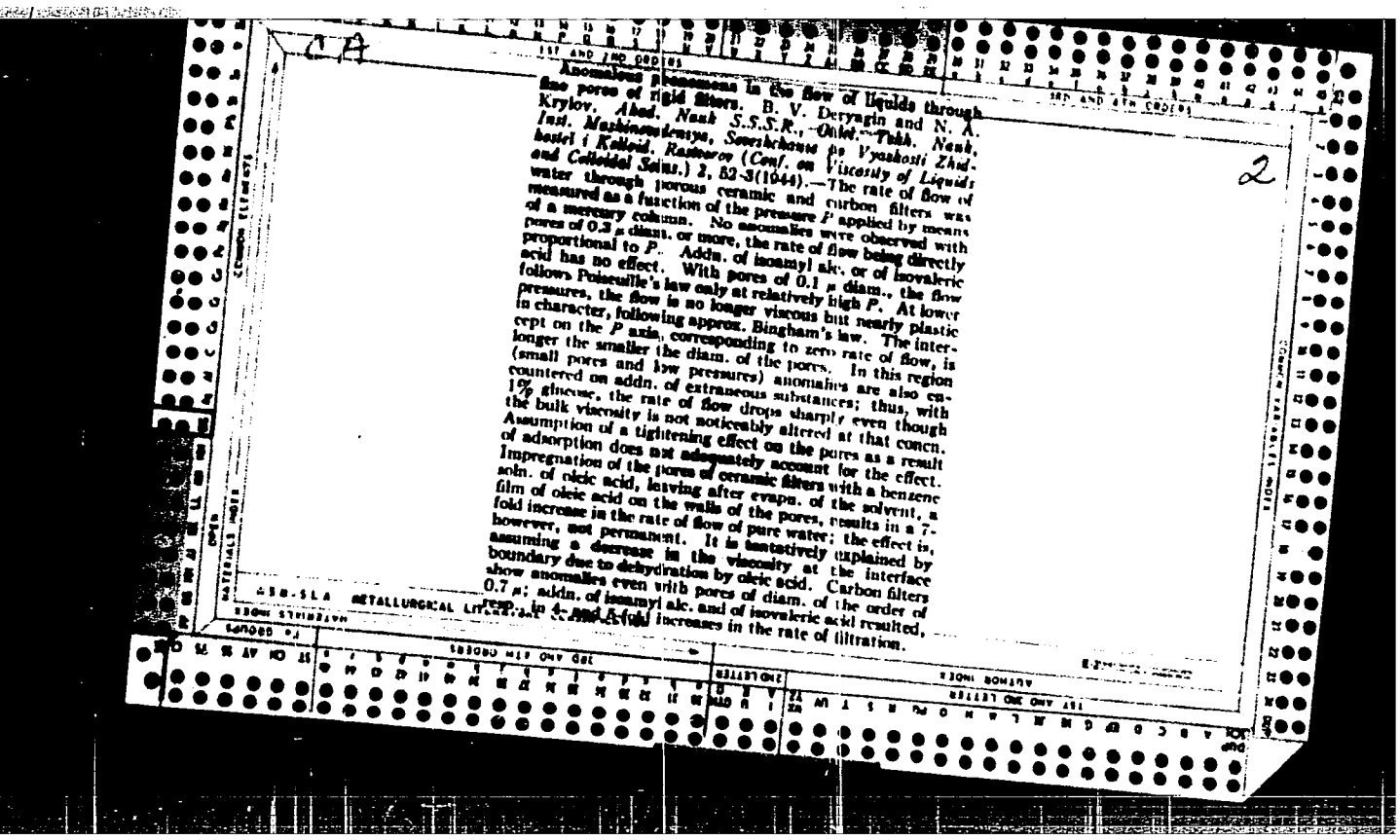

Anomalous phenomena in the flow of liquids through fine pores of rigid filters. B. V. Deryagin and N. A. Krylov. *Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk, Inst. Mashinovedeniya, Soveshchanie po Vyazkosti Zhidkostei i Kolloid. Rastvorov (Conf. on Viscosity of Liquids and Colloidal Solns.)* 2, 82-3(1944).—The rate of flow of water through porous ceramic and carbon filters was measured as a function of the pressure P applied by means of a mercury column. No anomalies were observed with pores of 0.3 μ diam. or more, the rate of flow being directly proportional to P. Addn. of isoamyl alc. or of isovaleric acid has no effect. With pores of 0.1 μ diam., the flow follows Poiseuille's law only at relatively high P. At lower pressures, the flow is no longer viscous but nearly plastic in character, following approx. Bingham's law. The intercept on the P axis, corresponding to zero rate of flow, is longer the smaller the diam. of the pores. In this region (small pores and low pressures) anomalies are also encountered on addn. of extraneous substances; thus, with 1% glucose, the rate of flow drops sharply even though the bulk viscosity is not noticeably altered at that concn. Assumption of a tightening effect on the pores as a result of adsorption does not adequately account for the effect. Impregnation of the pores of ceramic filters with a benzene soln. of oleic acid, leaving after evapn. of the solvent, a film of oleic acid on the walls of the pores, results in a 7-fold increase in the rate of flow of pure water; the effect is, however, not permanent. It is tentatively explained by assuming a decrease in the viscosity at the interface boundary due to dehydration by oleic acid. Carbon filters show anomalies even with pores of diam. of the order of 0.7 μ; addn. of isoamyl alc. and of isovaleric acid resulted, resp., in 4- and 4.5-fold increases in the rate of filtration.

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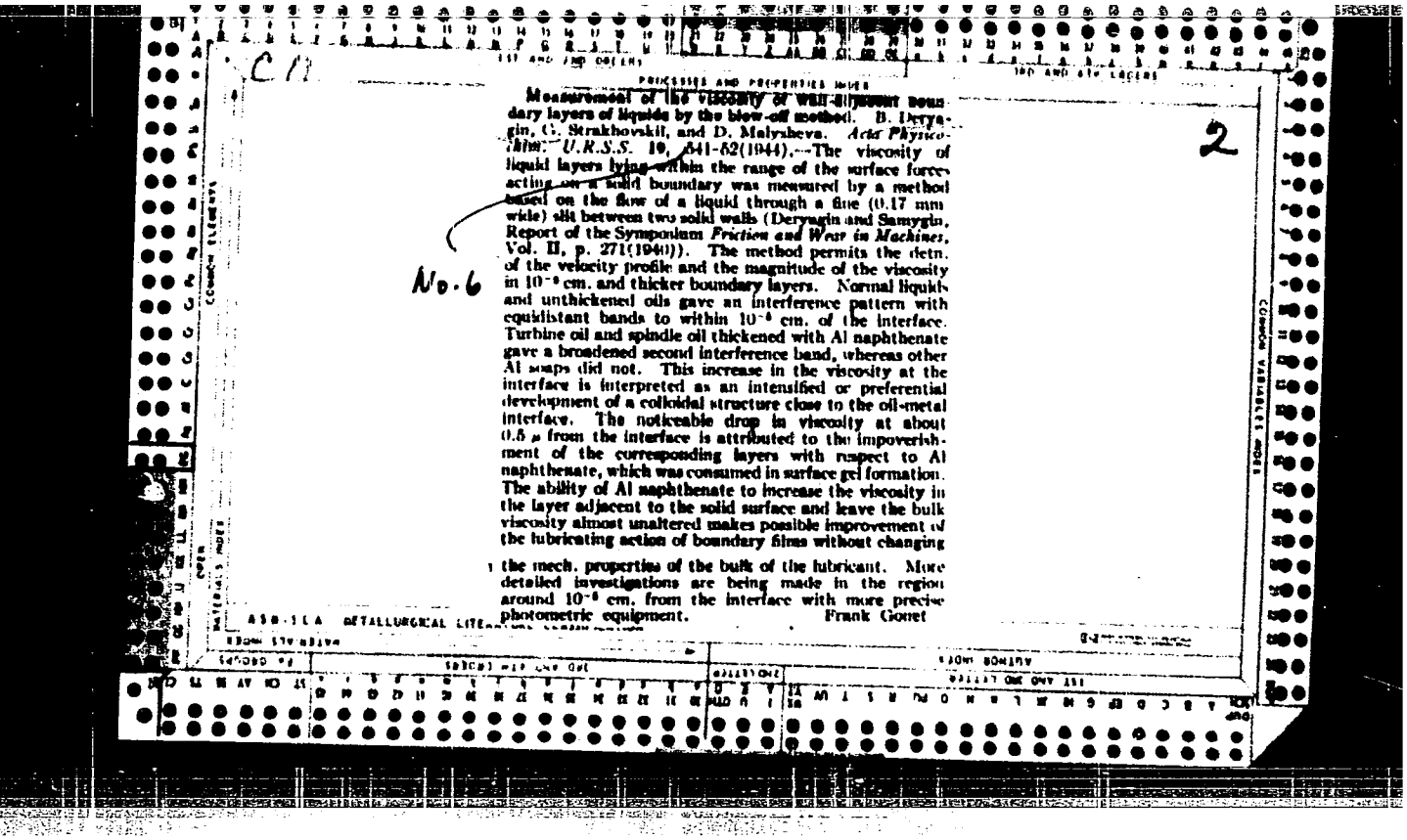

C 11

PROCESSES AND PROPERTIES INDEX

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No. 6

Measurement of the viscosity of wall-adjacent boundary layers of liquids by the blow-off method. B. Deryagin, G. Strakhovskii, and D. Malysheva. *Acta Physicochim. U.R.S.S.* 19, 541-52(1944).—The viscosity of liquid layers lying within the range of the surface forces acting on a solid boundary was measured by a method based on the flow of a liquid through a fine (0.17 mm wide) slit between two solid walls (Deryagin and Samygin, Report of the Symposium *Friction and Wear in Machines*, Vol. II, p. 271(1940)). The method permits the detn. of the velocity profile and the magnitude of the viscosity in 10^{-6} cm. and thicker boundary layers. Normal liquids and unthickened oils gave an interference pattern with equidistant bands to within 10^{-6} cm. of the interface. Turbine oil and spindle oil thickened with Al naphthenate gave a broadened second interference band, whereas other Al soaps did not. This increase in the viscosity at the interface is interpreted as an intensified or preferential development of a colloidal structure close to the oil-metal interface. The noticeable drop in viscosity at about 0.5 μ from the interface is attributed to the impoverishment of the corresponding layers with respect to Al naphthenate, which was consumed in surface gel formation. The ability of Al naphthenate to increase the viscosity in the layer adjacent to the solid surface and leave the bulk viscosity almost unaltered makes possible improvement of the lubricating action of boundary films without changing the mech. properties of the bulk of the lubricant. More detailed investigations are being made in the region around 10^{-6} cm. from the interface with more precise photometric equipment. Frank Gonet

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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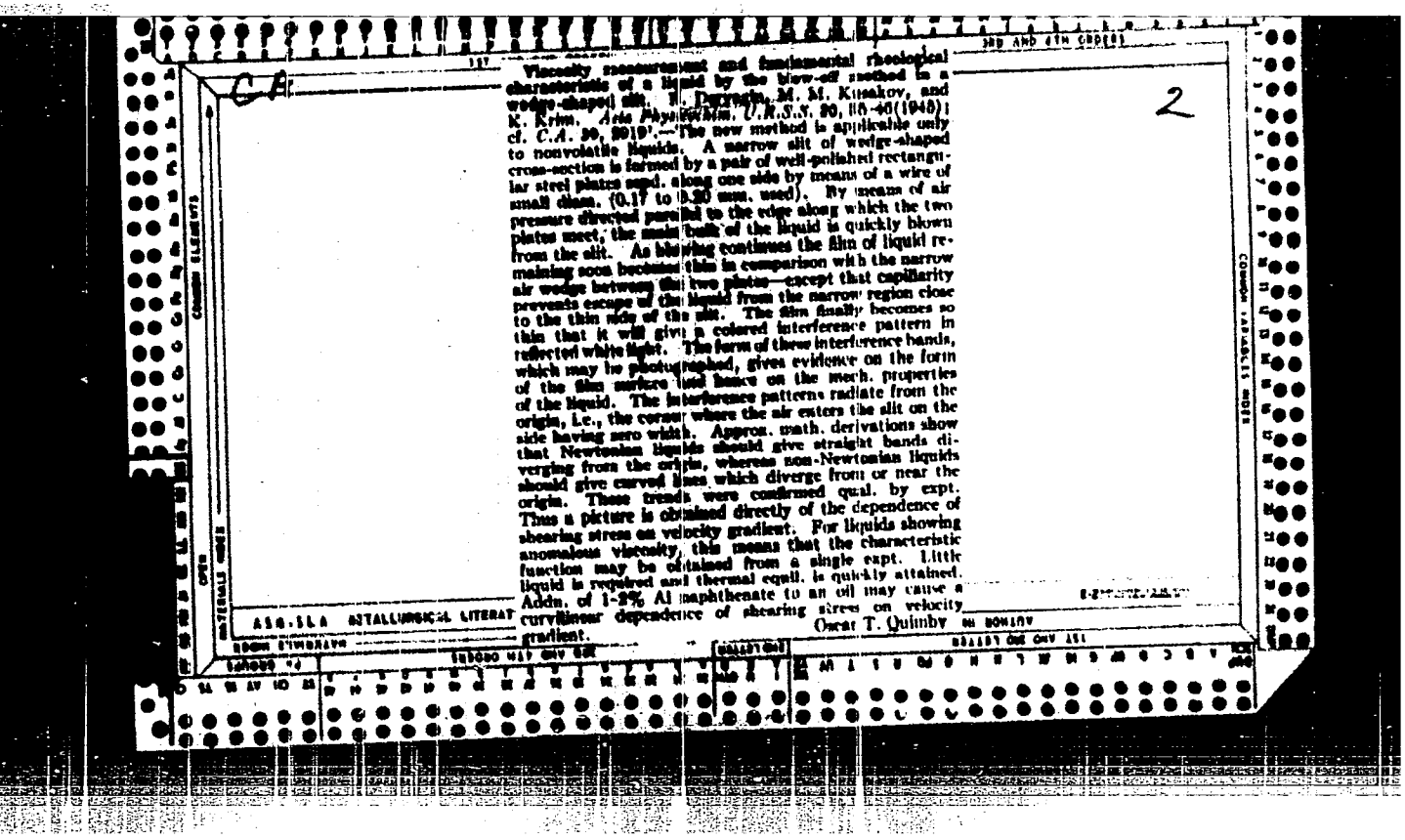

Viscosity measurement and fundamental rheological characteristic of a liquid by the blow-off method in a wedge-shaped slit. B. Deryagin, M. M. Kusakov, and K. Krim. *Acta Physicochim. U.R.S.S.* 20, 55-46(1945); cf. *C.A.* 39, 2919'.—The new method is applicable only to nonvolatile liquids. A narrow slit of wedge-shaped cross-section is formed by a pair of well-polished rectangular steel plates sepd. along one side by means of a wire of small diam. (0.17 to 0.20 mm. used). By means of air pressure directed parallel to the edge along which the two plates meet, the main bulk of the liquid is quickly blown from the slit. As blowing continues the film of liquid remaining soon becomes thin in comparison with the narrow air wedge between the two plates—except that capillarity prevents escape of the liquid from the narrow region close to the thin side of the slit. The film finally becomes so thin that it will give a colored interference pattern in reflected white light. The form of these interference bands, which may be photographed, gives evidence on the form of the film surface and hence on the mech. properties of the liquid. The interference patterns radiate from the origin, i.e., the corner where the air enters the slit on the side having zero width. Approx. math. derivations show that Newtonian liquids should give straight bands diverging from the origin, whereas non-Newtonian liquids should give curved lines which diverge from or near the origin. These trends were confirmed qual. by expt. Thus a picture is obtained directly of the dependence of shearing stress on velocity gradient. For liquids showing anomalous viscosity, this means that the characteristic function may be obtained from a single expt. Little liquid is required and thermal equil. is quickly attained. Addn. of 1-2% Al naphthenate to an oil may cause a curvilinear dependence of shearing stress on velocity gradient.

Oscar T. Quimby

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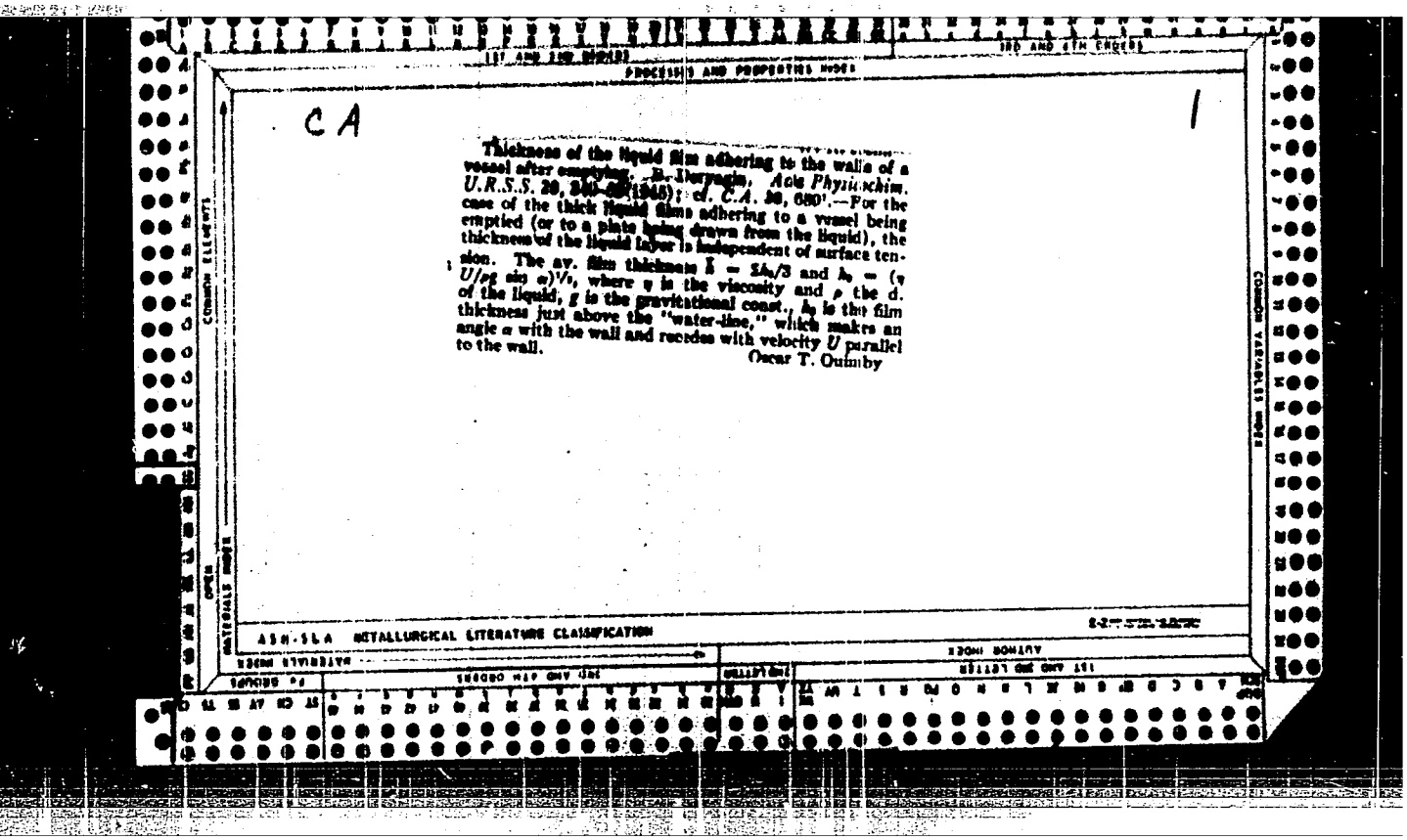
1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX



CA

1

Thickness of the liquid film adhering to the walls of a vessel after emptying. B. Deryagin. *Acta Physicochim. U.R.S.S.* 20, 349-[illegible] (1945); cf. *C.A.* 38, 680[1].—For the case of the thick liquid films adhering to a vessel being emptied (or to a plate being drawn from the liquid), the thickness of the liquid layer is independent of surface tension. The av. film thickness $\bar{h} = 2h_0/3$ and $h_0 = (\eta U/\rho g \sin \alpha)^{1/2}$, where η is the viscosity and ρ the d. of the liquid, g is the gravitational const., h_0 is the film thickness just above the "water-line," which makes an angle α with the wall and recedes with velocity U parallel to the wall.

Oscar T. Quimby

COMMON ELEMENTS

COMMON VARIABLES INDEX

OPEN

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MATERIALS INDEX

AUTHOR INDEX

1ST AND 2ND LETTER

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

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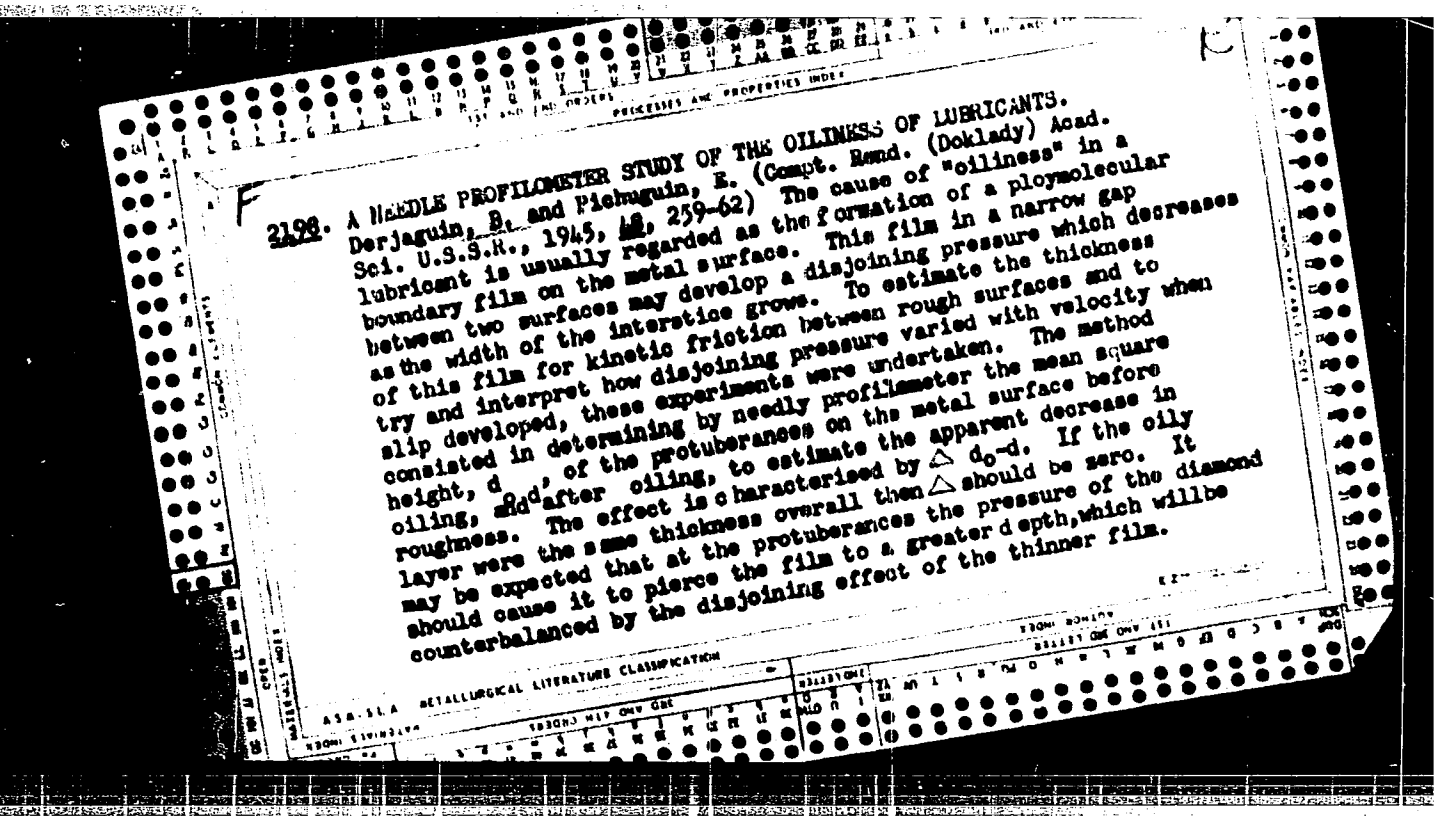

2198. A NEEDLE PROFILOMETER STUDY OF THE OILINESS OF LUBRICANTS.
Derjaguin, B. and Pichugin, E. (Compt. Rend. (Doklady) Acad. Sci. U.S.S.R., 1945, 48, 259-62) The cause of "oiliness" in a lubricant is usually regarded as the formation of a ploymolecular boundary film on the metal surface. This film in a narrow gap between two surfaces may develop a disjoining pressure which decreases as the width of the interstice grows. To estimate the thickness of this film for kinetic friction between rough surfaces and to try and interpret how disjoining pressure varied with velocity when slip developed, these experiments were undertaken. The method consisted in determining by needly profilometer the mean square height, d_o, of the protuberances on the metal surface before oiling, and d, after oiling, to estimate the apparent decrease in roughness. The effect is characterised by $\Delta = d_o - d$. If the oily layer were the same thickness overall then Δ should be zero. It may be expected that at the protuberances the pressure of the diamond should cause it to pierce the film to a greater depth, which willbe counterbalanced by the disjoining effect of the thinner film.

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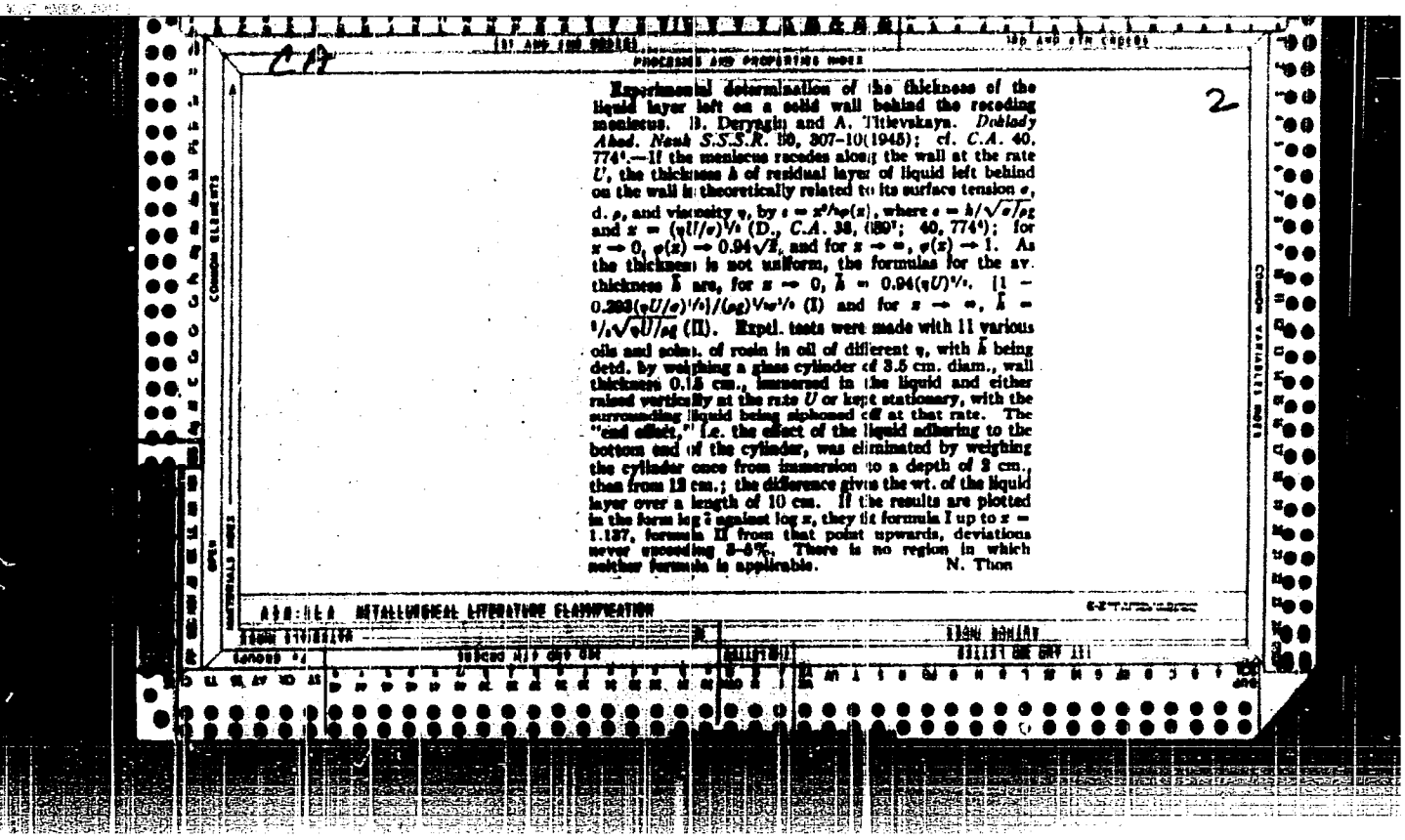

Experimental determination of the thickness of the liquid layer left on a solid wall behind the receding meniscus. B. Deryagin and A. Titievskaya. *Doklady Akad. Nauk S.S.S.R.* 60, 307–10(1948); cf. *C.A.* 40, 774[1].—If the meniscus recedes along the wall at the rate U, the thickness h of residual layer of liquid left behind on the wall is theoretically related to its surface tension σ, d. ρ, and viscosity η, by $z = x^2/\varphi(x)$, where $z = h/\sqrt{\sigma/\rho g}$ and $x = (\eta U/\sigma)^{1/2}$ (D., *C.A.* 38, 1890[1]; 40, 774[1]); for $x \to 0$, $\varphi(x) \to 0.94\sqrt{x}$, and for $x \to \infty$, $\varphi(x) \to 1$. As the thickness is not uniform, the formulas for the av. thickness $\bar{h}$ are, for $x \to 0$, $\bar{h} = 0.94(\eta U)^{1/2}$. [1 − $0.283(\eta U/\sigma)^{1/3}$]/$(\rho g)^{1/2}$ (I) and for $x \to \infty$, $\bar{h} = {}^1/_3\sqrt{\eta U/\rho g}$ (II). Expt. tests were made with 11 various oils and solns. of rosin in oil of different η, with $\bar{h}$ being detd. by weighing a glass cylinder of 3.5 cm. diam., wall thickness 0.15 cm., immersed in the liquid and either raised vertically at the rate U or kept stationary, with the surrounding liquid being siphoned off at that rate. The "end effect," i.e. the effect of the liquid adhering to the bottom end of the cylinder, was eliminated by weighing the cylinder once from immersion to a depth of 2 cm., then from 12 cm.; the difference gives the wt. of the liquid layer over a length of 10 cm. If the results are plotted in the form log z against log x, they fit formula I up to x = 1.137, formula II from that point upwards, deviations never exceeding 3–6%. There is no region in which neither formula is applicable. N. Thon

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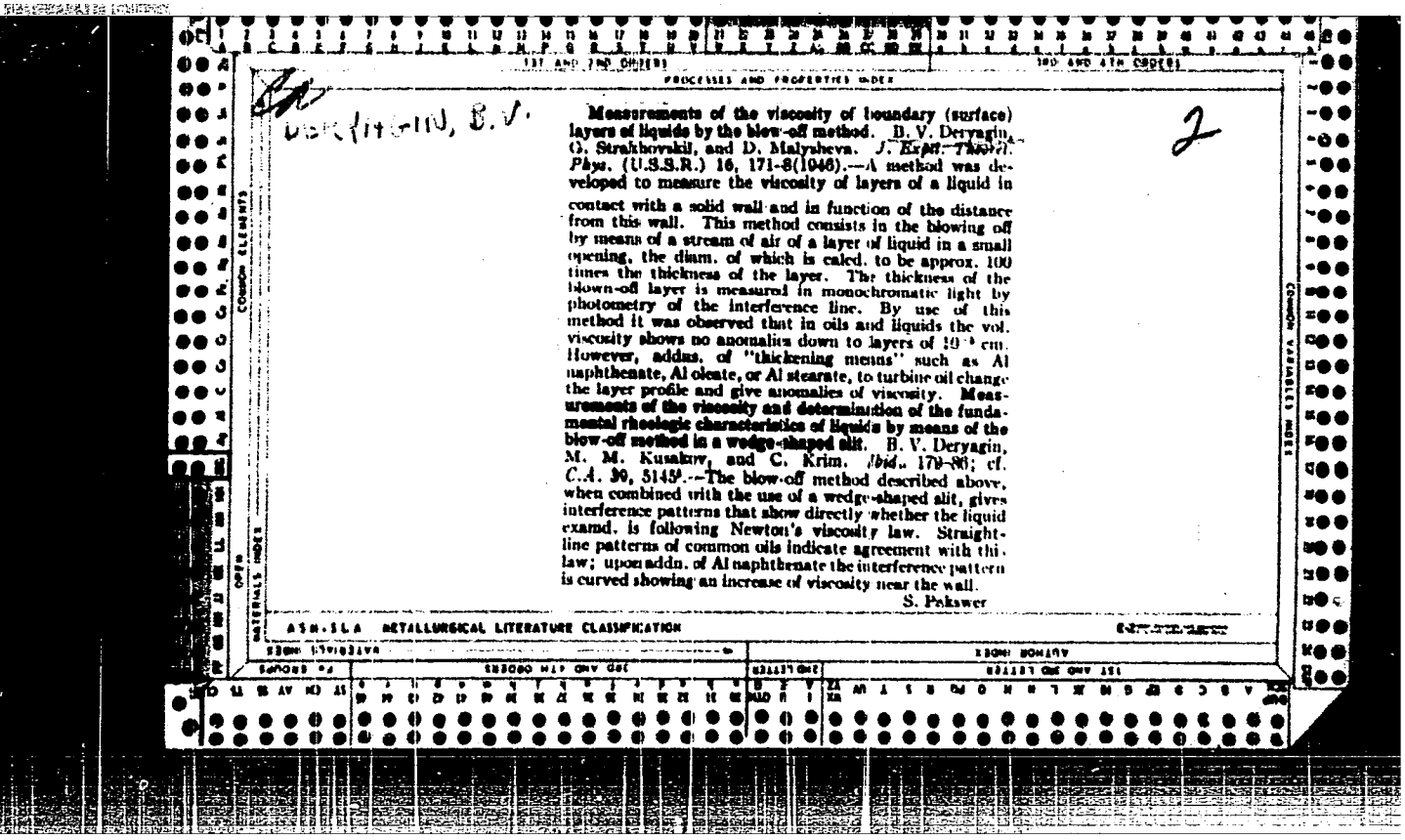

PROCESSES AND PROPERTIES INDEX

DERYAGIN, B. V.

2

Measurements of the viscosity of boundary (surface) layers of liquids by the blow-off method. B. V. Deryagin, G. Strakhovskii, and D. Malysheva. *J. Exptl. Theoret. Phys.* (U.S.S.R.) 16, 171-8(1946).—A method was developed to measure the viscosity of layers of a liquid in contact with a solid wall and in function of the distance from this wall. This method consists in the blowing off by means of a stream of air of a layer of liquid in a small opening, the diam. of which is calcd. to be approx. 100 times the thickness of the layer. The thickness of the blown-off layer is measured in monochromatic light by photometry of the interference line. By use of this method it was observed that in oils and liquids the vol. viscosity shows no anomalies down to layers of 10^{-5} cm. However, addns. of "thickening means" such as Al naphthenate, Al oleate, or Al stearate, to turbine oil change the layer profile and give anomalies of viscosity. **Measurements of the viscosity and determination of the fundamental rheologic characteristics of liquids by means of the blow-off method in a wedge-shaped slit.** B. V. Deryagin, M. M. Kusakov, and C. Krim. *Ibid.*, 179-86; cf. *C.A.* 30, 5145⁹.—The blow-off method described above, when combined with the use of a wedge-shaped slit, gives interference patterns that show directly whether the liquid exaind. is following Newton's viscosity law. Straight-line patterns of common oils indicate agreement with this law; upon addn. of Al naphthenate the interference pattern is curved showing an increase of viscosity near the wall.

S. Pekarer

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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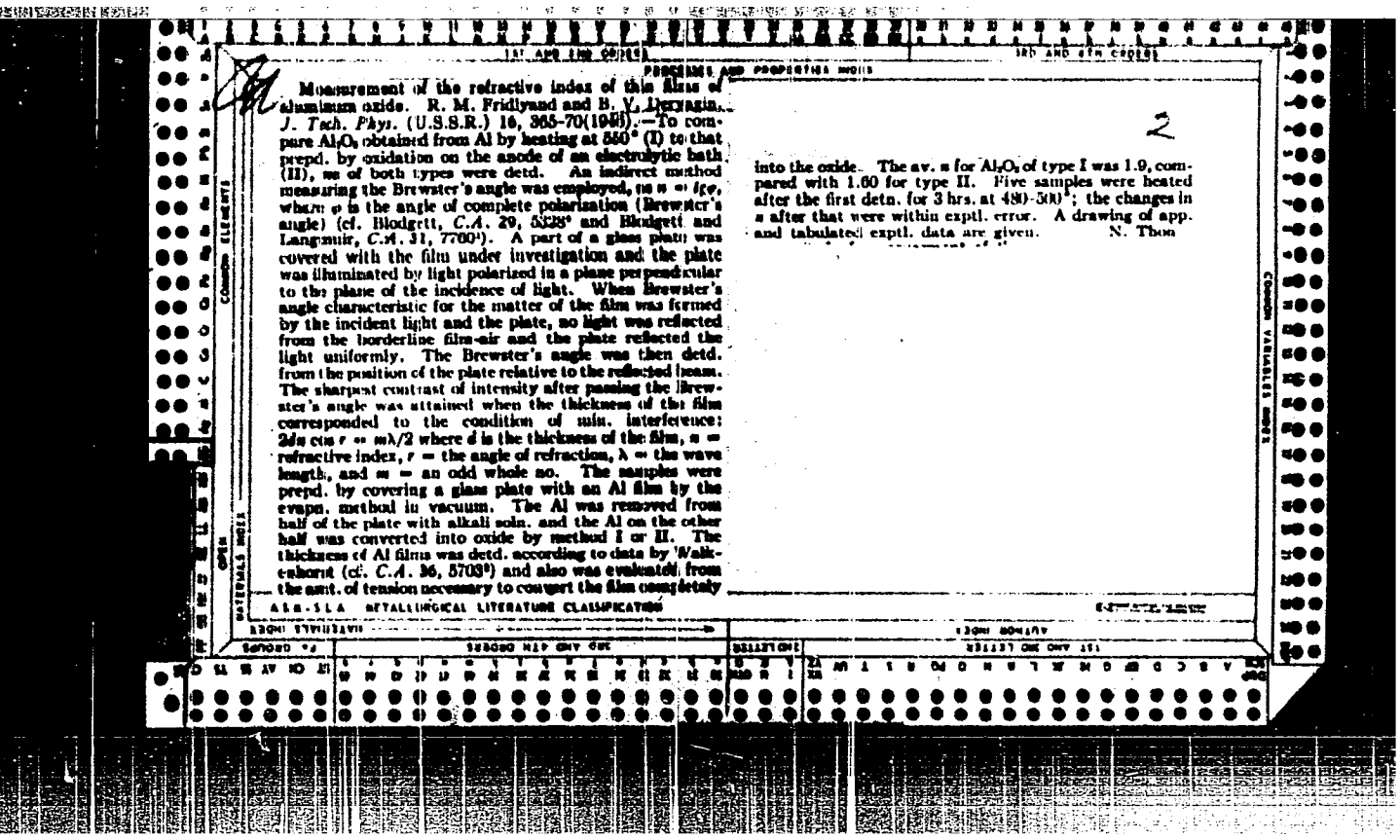

Measurement of the refractive index of thin films of aluminum oxide. R. M. Fridlyand and B. V. Deryagin. *J. Tech. Phys.* (U.S.S.R.) 16, 365-70(1946).—To compare Al_2O_3 obtained from Al by heating at 550° (I) to that prepd. by oxidation on the anode of an electrolytic bath (II), *n* of both types were detd. An indirect method measuring the Brewster's angle was employed, as $n = \tan\varphi$, where φ is the angle of complete polarization (Brewster's angle) (cf. Blodgett, *C.A.* 29, 5328[8] and Blodgett and Langmuir, *C.A.* 31, 7760[1]). A part of a glass plate was covered with the film under investigation and the plate was illuminated by light polarized in a plane perpendicular to the plane of the incidence of light. When Brewster's angle characteristic for the matter of the film was formed by the incident light and the plate, no light was reflected from the borderline film-air and the plate reflected the light uniformly. The Brewster's angle was then detd. from the position of the plate relative to the reflected beam. The sharpest contrast of intensity after passing the Brewster's angle was attained when the thickness of the film corresponded to the condition of min. interference: $2dn\cos r = m\lambda/2$ where *d* is the thickness of the film, *n* = refractive index, *r* = the angle of refraction, λ = the wave length, and *m* = an odd whole no. The samples were prepd. by covering a glass plate with an Al film by the evapn. method in vacuum. The Al was removed from half of the plate with alkali soln. and the Al on the other half was converted into oxide by method I or II. The thickness of Al films was detd. according to data by Walkenhorst (cf. *C.A.* 36, 5703[9]) and also was evaluated from the amt. of tension necessary to convert the film completely into the oxide. The av. *n* for Al_2O_3 of type I was 1.9, compared with 1.60 for type II. Five samples were heated after the first detn. for 3 hrs. at 480-500°; the changes in *n* after that were within exptl. error. A drawing of app. and tabulated exptl. data are given. N. Thon

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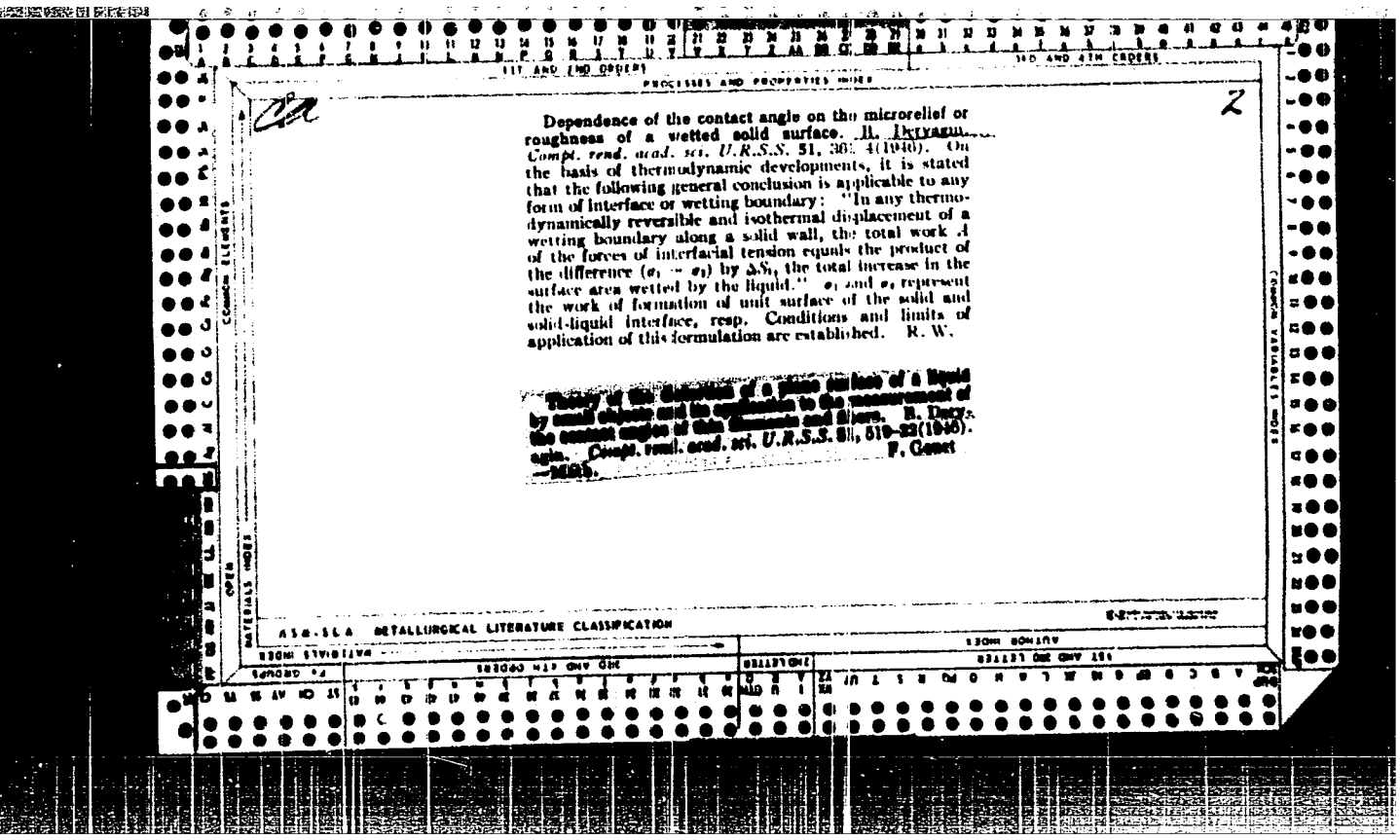

Dependence of the contact angle on the microrelief or roughness of a wetted solid surface. II. Derjagin. *Compt. rend. acad. sci. U.R.S.S.* 51, 361-4(1946). On the basis of thermodynamic developments, it is stated that the following general conclusion is applicable to any form of interface or wetting boundary: "In any thermodynamically reversible and isothermal displacement of a wetting boundary along a solid wall, the total work A of the forces of interfacial tension equals the product of the difference $(\sigma_1 - \sigma_2)$ by ΔS_1, the total increase in the surface area wetted by the liquid." σ_1 and σ_2 represent the work of formation of unit surface of the solid and solid-liquid interface, resp. Conditions and limits of application of this formulation are established. R. W.

Theory of the distortion of a plane surface of a liquid by small objects and its application to the measurement of the contact angles of thin filaments and fibers. B. Derjagin. *Compt. rend. acad. sci. U.R.S.S.* 51, 519-22(1946). F. Genet

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DERYAGIN, B. PA 21T67

USSR/Mathematics, Applied Sep 1946
Gases - Measurements

"Measuring the Specific Surface of Porous and Dispersive Bodies by Their Resistance to the Flow of Rarified Gases," B.Deryagin, 4 pp

"Comptes Rendus (Doklady), Vol LIII, No 7

A mathematical treatment according to the kinetic theory of gases.

21T67

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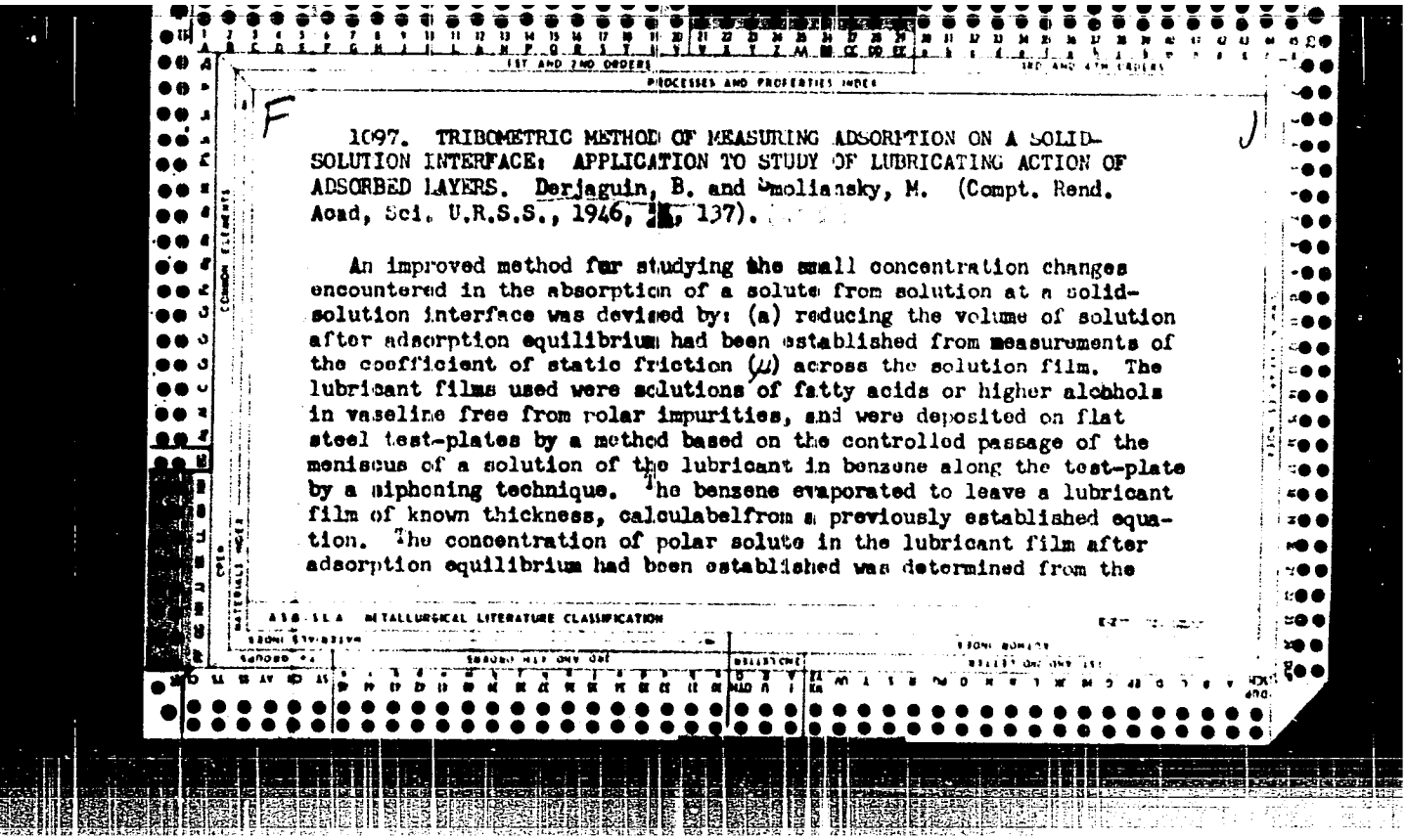

F

J

1097. TRIBOMETRIC METHOD OF MEASURING ADSORPTION ON A SOLID-SOLUTION INTERFACE: APPLICATION TO STUDY OF LUBRICATING ACTION OF ADSORBED LAYERS. Derjaguin, B. and Smoliansky, M. (Compt. Rend. Acad. Sci. U.R.S.S., 1946, [illegible], 137).

An improved method for studying the small concentration changes encountered in the absorption of a solute from solution at a solid-solution interface was devised by: (a) reducing the volume of solution after adsorption equilibrium had been established from measurements of the coefficient of static friction (μ) across the solution film. The lubricant films used were solutions of fatty acids or higher alcohols in vaseline free from polar impurities, and were deposited on flat steel test-plates by a method based on the controlled passage of the meniscus of a solution of the lubricant in benzene along the test-plate by a siphoning technique. The benzene evaporated to leave a lubricant film of known thickness, calculabelfrom a previously established equation. The concentration of polar solute in the lubricant film after adsorption equilibrium had been established was determined from the

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value of f, determined by a slider method, the relation between f and solute concentration having been determined in preliminary experiments with thick films of known solute concentration and film thickness, adsorption isotherms for stearic, palmitic, myristic, and caproic acids, and octyl and cetyl alcohols, all on steel at 12-15°C, were determined. The relation between the solute concentrations in the absorbed films and the frictional characteristics were determined, and it was concluded that some degree of metal-to-metal contact between the slider and plate persisted until the adsorbed solute layer was completely established.

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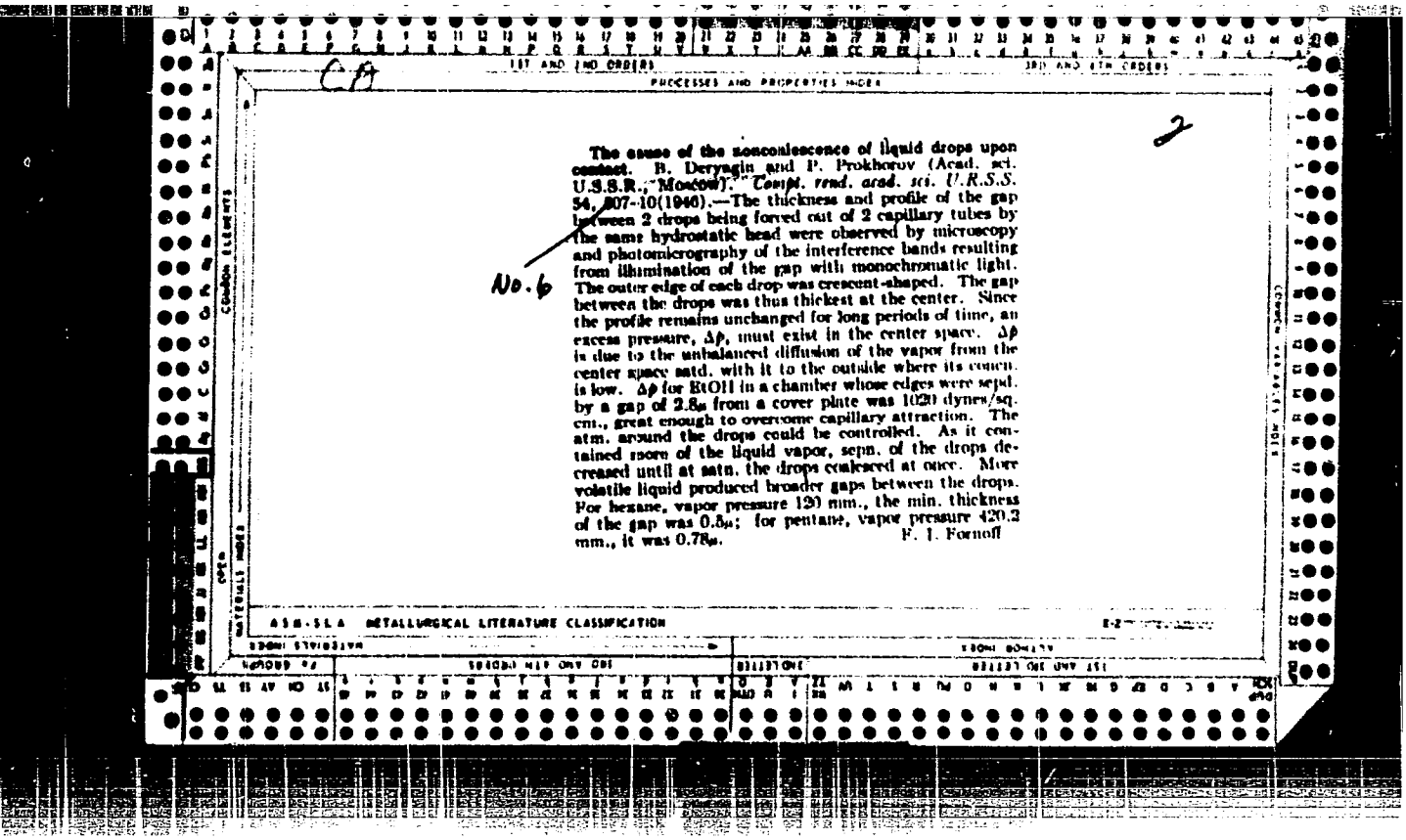

The cause of the nonconlescence of liquid drops upon contact. B. Deryagin and P. Prokhorov (Acad. sci. U.S.S.R., Moscow). *Compt. rend. acad. sci. U.R.S.S.* 54, 307-10(1946).—The thickness and profile of the gap between 2 drops being forced out of 2 capillary tubes by the same hydrostatic head were observed by microscopy and photomicrography of the interference bands resulting from illumination of the gap with monochromatic light. The outer edge of each drop was crescent-shaped. The gap between the drops was thus thickest at the center. Since the profile remains unchanged for long periods of time, an excess pressure, Δp, must exist in the center space. Δp is due to the unbalanced diffusion of the vapor from the center space satd. with it to the outside where its concn. is low. Δp for EtOH in a chamber whose edges were sepd. by a gap of 2.8μ from a cover plate was 1020 dynes/sq. cm., great enough to overcome capillary attraction. The atm. around the drops could be controlled. As it contained more of the liquid vapor, sepn. of the drops decreased until at satn. the drops coalesced at once. More volatile liquid produced broader gaps between the drops. For hexane, vapor pressure 120 mm., the min. thickness of the gap was 0.5μ; for pentane, vapor pressure 420.2 mm., it was 0.78μ.

F. I. Fornoff

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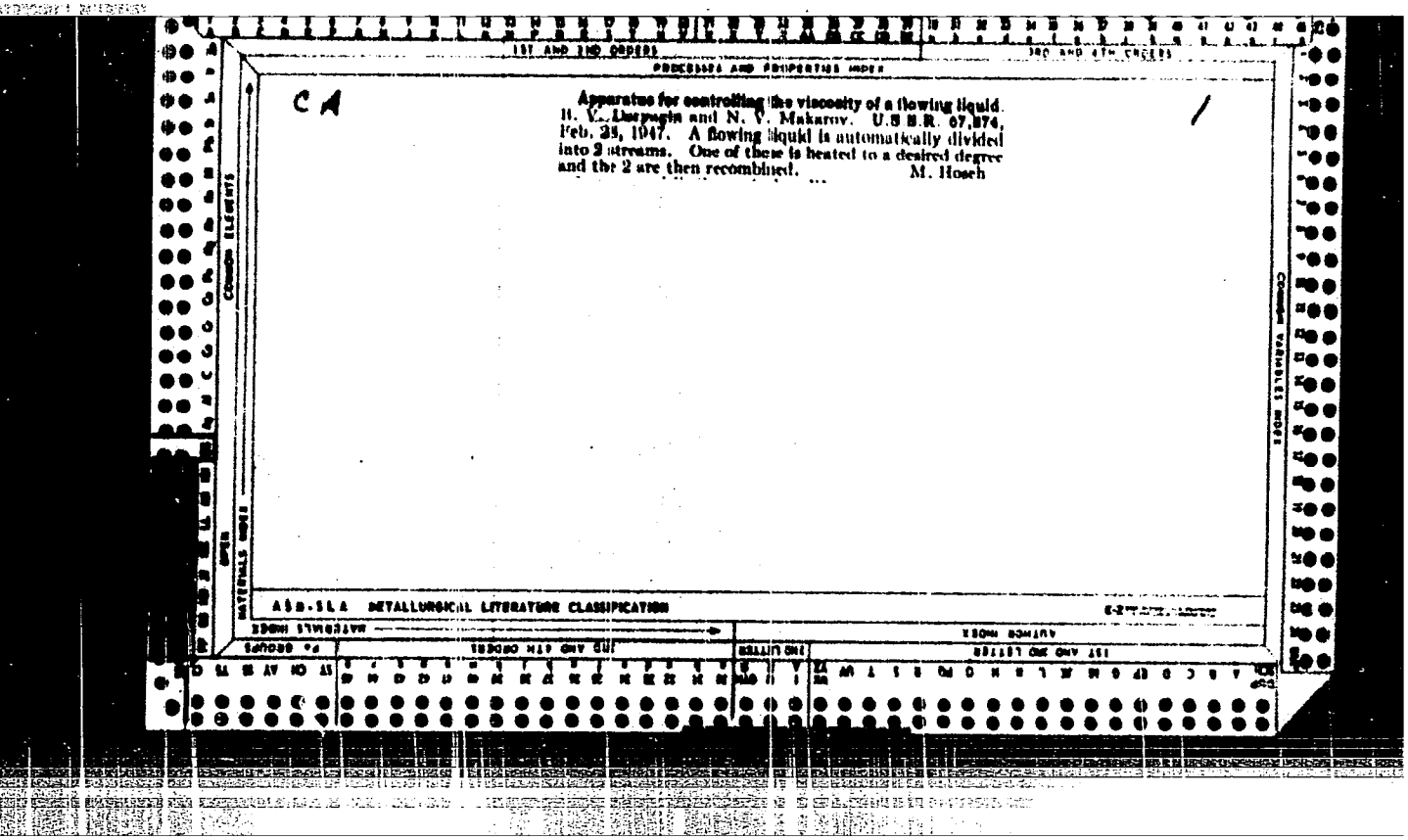

CA

Apparatus for controlling the viscosity of a flowing liquid. N. V. Lisyagin and N. V. Makarov. U.S.S.R. 67,874, Feb. 29, 1947. A flowing liquid is automatically divided into 2 streams. One of these is heated to a desired degree and the 2 are then recombined. M. Hoseh

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

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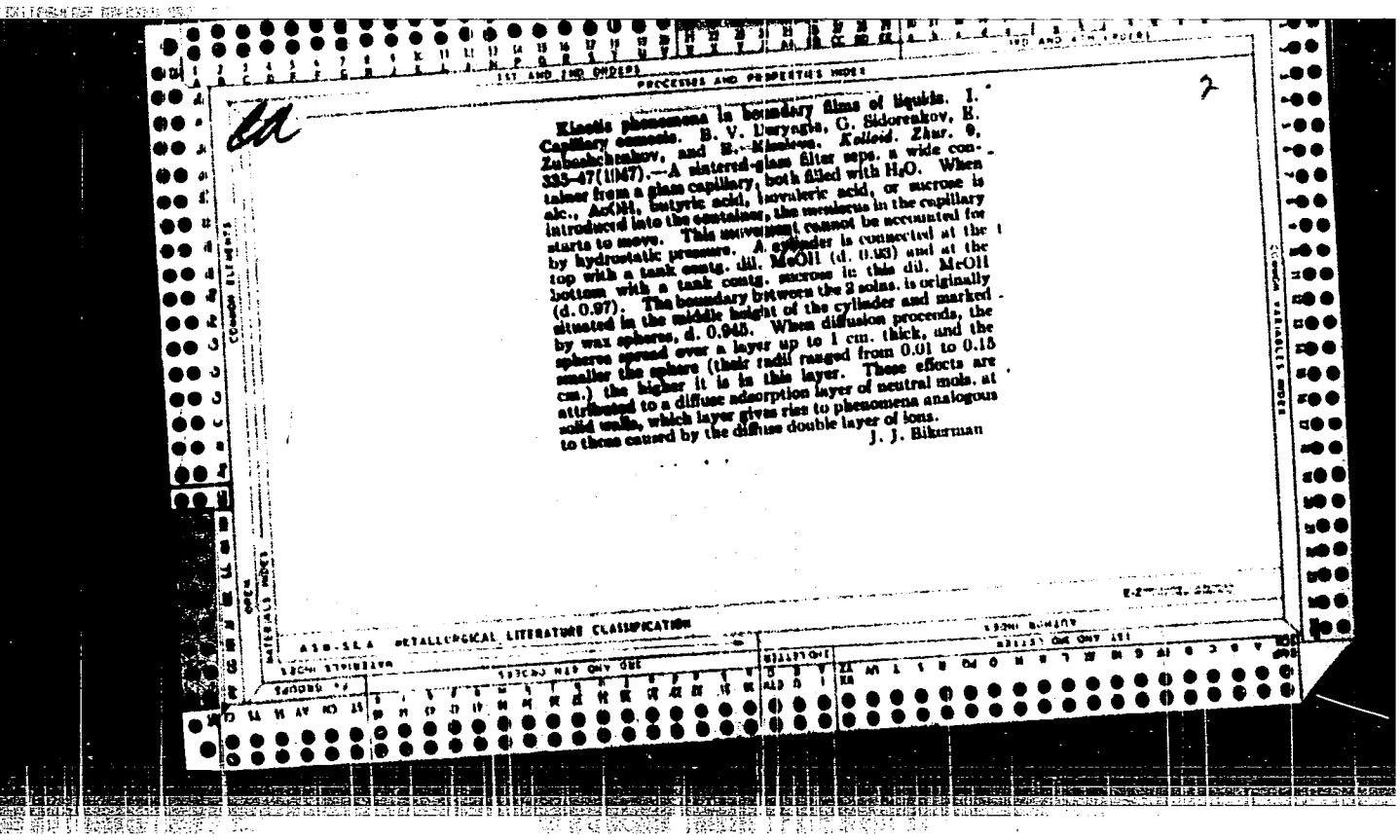

Kinetic phenomena in boundary films of liquids. I. Capillary osmosis. B. V. Deryagin, G. Sidorenkov, E. Zubashchenkov, and E. Kiselova. *Kolloid. Zhur.* 9, 335-47(1947).—A sintered-glass filter seps. a wide container from a glass capillary, both filled with H_2O. When alc., AcOH, butyric acid, isovaleric acid, or sucrose is introduced into the container, the meniscus in the capillary starts to move. This movement cannot be accounted for by hydrostatic pressure. A cylinder is connected at the top with a tank contg. dil. MeOH (d. 0.93) and at the bottom with a tank contg. sucrose in this dil. MeOH (d. 0.97). The boundary between the 2 solns. is originally situated in the middle height of the cylinder and marked by wax spheres, d. 0.945. When diffusion proceeds, the spheres spread over a layer up to 1 cm. thick, and the smaller the sphere (their radii ranged from 0.01 to 0.15 cm.) the higher it is in this layer. These effects are attributed to a diffuse adsorption layer of neutral mols. at solid walls, which layer gives rise to phenomena analogous to those caused by the diffuse double layer of ions.

J. J. Bikerman

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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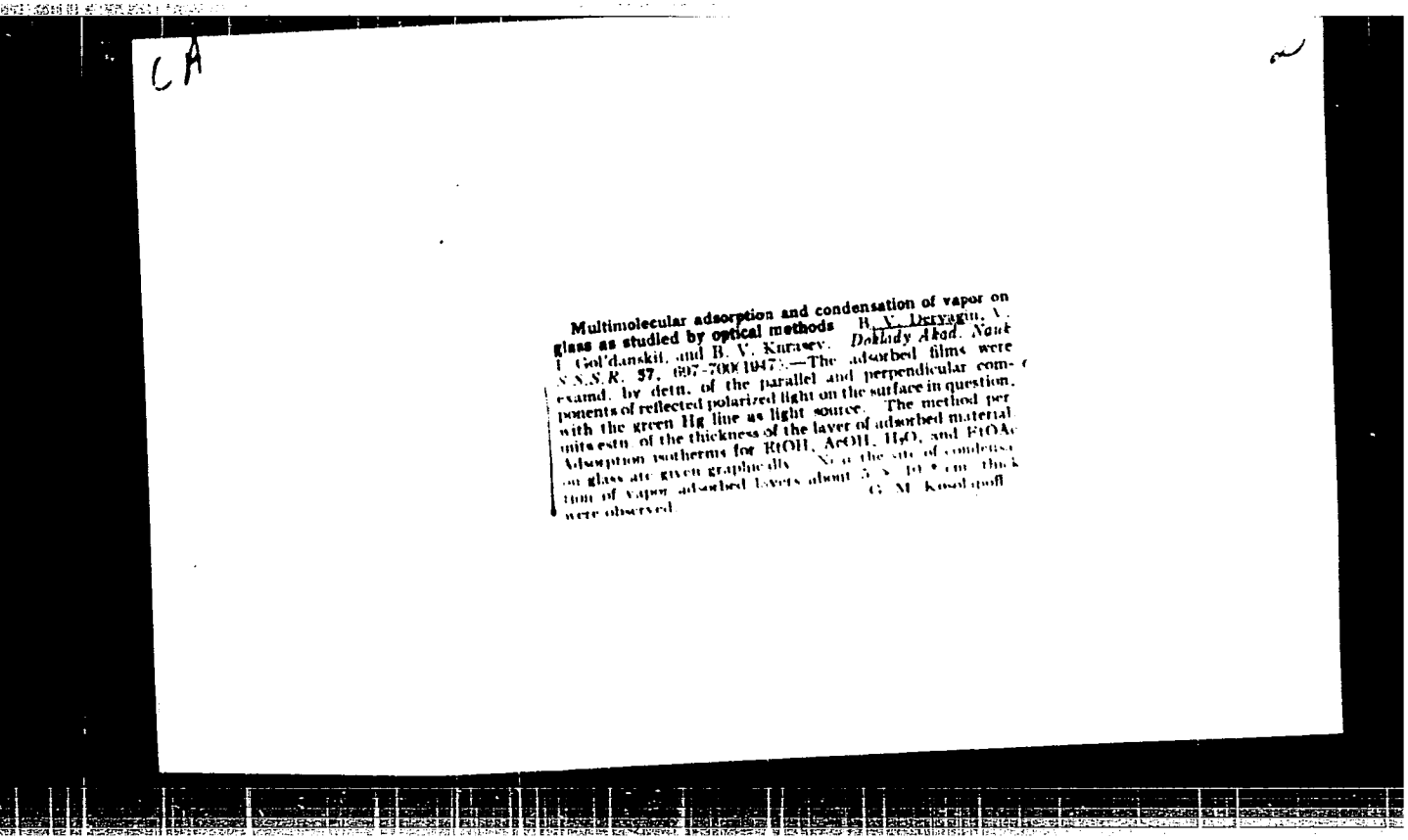

CA

Multimolecular adsorption and condensation of vapor on glass as studied by optical methods B. V. Deryagin, V. I. Gol'danskii, and B. V. Kuraev. *Doklady Akad. Nauk S.S.S.R.* **57**, 697-700 (1947).—The adsorbed films were examd. by detn. of the parallel and perpendicular components of reflected polarized light on the surface in question, with the green Hg line as light source. The method permits estn. of the thickness of the layer of adsorbed material. Adsorption isotherms for EtOH, AcOH, H_2O, and EtOAc on glass are given graphically. Near the str. of condensation of vapor adsorbed layers about 3 × 10⁻⁶ cm. thick were observed. G. M. Kosolapoff

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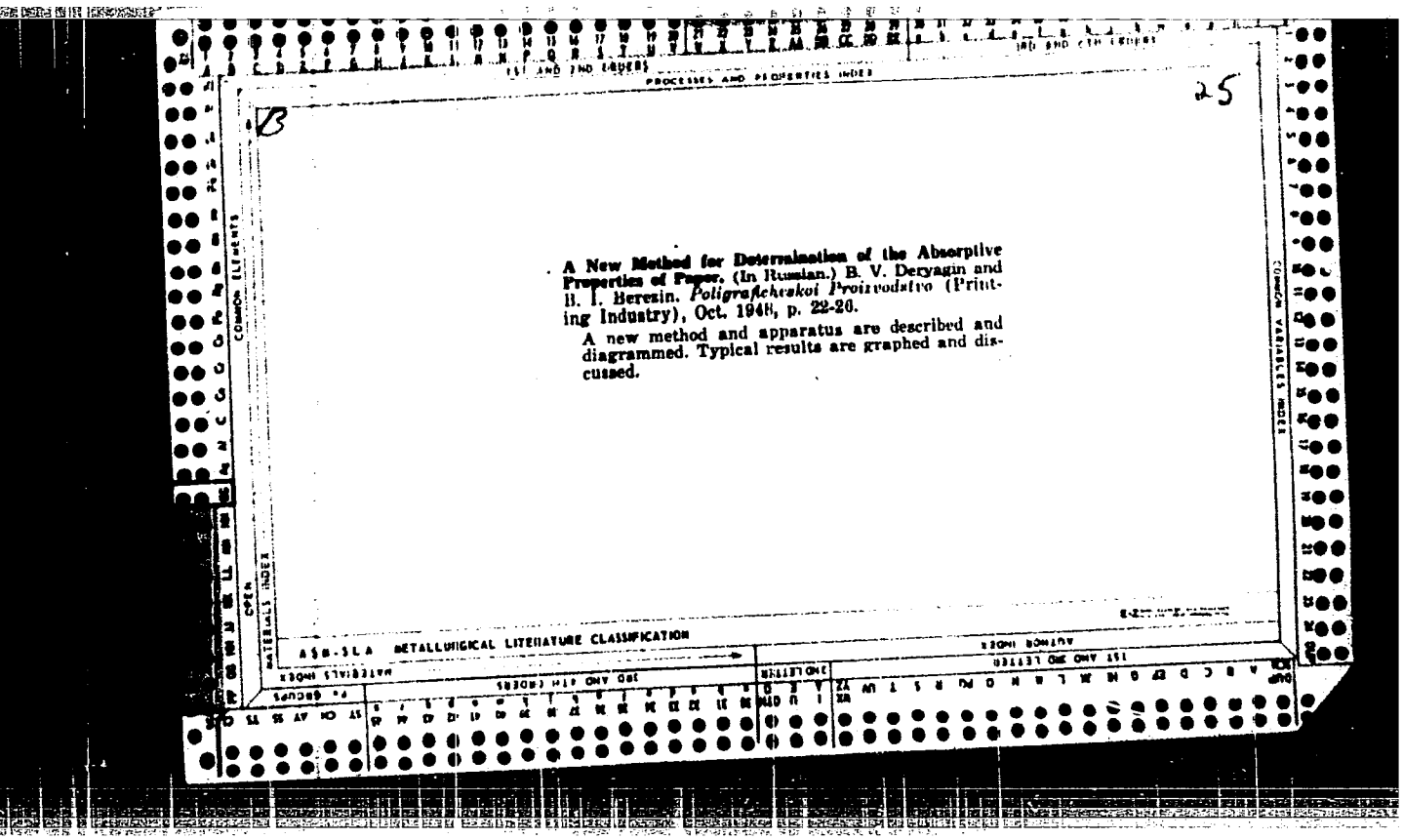

25

B

A New Method for Determination of the Absorptive Properties of Paper. (In Russian.) B. V. Deryagin and B. I. Berezin. *Poligraficheskoi Proizvodstvo* (Printing Industry), Oct. 1948, p. 22-26.

A new method and apparatus are described and diagrammed. Typical results are graphed and discussed.

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CA

Problems of friction of solids and lubrication. B. V. Deryagin. *Vestnik Akad. Nauk S.S.S.R.* 1948, No. 3, 28-31. N. Thon

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DERYAGIN, B. V.

TA 18/49T9

USSR/Chemistry - Aluminum Oxide Nov 48
Chemistry - Aluminum, Films of

"Thickness of the Oxidized Film Which Forms on Electrolytic Aluminum," B. V. Deryagin, R. M. Fridlyand, Inst of Phys Chem, Acad Sci USSR, 6 pp

"Zhur Tekh Fiz" Vol XVIII, No 11, pp 1443-8.

Measures by optic methods thickness of an oxide film on aluminum for various intensities of oxidation. Results of measurements showed that at any rate in the limits of 5-170 V, oxidation occurs for fixed gradient equal to 8.5×10^6 V/cm, of potential on the film. Submitted 7 Apr 48

18/49T9

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

"Review of N. K. Adam's Book 'Physics and Chemistry of Surfaces.'" Uspekhi Fiz. Nauk, 35, No. 2, 1948

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V. PA 37/49T10

USSR/Chemistry - Films Nov 48
Chemistry - Adhesion, Theory of

"The Electrical Theory of Adhesion of Layers to Solid Surfaces and Its Explanation," B. Deryagin, N. Krotova, 10 pp

"Uspekhi Fiz Nauk" Vol XXXVI, No 3

General discussion of the theory of adhesion. Presents mathematical proof of theoretical claims. Describes various types of equipment used to determine the force of adhesion of films.

[redacted]

37/49T10

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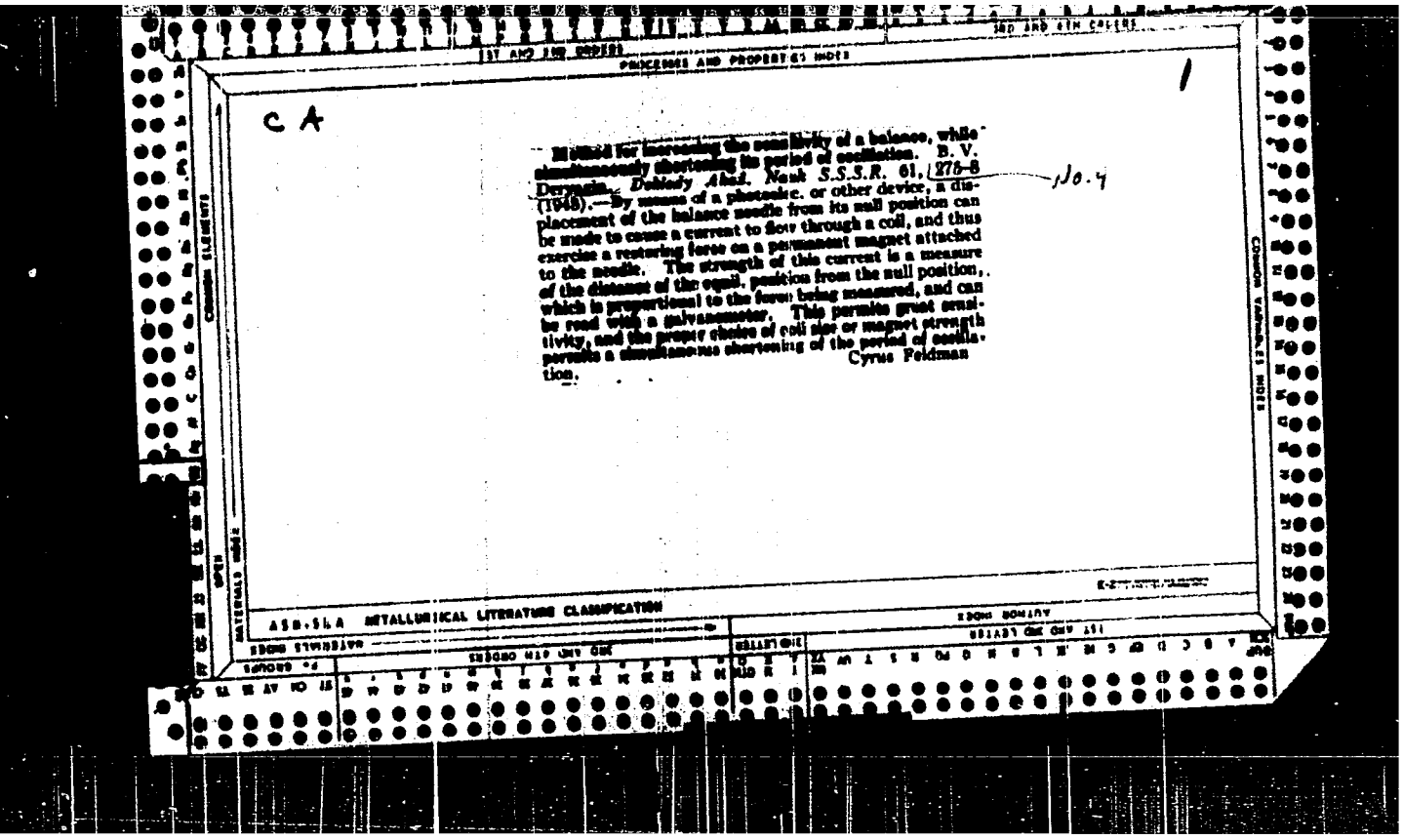

C A

1

Method for increasing the sensitivity of a balance, while simultaneously shortening its period of oscillation. B. V. Deryagin. *Doklady Akad. Nauk S.S.S.R.* 61, 275-8 (1948).—By means of a photocell, or other device, a displacement of the balance needle from its null position can be made to cause a current to flow through a coil, and thus exercise a restoring force on a permanent magnet attached to the needle. The strength of this current is a measure of the distance of the equil. position from the null position, which is proportional to the force being measured, and can be read with a galvanometer. This permits great sensitivity, and the proper choice of coil size or magnet strength permits a simultaneous shortening of the period of oscillation.

Cyrus Feldman

No. 4

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

USSR/Chemistry - Films
Chemistry - Adhesion

Aug 48

"Electric Theory of the Adhesion (Attachment) of Film to Solid Surfaces," B. V. Deryagin, Corr Mem, Acad Sci USSR, M. A. Krotova, Inst of Physicochem, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXI, No 5, pp 849-52.

Investigates subject theory by method of measuring amount of energy (in units of work per cm) necessary to tear a film away from a surface (A), and comparing it with work in attaching a liquid to a solid (A'). Advances new supposition that practically all work in breaking away is expended

24/49T15

USSR/Chemistry - Films (Contd) Aug 48

in overcoming electrostatic attracting force of opposite charges which form during separation of surfaces.

24/49T15

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

DERYAGIN, B. V., and O. M. TODES.

Teoriia dvizheniia kapel' v voskhodiashchem potoke nenasyshchennogo ili peresyshchennogo parami vozdukha i ee vozmozhnye meteorologicheskie primeneniia. (Akademiia Nauk SSSR. Doklady. Novaia seriia, 1948, v.62, no. 1, p. 93-96, illus.

Title tr.: Theory of the motion of droplets in an ascending current of unsaturated or supersaturated air and its possible meteorological applications.

AS262.S3663 v.62

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

USSR/Physics
Films
Techniques

Oct 48

"Application of a Rotating Polarizer to the Study of the Polarization State in Reflected and Diffuse Light With the Particular Aim of Measuring Precisely the Width of Thin Films," V.V. Karasev, Corr Mem, Acad Sci USSR, B.V. Deryagin, Lab of Surface Forces, Inst of Phys Chem, Acad Sci USSR, 3 3/4 pp

"Dok Ak Nauk SSSR" Vol LXII, No 6, 1948

Use of an "electric eye" type apparatus obviated the neccessity of amplifying very low frequencies or rotating the polarizer quickly. To calculate the thickness of a film, it is sufficient to determine the reflection path from the dry "underlayer." Thereafter, it can be determined by Obreymov's method. Submitted 28 Aug 48

60/49T106

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

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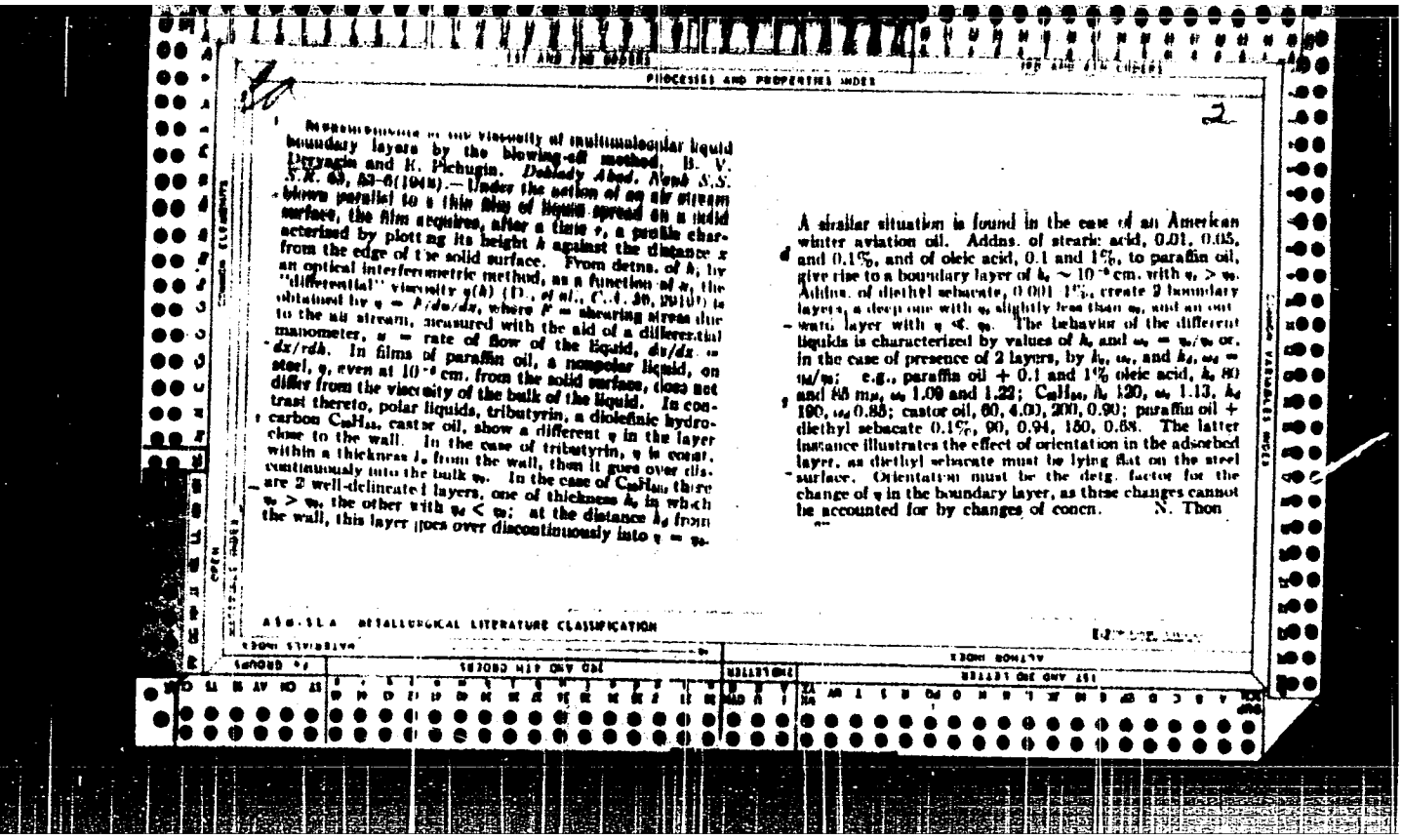
1ST AND 2ND ORDERS



PROCESSES AND PROPERTIES INDEX

2

Measurements of the viscosity of multimolecular liquid boundary layers by the blowing-off method. B. V. Deryagin and K. Pichugin. *Doklady Akad. Nauk S.S.S.R.* 63, 53-6(1948).—Under the action of an air stream blown parallel to a thin film of liquid spread on a solid surface, the film acquires, after a time τ, a profile characterized by plotting its height h against the distance x from the edge of the solid surface. From detns. of h, by an optical interferometric method, as a function of x, the "differential" viscosity $\eta(h)$ (D., *et al.*, C.A. 36, 2910[1]) is obtained by $\eta = F/du/dx$, where F = shearing stress due to the air stream, measured with the aid of a differential manometer, u = rate of flow of the liquid, $du/dx = dx/rdh$. In films of paraffin oil, a nonpolar liquid, on steel, η, even at 10^{-6} cm. from the solid surface, does not differ from the viscosity of the bulk of the liquid. In contrast thereto, polar liquids, tributyrin, a diolefinic hydrocarbon $C_{20}H_{34}$, castor oil, show a different η in the layer close to the wall. In the case of tributyrin, η is const. within a thickness h_0 from the wall, then it goes over discontinuously into the bulk η_0. In the case of $C_{20}H_{34}$, there are 2 well-delineated layers, one of thickness h_0 in which $\eta_0 > \eta_0$, the other with $\eta_d < \eta_0$; at the distance h_d from the wall, this layer goes over discontinuously into $\eta = \eta_0$.

A similar situation is found in the case of an American winter aviation oil. Addns. of stearic acid, 0.01, 0.05, and 0.1%, and of oleic acid, 0.1 and 1%, to paraffin oil, give rise to a boundary layer of $h_0 \sim 10^{-6}$ cm. with $\eta_0 > \eta_0$. Addns. of diethyl sebacate, 0.001-1%, create 2 boundary layers, a deep one with η_0 slightly less than η_0, and an outward layer with $\eta \ll \eta_0$. The behavior of the different liquids is characterized by values of h_0 and $\omega_0 = \eta_0/\eta_0$ or, in the case of presence of 2 layers, by h_0, ω_0, and h_d, $\omega_d = \eta_d/\eta_0$; e.g., paraffin oil + 0.1 and 1% oleic acid, h_0 80 and 85 mμ, ω_0 1.09 and 1.22; $C_{20}H_{34}$, h_0 120, ω_0 1.13, h_d 190, ω_d 0.85; castor oil, 60, 4.00, 200, 0.90; paraffin oil + diethyl sebacate 0.1%, 90, 0.94, 150, 0.58. The latter instance illustrates the effect of orientation in the adsorbed layer, as diethyl sebacate must be lying flat on the steel surface. Orientation must be the detg. factor for the change of η in the boundary layer, as these changes cannot be accounted for by changes of concn. N. Thon

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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USSR/Physics
Aerosols
Dispersions

Nov 48

"A Continuous Method for Ultramicroscopic Measurements of the Particle Concentrations in Aerosols and Other Dispersed Systems," B. Deryagin, Corr Mem, Acad Sci USSR, G. Vlasenko, Lab of Surface Forces, Inst of Phys Chem, Acad Sci USSR, 3 3/4 pp

"Dok Ak Nauk SSSR" Vol LXIII, No 2, pp 155-8.

Among many advantages adduced for this method are: less time is spent in measuring small particle concentrations; aerosol volumes are more quickly

55/49T81

USSR/Physics (Contd) Nov 48

and correctly measured by the counter system employed; and it makes future introduction of automatic calculation for aerosol particles possible. It should be applicable to many scientific problems. Submitted 10 Jul 48.

55/49T81

DERYAGIN, B.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERIAGIN, B. V. & OTHERS

RT-1333 /New Concepts in the Field of Aerosol Research/
Novye Idei v Oblasti Izucheniia Aerosolei. Moscow, 1960.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.; ARTEMOV, I.S.

Apparatus for the distillation of liquids below their boiling points.
Patent U.S.S.R. 77,554, Dec. 31, 1949.
(CA 47 no.19:9680 '53)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

3

A study of reasons of noncoalescence of liquid droplets under static conditions (under prolonged contact). B. V. Deryagin and P. S. Prokhorov. *Novye Idei v Klassi Zaimeniya Aerozolei, Akad. Nauk S.S.S.R., Inst. Fiz.-Khim., Sbornik Statei* 1949, 84–101.—A method was developed that permits study of the shape and dimensions of the air space between 2-touching half-droplets, while preventing their coalescence. It involves microscopic observation of interference rings with monochromatic light of continuously variable wave length, and permits variation in the compn. of the surrounding atm. The air space has a form resembling a crater inverted over another crater, and the distance between the rims of the opposite craters is the parameter studied. This gap is larger for liquids with higher vapor pressure, and it decreases with increasing concn. of the vapor in the surrounding atm. The noncoalescence of the half-droplets is explained by an excess pressure in the air space caused by the diffusion of the vapor of the substance through the gap between the rims of the air space, while air is drawn into the air space. A study was made with an app. designed to serve as a model illustrating the diffusion theory, and an equation was derived for this case, relating the value of the excess pressure to the size of the gap and properties of the substance. The exptl. results obtained on this app. closely follow the theoretical values. The equation applied to half-droplets of Et_2O gives a value for the gap several times as large as the exptl. value. This is explained by the flow of the liquid, in the outer layer of the half-drops, from the center of the air space toward the gap between the rims. This effect was absent in the expts. with the model. The diffusion theory explains the dependence of the size of the gap on the vapor pressure of the liquid and on the concn. of the vapor in the surrounding atm.

Ludwig Luft-Zurakowski

SMW
76

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

Deryagin B.V.

4

Peculiarities of behavior of thin layers of polymers of vinyl ethers and their solutions on metallic surfaces. B. V. Deryagin and N. N. Zakhavaeva. *Issledovaniya v Oblasti [illegible] Sostoyanii, Doklady Akad. Nauk S.S.S.R.* 1949, 282-37.—The behavior of polyvinyl ethers and their solns. on metallic films was examd. by the method of blowing them off a polished plate by means of a collimated air stream (cf. C.A. 43, 2130a). Polyvinyl butyl ether and related substances, pure and in solns., usually show an increase in viscosity with increased distance from a solid surface; the effect may attain 2–4 fold magnitude and extends to 5 μ or beyond. Similar behavior of instability type is shown by a wedge-shaped film of these polymers. Max. instability is found at intermediate concns., which are generally lower with higher mol. wt. of the polymers. In contrast to common liquids these polymers show instability as a result of shear with film flow; the effect is greater, the longer is the contact of the polymer with the metal. The instability phenomenon is little affected by temp. The results are explainable on the basis of mol. orientation at the interface. The results are shown graphically. G. M. Kosolapoff

(1)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

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DERYAGIN, B. V.

USSR/Hydrology
Water, Underground
Soil Studies

Mar/Apr 49

"Nonfreezing Water in the Soil," P. V. Vershinin, Corr Mem, Acad Sci USSR, B. V. Deryagin, N. V. Kirilenko, 7 pp

"Iz Ak Nauk SSSR, Ser Geog i Geofiz" No 2

Two basic factors prevent freezing of all water in the ground during freezing process: (1) difference between freezing point of polymolecular water layers on soil surface and normal freezing point, and (2) expansion of water during transformation to ice, which hinders freezing in narrow gaps. Five diagrams show results of tests. Submitted 30 Oct 48.

PA 43/49T 71

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

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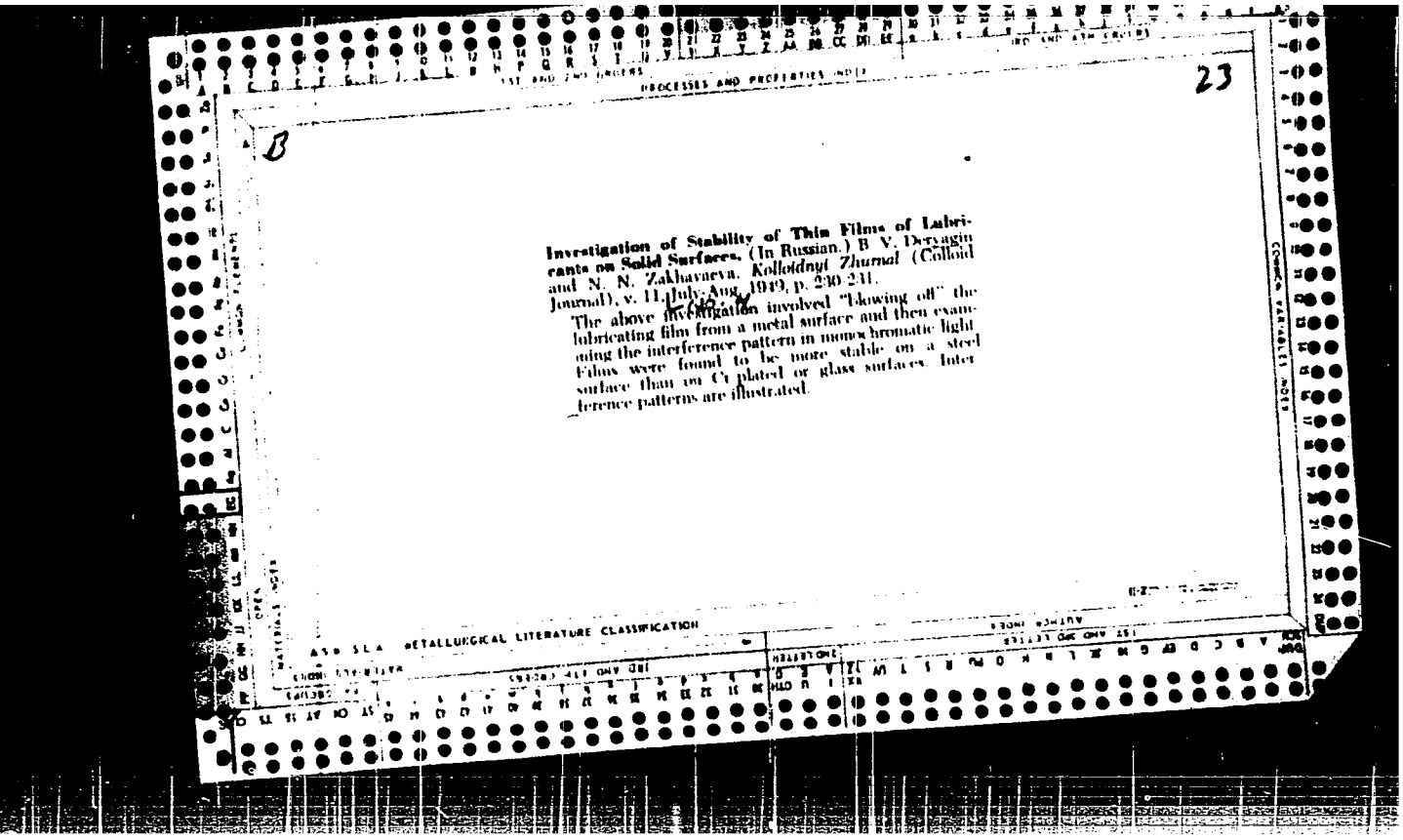


PROCESSES AND PROPERTIES INDEX

23

B

Investigation of Stability of Thin Films of Lubricants on Solid Surfaces. (In Russian.) B. V. Deryagin and N. N. Zakhavaeva. *Kolloidnyi Zhurnal* (Colloid Journal), v. 11, July-Aug. 1949, p. 230-241.

The above investigation involved "blowing off" the lubricating film from a metal surface and then examining the interference pattern in monochromatic light. Films were found to be more stable on a steel surface than on Cr plated or glass surfaces. Interference patterns are illustrated.

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V., redaktor.

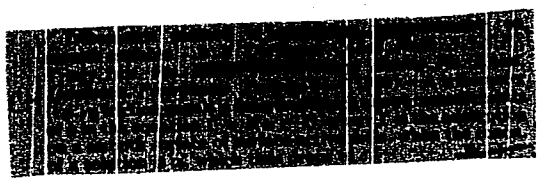
[New methods of physical chemistry research on surface phenomena] Novye metody fiziko-khimicheskikh issledovanii poverkhnostnykh iavlenii. [Otvetstvennyi redaktor B.V.Deriagin] Moskva, Izd-vo Akademii nauk SSSR, 1950. 188 p. (MLRA 6:9)

1. Akademiya nauk SSSR. Institut fizicheskoy khimii. (Surface chemistry)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.



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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

CH

A new method of measuring the specific surface of porous substances and powders. B. V. Deryagin. *Akad. Nauk. S.S.S.R., Trudy Inst. Fiz. Khim.* No. 1, *Novye Metody Fiz. Khim. Issledovan. Poverkhnost. Yavlenii* 150-4(1930).—An app. is described, which is first evacuated, and then filled with a certain amt. of air, which is measured by aid of a rheometer. If this app. contains a porous material, the air will filter through it and the pressure found will be different at various times. Two manometers are provided, one with oil for low pressures, the other with Hg for high pressures. Values are presented and compared with those obtained by other methods; thus, e.g. apatite will show from 0.91 to 49.0 × 10^3 sq. m./g., depending upon the mesh, whereas the MeOH-adsorption method furnished 60.1 × 10^3 sq.m./g. for the finest mesh. ZnO showed values of 0.57 by this method, 2.7 by N adsorption, and 0.58 sq.m./g. by the dye adsorption method. Other materials used in the measurements were corundum, $BaSO_4$, soil, silica gel, and concrete.

Werner Jacobson

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

BA

-0

Basic laws of movement of water in soil having different moisture contents. B. V. Deryagin and F. K. Kolyasev (*Gidrotekhnika i Melioratsiya*, 1950, 2, No. 2, 3—12; *Build. Sci. Abstr.*, 1950, 23, 81).—A theory of soil-moisture movement for different water contents is developed on the basis of a general theory of filtration, Kolyasev's theory of differential soil-water, and Deryagin's theory of capillary flow, taking into account the properties of absorbed films and their mobility under the influence of water and temp. gradients.

R. B. CLARKE.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

USSR/Chemistry - Surface Phenomena Nov/Dec 50

"Adhesion of Quartz Filaments in Aqueous Media," A. D. Malkina, B. V. Deryagin, Inst of Phys Chem, Acad Sci USSR, Lab of Surface Forces

"Kolloid Zhur" Vol XII, No 6, pp 431-447

Measured adhesion of fine quartz filaments in aqueous media using Deryagin's formula to calculate specific adhesion energy. Values obtained correspond closely to Bradley's for adhesion of quartz spheres in air. In air adhesion energy is independent of duration of contact; in water it grows slowly from zero to equilibrium value approximately equal to value in air. Time for reaching equilibrium value is decreased by addition of electrolytes (increased cation charge) and as temperature is increased. Between 30-43°C this time drops sharply from days to 1 hr. Adhesion kinetics are not affected by time of filament immersion prior to contact or any force pressing them together. Slow separation requires 10-15% less force than rapid. Apparently hydrate layers covering filaments are gradually "destroyed" after contact period. Absence of these kinetics for contact in air and similarity of specific energies for contact in water and in air indicate in both cases filament surfaces enter into "direct" contact or are separated by identical boundary layer of water. Addition of high concentration of acetone stabilizes hydrate layers and reduces adhesion energy to zero. Explains effect of solvation on lyophilic dispersed systems and has applications in technological processes.

[redacted]

PA 170T10

DERYAGIN, B. V.

170T10

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

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CA

Apparatus for determination of the coefficients of diffusion of vapors of liquids in the atmosphere. B. V. Deryagin, P. S. Prokhorov, and A. D. Malkina (Acad. Sci. U.S.S.R.). *Zavodskaya Lab.* 16, No. 3(1950); cf. C.A. 44, 8184g.--The app. consists of a vessel provided with a horizontal porous separator. The test liquid is introduced into the bottom compartment, while air or other gas is circulated through the upper compartment. Both air spaces are connected to a differential manometer, with 3-way stopcock switching. The differential pressure read on the manometer is proportional to the vapor pressure difference on the 2 sides of the porous barrier. Tests with acetone, CCl_4, benzene, and MeOH gave satisfactory results. G. M. Kosolapoff

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

USSR/Engineering - Testing Equipment, Sep 50
Films
Instrumentation

"Device for Automatic Control and Regulation of Film Thickness," B. V. Deryagin, M. R. Kudryavitskiy, S. M. Levi, All-Union Sci Res Inst of Cinematography

"Zavod Lab" Vol XVI, No 9, pp 1091-1093

PA 169T32

Uses 2 pairs of condensers -- one before the after emulsion bath -- in 2 oscillator circuits. Coated film passing between 2d pair of condensers changes their capacitance, disrupting circuit. Voltage change is measured by inductively coupled

169T32

USSR/Engineering - Testing Equipment, Sep 50
(Contd)

Voltmeter, and relation established between currents and emulsion-layer thickness.

169T32

DERYAGIN, B. V.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

CA

New diffusion manometric instruments for measuring diffusion coefficients, volatility, and vapor content of various liquids in the atmosphere. B. C. Pervagin, P. S. Prokhorov, and A. D. Malkina (Acad. Sci. U.S.S.R., Moscow). *Zhur. Fiz. Khim.* 24, 50[illegible]. A chamber contg. satd. vapor is sepd. by a porous membrane (pore diam. 1.3 μ) from a chamber in which the vapor pressure p is kept very low by an air current. In steady state, the pressure difference between the 2 chambers at a first approximation is $\eta D(p_0 - p)/kP$. D is the diffusion coeff. of the vapor, η viscosity of the air-vapor mixt., p_0 the pressure of the satd. vapor, P the pressure in the air chamber, and K the app. const. The following D were obtained at 0° and 20°: Me_2CO 0.1076 and 0.1126, benzene 0.0841 and 0.0900; MeOH 0.1214 and 0.1308, and CCl_4 0.1236 and 0.1424 cm.²/sec. Another method makes the knowledge of η unnecessary. The instrument can be used also for detg. vapor pressures (if D is known), the product Dp_0 which dets. the rate of evapn., and the rate of thermal diffusion of vapors. L. J. Bikerman

9

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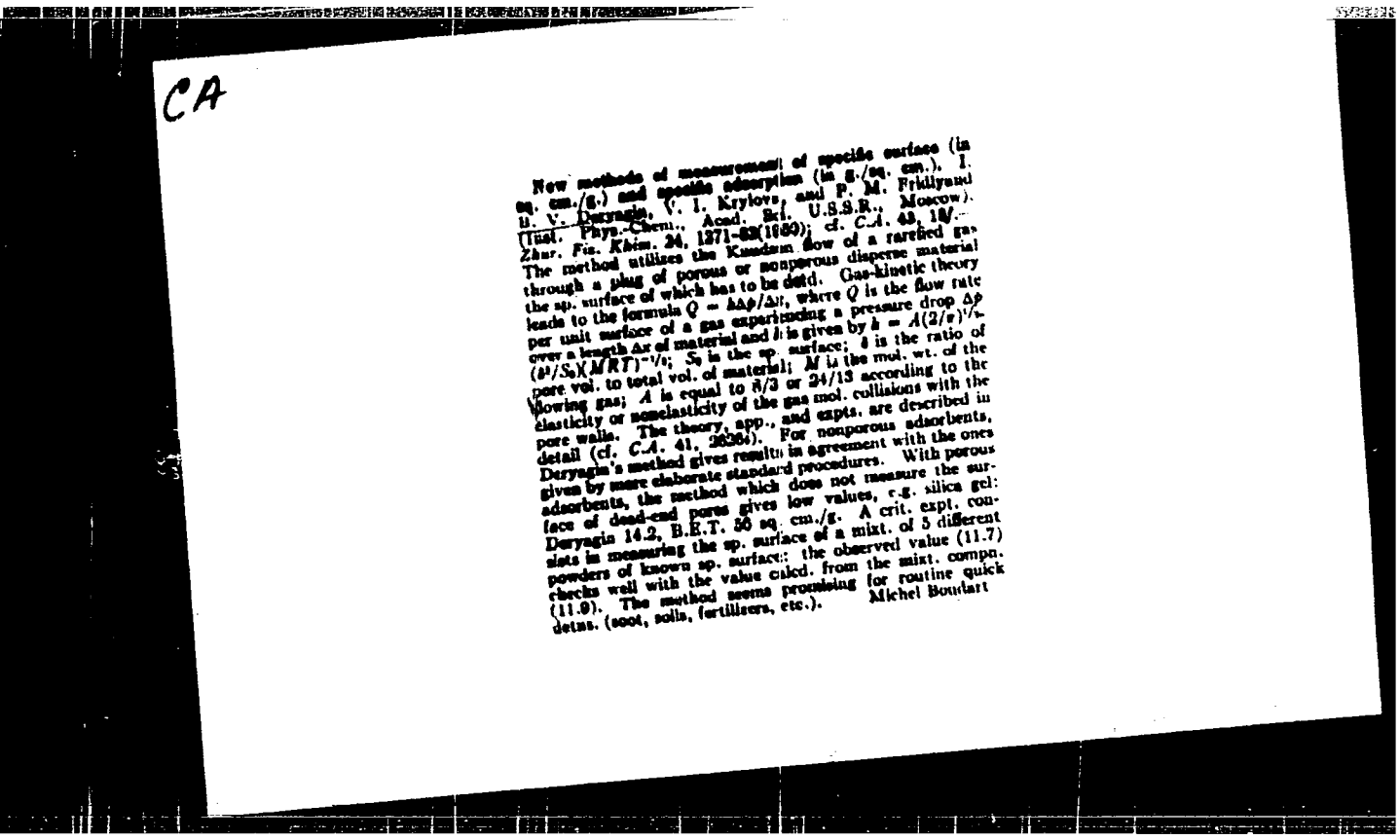

CA

New methods of measurement of specific surface (in sq. cm./g.) and specific adsorption (in g./sq. cm.). I. B. V. Deryagin, V. I. Krylova, and P. M. Frikiyand [Inst. Phys.-Chem., Acad. Sci. U.S.S.R., Moscow]. *Zhur. Fiz. Khim.* 24, 1271-82(1950); cf. *C.A.* 43, 1[illegible]. The method utilizes the Knudsen flow of a rarefied gas through a plug of porous or nonporous disperse material the sp. surface of which has to be detd. Gas-kinetic theory leads to the formula $Q = kA\phi/\Delta x$, where Q is the flow rate per unit surface of a gas experiencing a pressure drop $\Delta\phi$ over a length Δx of material and k is given by $k = A(2/\pi)^{1/2}$. $(\delta^2/S_0)(M/RT)^{-1/2}$; S_0 is the sp. surface; δ is the ratio of pore vol. to total vol. of material; M is the mol. wt. of the flowing gas; A is equal to $\pi/3$ or 24/13 according to the elasticity or nonelasticity of the gas mol. collisions with the pore walls. The theory, app., and expts. are described in detail (cf. *C.A.* 41, 2926i). For nonporous adsorbents, Deryagin's method gives results in agreement with the ones given by more elaborate standard procedures. With porous adsorbents, the method which does not measure the surface of dead-end pores gives low values, e.g. silica gel: Deryagin 14.2, B.E.T. 50 sq. cm./g. A crit. expt. consists in measuring the sp. surface of a mixt. of 5 different powders of known sp. surface: the observed value (11.7) checks well with the value calcd. from the mixt. compn. (11.9). The method seems promising for routine quick detns. (soot, soils, fertilizers, etc.). Michel Boudart

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

USSR/Chemistry - Aerosols Jul/Aug 51

"Flow Ultramicrophotometric Method of Dispersion Analysis," B. V. Deryagin, G. Ya. Vlasenko, Inst of Phys Chem, Acad Sci USSR, Lab of Surface Forces

"Kolloid Zhur" Vol XIII, No 4, pp 249-256

Describes method for dispersion analysis of aerosols and other colloidal dispersion systems in state of flow by method of ultramicroscopic count of particles. Equipment specially devised and used: flow ultramicrophotometers for dispersion analysis of aerosols using photometric wedge for gradually reducing illumination of zone in which

18813

USSR/Chemistry - Aerosols (Contd) Jul/Aug 51

flashes are detd. Measuring aerosol systems (including water mist) shows comparative ease with which the fractional composition is broken down /observed/. Developed graduating method permitting transition from the "optical" to the "geometric radius" and carried out measurements on oil aerosols.

18813

DERYAGIN, B. V.

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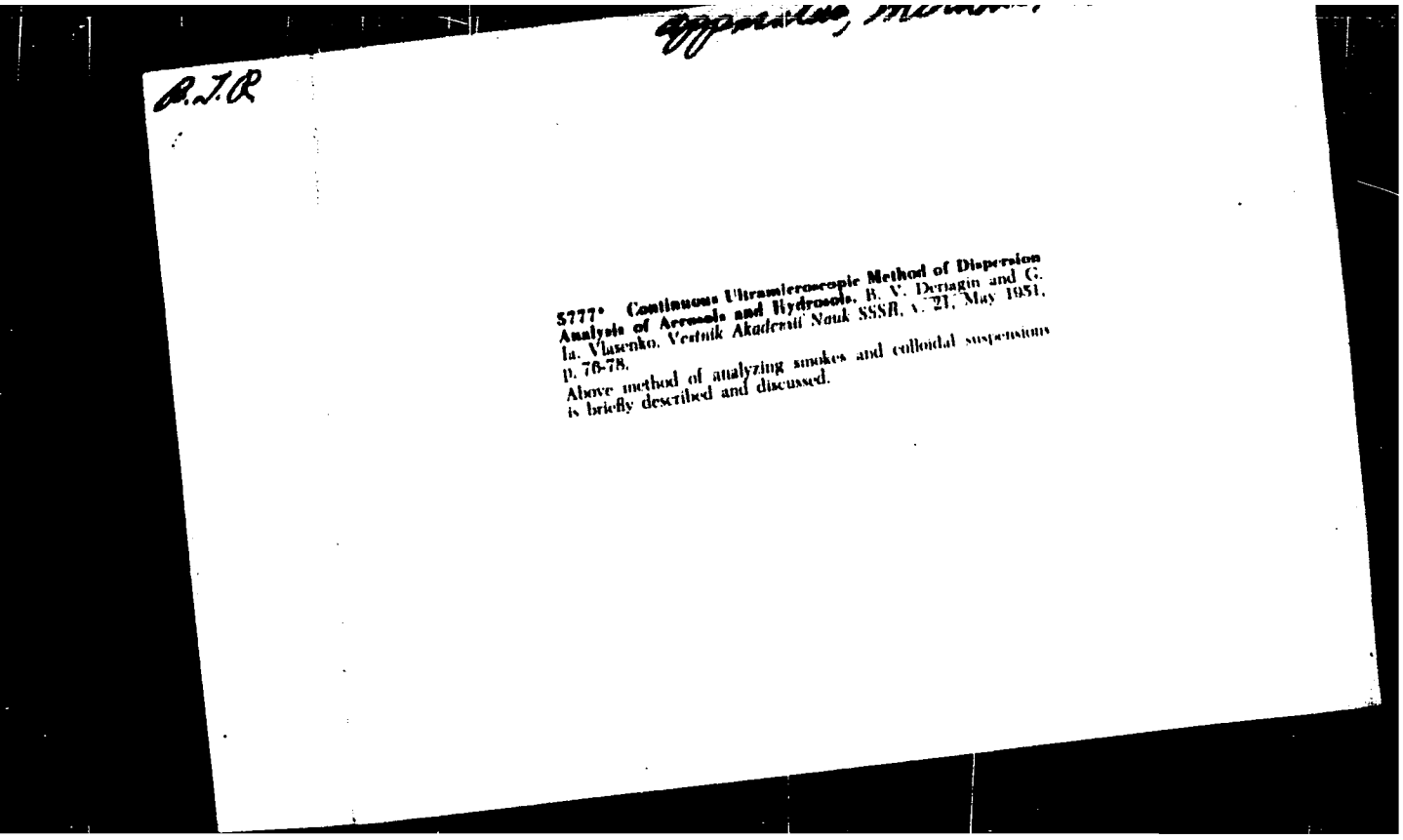

B.J.R

5777• **Continuous Ultramicroscopic Method of Dispersion Analysis of Aerosols and Hydrosols.** B. V. Deriagin and G. Ia. Vlasenko. *Vestnik Akademii Nauk SSSR*, v. 21, May 1951, p. 76-78.

Above method of analyzing smokes and colloidal suspensions is briefly described and discussed.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

SA
Sect. II

Optics - Spectra

535.347

5676. Modulation method of measuring dichroism. B. V. DERYAGIN AND V. V. KARASEV. *Zh. Tekh. Fiz.*, 21, 708–9 (*No.* 6, 1951) *In Russian.*

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

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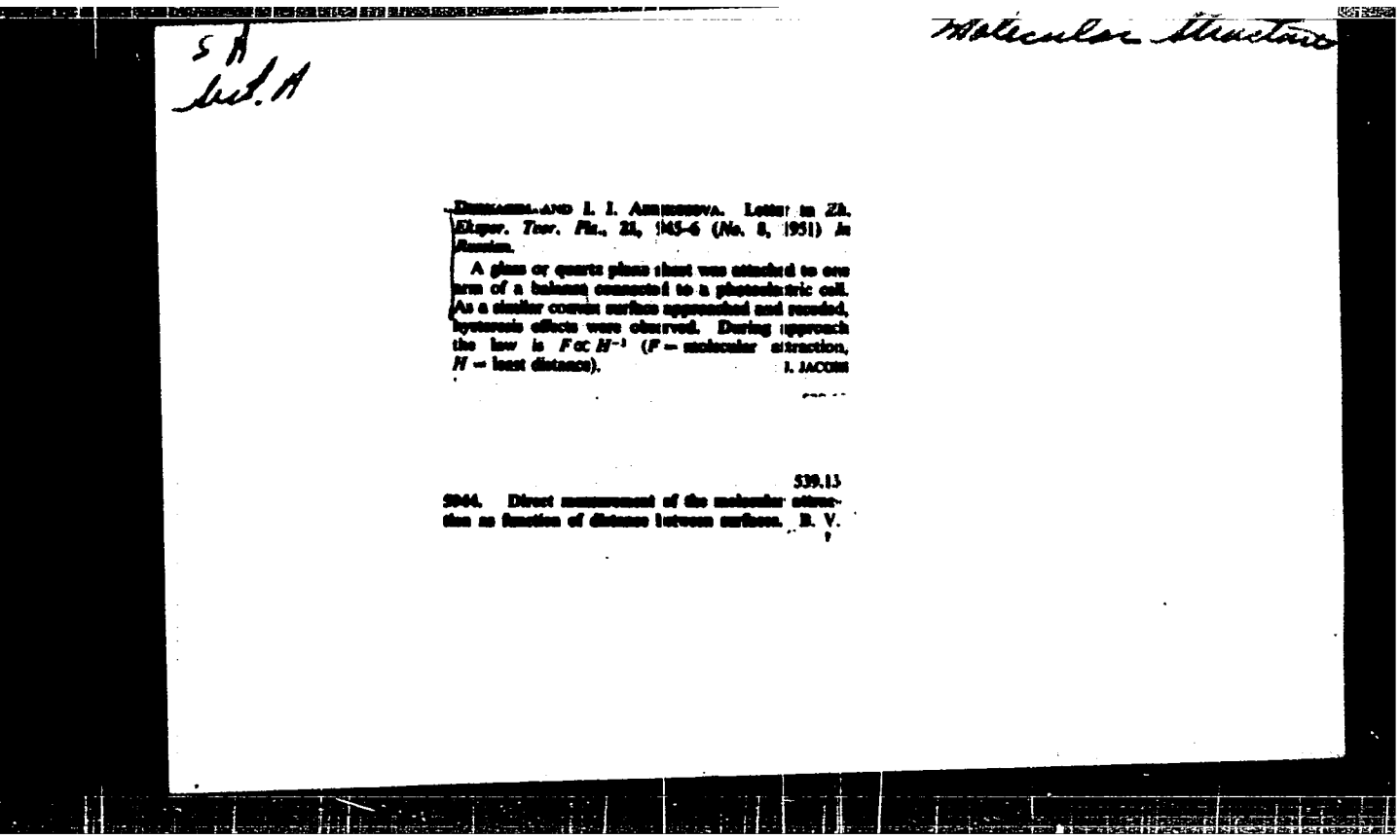

Molecular Structure

S A
Sect. A

DERYAGIN AND I. I. ABRIKOSOVA. Letter in Zh. Eksper. Teor. Fiz., 21, 945-6 (No. 8, 1951) In Russian.

A glass or quartz plane sheet was attached to one arm of a balance connected to a photoelectric cell. As a similar convex surface approached and receded, hysteresis effects were observed. During approach the law is $F \propto H^{-1}$ (F = molecular attraction, H = least distance). I. JACOBS

539.13

5944. Direct measurement of the molecular attraction as function of distance between surfaces. B. V.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

PA 190T41

USSR/Chemistry - Plastics Oct 51

"The Viscosity Properties of Vinyl Alkyl Ether Polymers," M. F. Shostakovskiy, B. V. Deryagin, I. F. Bogdanov, N. N. Zakhavayeva, Inst Org Chem and Inst Phys Chem, Acad Sci USSR

"Zhur Prik Khim" Vol XXIV, No 10, pp 1063-1070

Polymers of vinyl alkyl ethers have very favorable temp viscosity curve (index of viscosity). A 2% soln of these polymers strongly reduces metal corrosion.

190T41

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

USSR/Chemistry - Viscosity of Emulsions 11 Jul 51

"The Effect of Surface-Active Agents (Color Components) on the Specific Viscosity of Gelatin Solutions and Photographic Emulsions," B. V. Deryagin, S. M. Levi, V. S. Kolytsov, All-Union Sci Res Cinephoto Inst

"Dok Ak Nauk SSSR" Vol LXXIX, No 2, pp 283-286

Adds 3 color components, the formulas of which are given to gelatin solns in varying quantities and studies the resultant effect on the viscosity. Graphically illustrates the results.

214T11

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

USSR/Chemistry - Aerosols Dec 51

"The Effect of Moisture Deficiency on the Speed of Coagulation of Water Aerosol," P. S. Prokhorov, B. V. Deryagin, L. F. Leonov, Lab of Surface Forces, Inst Phys Chem, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXXI, No 4, pp 637-640

Coagulation of droplets is retarded if the surrounding atm is not satd with the vapor of the droplets. This is confirmed experimentally. Coagulation is shown graphically to decrease with increased dryness of surrounding air.

202T25

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

[What friction is; essays on the nature of friction] Chto takoe trenie; ocherki o prirode treniia. Moskva, Izd-vo Akademii nauk SSSR, 1952. 243 p.
(MLRA 6:5)
(Friction)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V. and KARASEV, V. V.

"Micropolarization Methods for Measuring the Thickness of Thin Films," Trudy Inst. Fiz. Khimii, AS USSR, No.1, 1952

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

"Tribometric Method for Measuring Adsorption on Smooth Surfaces," Trudy Inst. Fiz. Khimii, AS USSR, No.1, 1952

DERYAGIN, B. V.

"A New Method for Measuring the Specific Surface Area of Porous Bodies and of Powders," Trudy Inst. Fiz. Khimii, AS USSR, No.1, 1952.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

KUKHARIN, S. V.; VLADYKO, I. YA.

Colloids

Flow method and apparatus for measuring partial concentrations of aerosols and other colloid-disperse systems. Trudy Inst. fiz. khimii AN SSSR, no. 1, 1952.

Monthly List of Russian Accessions, Library of Congress, December, 1952. Unclassified.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.; PROKHOROV, P. S. and MALKINA, A. D.

"Determination of diffusion coefficients, evaporation rate and content of vapors of various liquids in the atmosphere," Trudy Inst. fiz. khimii, AS USSR, No.1, 1952.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

USSR/Meteorology - Hygrometer, May 52
Humidity of Air

"Membrane Hygrometer and Its Application for Determining Relative Humidity of Air," B. V. Deryagin, Moscow Inst of Phys Chem, M. K. Melnikova, Leningrad Agrophys Inst

"Meteorol i Gidrol" No 5, pp 54-58

Describes new equipment designed on principles governing diffusion of water vapor through a porous screen, as suggested by Prokhorova, Deryagin and Malkina. Notes that, because of its advantageous sensitivity, accuracy, and rapid operation, it is recommended for use in agricultural meteorology.

229T88

229T88 229

DERYAGIN, B. V.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

Chemical Abst.
Vol. 48 No. 9
May 10, 1954
General and Physical Chemistry

The effective magnitude of the spreading angle during imbibition of porous bodies and a method for its evaluation. B. V. Deryagin, M. K. Mel'nikova, and V. L. Krylova. Colloid J. (U.S.S.R.) 14, 459-63(1952)(Engl. translation). —See C.A. 47, 3082c. H. L. H.

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(3)

9-2-54

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

1. BUDNEVICH, S. S.; DERYAGIN, B. V.

2. USSR (600)

4. Solids

7. Sliding of solids on ice. Zhur. tekh. fiz. 22, No. 12, 1952.

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

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

(4) Phys. Chem

6

An attempt to reduce the wedge action of polymolecular liquid layers to the electroviscous effect. B. V. Deryagin and M. M. Kusakov (Inst. Phys. Chem., Acad. Sci., Moscow). *Zhur. Fiz. Khim.* 26, 1538–40(1952).—Contrary to Elton (*C.A.* 43, 4927*a*) the liquid films remaining between a gas bubble and a solid are equil. formations; the light interference patterns shown by these films are different from those reproduced in Elton's paper. J. J. Bikerman

9/30/54

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

USSR/Chemistry - Surface-Active Agents 1 Nov 52

"The Influence of Adsorbed Layers on External Friction," G.I. Izmaylova and B.V. Deryagin, Corr Mem Acad Sci USSR

DAN SSSR, Vol 87, No 1, pp 85-88

The changes in the coef of static friction as a result of the formation of adsorbed layers on the surface were studied. Spreading of small amounts (10^{-8} moles/l) of surface-active agents on the surface of glass or steel lowers the coef of static friction sharply. Elaborate precautions were taken to prevent contamination with impurities.

252T14

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V., KOLYASEV, F. YE., AND MEL'NIKOVA, M. K.

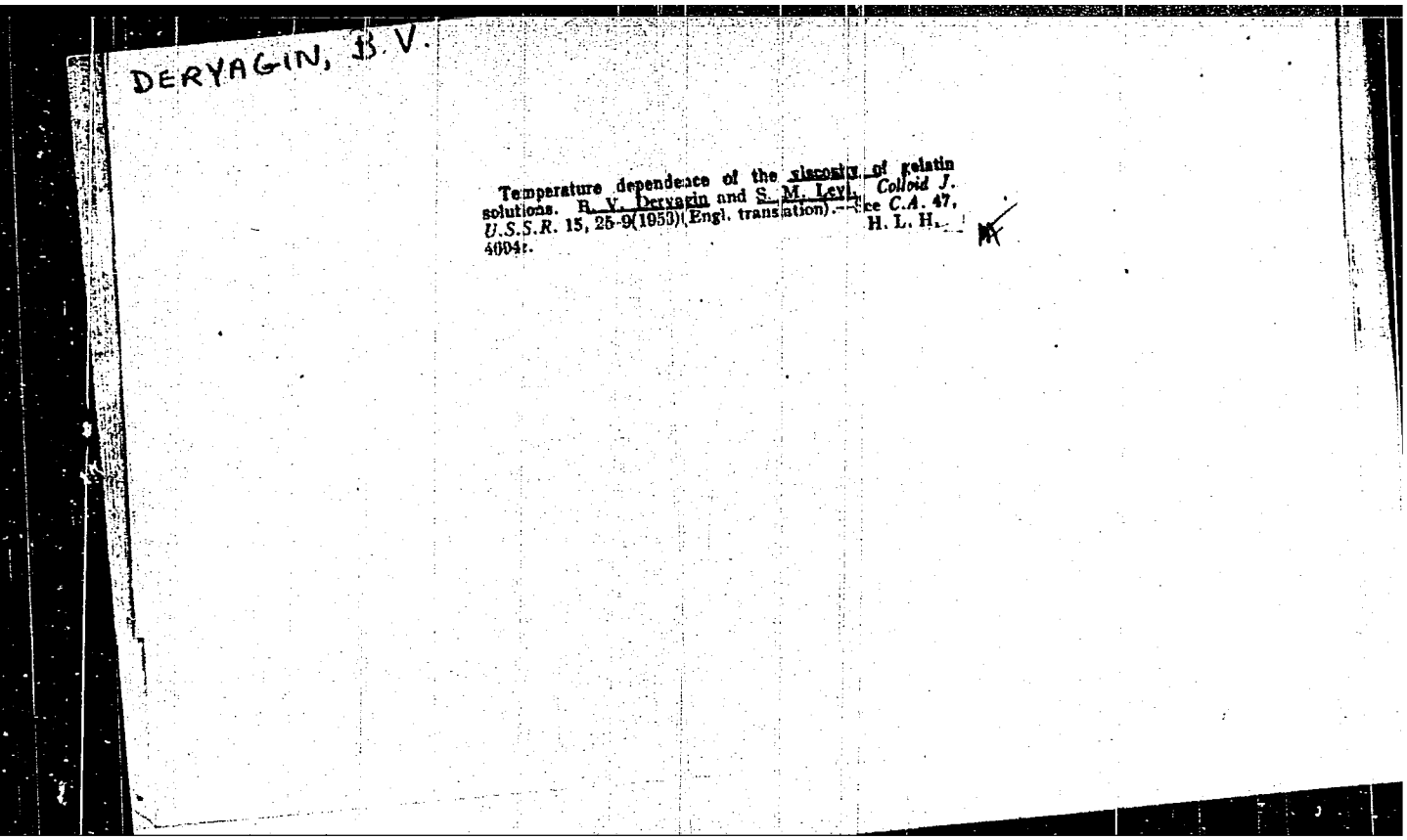
Principal Laws Governing the Movement of Water in Soil Under Various Wetting

The authors generalize the problems developed in an earlier published work of theirs (Gidrotekhnika i melioratsiya, No. 2, 1950), and also present some new information. They give values of the "kinetic" specific surface of certain grounds and soils (determined by V. I. Krylova by measuring the resistance to movement of gases through them). They consider the earlier proposed equation for the determination of the velocity of motion of the wetting front (B. V. Deryagin, Kolloid. zhur. 8, No. 1-2, 1946), based on the empirical connection of Kozeny between permeability and porosity and on the assumption concerning the complete filling by liquid of the region behind the moving wetting front. The quantity "capillary motion" at the front of wetting is expressed by means of "kinetic" specific surface, and not by meniscus radius (as done earlier). (RZhGeol, No. 4, 1955) Sb. tr. po agron. fizike, No. 6, 1953, 170-181.

SO: Sum. No. 744, 8 Dec 55 - Supplementary Survey of Soviet Scientific Abstracts (17)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022



DERYAGIN, B. V.

Temperature dependence of the viscosity of gelatin solutions. B. V. Deryagin and S. M. Levi. *Colloid J. U.S.S.R.* 15, 25-9(1953)(Engl. translation).—See *C.A.* 47, 4004i. H. L. H.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

USSR/Chemistry - Viscosity Sep/Oct 53

"Investigation of the Boundary Viscosity of Organic Liquids by the Method of Blowing," V. V. Karasev, B. V. Deryagin, Lab of Surface Forces, Inst of Phys Chem, Acad Sci USSR

Koll Zhur, Vol 15, No 5, pp 365-370

Describes procedures and equipment used for determining viscosity at the boundary solid-liquid by the method of blowing off the film of liquid. Points out that the method is useful for the investigation of lubricants, because formation of boundary phases is of importance there.

270T16

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.; TITIEVSKAYA, A.S.

Wedging action of free liquid films and its role in the stability of foams. Koll. zhur. 15 no.6:416-425 '53. (MLRA 6:12)

1. Institut fizicheskoy khimii Akademiya nauk SSSR, Laboratoriya poverkhnostnykh sil, Moscow. (Foam)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V., chlen-korrespondent; VLASENKO, G.Ya.

Continuous ultramicroscope. Priroda 42 no.11:29-35 N '53. (MLRA 6:11)

1. Akademiya nauk SSSR (for Deryagin). (Microscope and microscopy)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

~~USSR/Physics - Adhesion Field Emission~~ DERYAGIN, B. V.

"Investigation of Electron Emission When a High-Polymer Film is Torn off Glass in a Vacuum," V. V. Karasev, N. A. Krotova, and B. V. Deryagin, Corr Mem Acad Sci USSR

DAN SSSR, Vol 88, No 5, pp 777-781

Describes setup and results of expts in tearing films of polymer (e.g., cellulose acetate) from glass. Nature of emission was checked by fluorescent screen, photographic plates, and action of magnetic field. Found that electrons were emitted from the polymer film (a type of field emission) with energies of about 10^3 - 10^4 ev. This phenomenon is supposedly a visual demonstration of the electrical theory of adhesion. Submitted 3 Dec 52.

(PA 56 no. 671: 7709 '53)

25ST112

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

Investigation of gaseous discharge on tearing of high-polymer films from hard backing. V. V. Karasev, N. A. Krotova, and B. V. Deryagin. *Doklady Akad. Nauk S.S.S.R.* 80, [illegible]. Films of benzylcellulose, acetylcellulose, gutta-percha, caoutchouc, and polyvinyl chloride exhibited a luminous discharge when torn from a backing of brown glass at gas pressures not less than 10^{-3} mm. Hg and at rates not less than 10^{-3} cm./sec. with the exception of polyvinyl chloride which yielded bright sparks every 2–4 sec. at a tearing rate of 10^{-3} cm./sec. Discharge spectra were characteristic of the gas present and the substance under test. The discharge potential approximated the equation of Paschen, $V = f(ph)$ where V = discharge potential, p = gas pressure, h = discharge gap. Observation supported the elec. theory of adhesion previously published by the authors (cf. *C.A.* 43, 2842c).

V. N. Bednarski

PH

(2)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

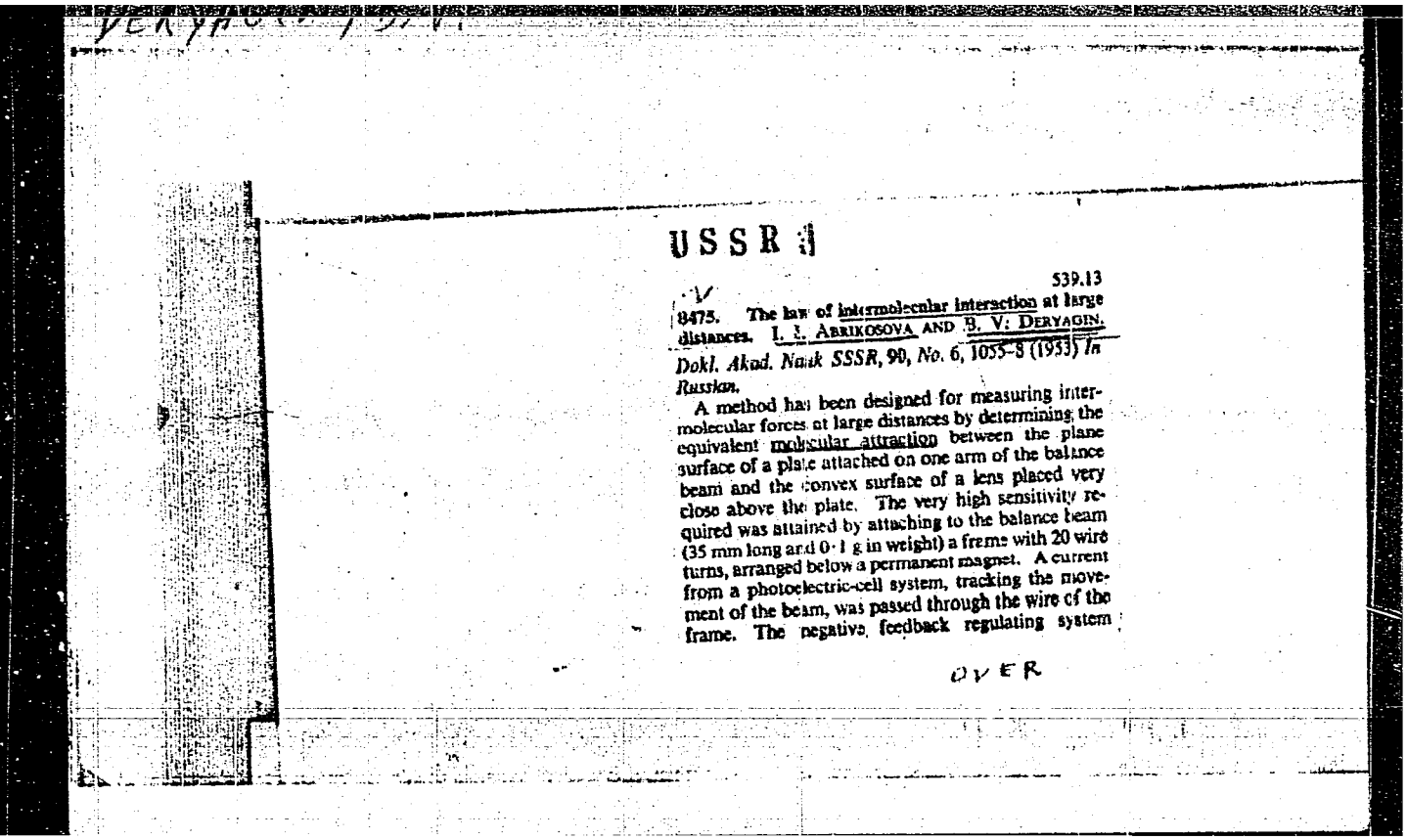
DERYAGIN, B.V.

(2)

Wedging action in free liquid films and its importance in the stability of foams. B. V. Deryagin and A. S. Titievskaya (*Dokl. Akad. Nauk. SSSR*, 1953, 89, 1041—1044).—Measurements of the variation of the lifetime of films from aqueous solutions of propyl alcohol and of various fatty acids with the pressure across the film and the concentration of electrolyte therein are discussed in their bearing on the problem of whether such a film can assume a thermodynamically stable state. R. C. MURRAY.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022



USSR

539.13

8475. The law of intermolecular interaction at large distances. I. I. ABRIKOSOVA AND B. V. DERYAGIN. *Dokl. Akad. Nauk SSSR*, 90, No. 6, 1055–8 (1953) *In Russian.*

A method has been designed for measuring intermolecular forces at large distances by determining the equivalent molecular attraction between the plane surface of a plate attached on one arm of the balance beam and the convex surface of a lens placed very close above the plate. The very high sensitivity required was attained by attaching to the balance beam (35 mm long and 0·1 g in weight) a frame with 20 wire turns, arranged below a permanent magnet. A current from a photoelectric-cell system, tracking the movement of the beam, was passed through the wire of the frame. The negative feedback regulating system

OVER

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

825. Deriagin, B. V., Goufman, I. N., Amelin, A. G., and Levi, S. M., Theory of thermogradient drying of thin-film materials (in Russian), *Dokladi Akad. Nauk SSSR (N. S.)* 92, 4, 759–762, Oct. 1953.

Authors describe a method for drying thin sheets by placing sheet with wet film between a heat-radiating screen and a cold condenser plate. Thermal gradient perpendicular to film surface sets up circular air-convection currents between sheet and condenser, carrying moisture to the condenser. From similarity of mass and heat transfer, authors derive a relation for rate of moisture transfer in terms of nondimensional parameters. Only one experimental value is given, and this is twice as large as that predicted. Authors explain discrepancy qualitatively by discussing (a) travel of dust particles which always move in direction of temperature drop, carrying with them additional moisture, and (b) effect of supersaturation. Y. R. Mayhew, England

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

Lubrication & Friction

2195* Investigation of Interdependence of Friction Forces and Sticking by the Method of Crossed Threads. (Russian.) S. B. Ratner, B. V. Deriagin, and M. F. Futran. *Doklady Akademii Nauk* SSSR, v. 92, no. 6, Oct. 21, 1953, p. 1137-1140.

Smoothness of threads and nearly perfect point contact permit exact measurement of friction and sticking force. Diagram, graphs. 9 ref.

Fr e/s

6-4-54

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

Deryagin B.V.

The rules of similitude in the thermodynamic properties of solutions. B. V. Deryagin and M. I. Shakhparonov (M. V. Lomonosov State Univ., Moscow). *Doklady Akad. Nauk S.S.S.R.* 93, 515–17(1953).—A math. proof is presented that the rule of similitude, or better "reciprocity," recently established (cf. *C.A.* 49, 14166) can be derived from very general considerations, which use no general assumptions about the nature of mol. forces, except for their additivity and independence of the orientation of mols.; these considerations are rigorously applicable to dispersional forces between symt. mols. The rule of reciprocity is further generalized. The conformity of these rules depends on conditions controlled macroscopically, based on the partial molar vols. of the components of the soln. W. M. S.

(1)

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

~~DERYAGIN, B. V.~~

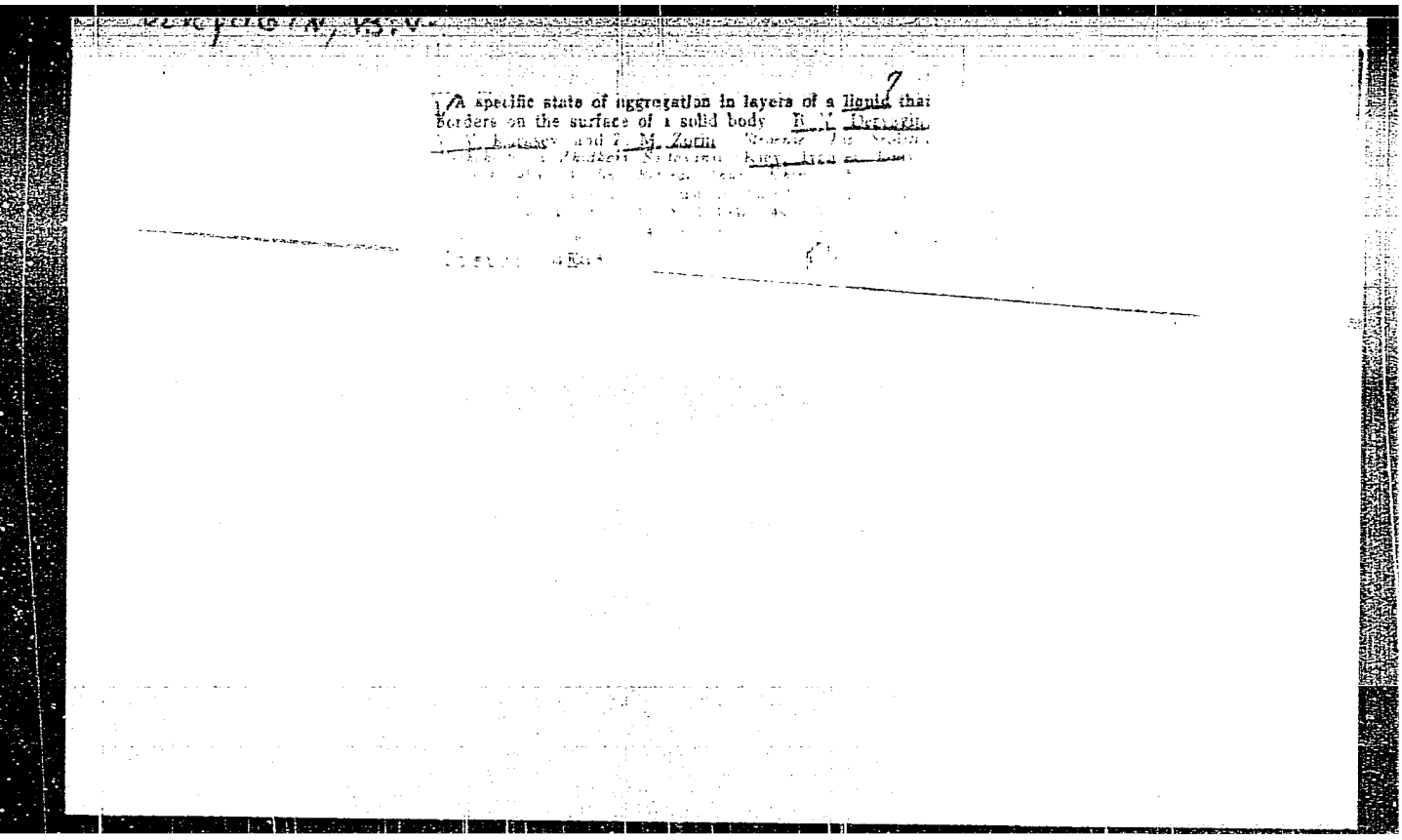
The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr 1954)

Name	Title of Work	Nominated by
Deryagin, B. V.	"What Is Friction?" (popular scientific work)	Institute of Physical Chemistry, Academy of Sciences USSR

SO: W-30604, 7 July 1954

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022



1. A specific state of aggregation in layers of a liquid that borders on the surface of a solid body [illegible]

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

USSR

Application of feedback to analytical and microanalytical balances. B. V. Deryagin, K. K. Timofeev, I. I. Abrikosova, and Yu. N. Sechkov. *Trudy Komissii Anal. Khim., Akad. Nauk S.S.R., Otdel. Khim. Nauk* 5(8), 173-81(1954).—An elec. set-up which relates deflection of the analytical balance beam to elec. current is described.
Burilla Mayerle

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

USSR/Physics -- Adhesion

Card 1/1 : Pub. 124 - 2/35

Authors : Deryagin, B. V., Memb. Corresp. of Acad. of Sc. USSR

Title : Problems of adhesion

Periodical : Vest. AN SSSR 7, 10-21, July 1954

Abstract : The physical aspects of adhesion, which takes place during the contact of two solid bodies in the presence of an external gaseous or liquid medium, are discussed. It was determined, through practice, that adhesion depends largely upon the nature of the functional groups included in the composition of the adhesive layer as well as upon the chemically active atoms and radicals present in this layer. The effect of individual active-atoms or groups of atoms, which are present in the adhesive layer and may enter into an electron chemical bond on the conversion of electrons from one phase into another, is explained. Drawings.

Institution : .....
Submitted : .....

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

Friction coefficient of ice. Fiz. v shkole 14 no.4:88-90
Jl-Ag '54. (MLRA 7:7)

1. Chlen-korrespondent Akademii nauk SSSR.
(Ice) (Friction)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

USSR

Theory of heterocoagulation, interaction, and mutual adhesion of different particles in electrolytic solutions. B. V. Deryagin (Inst. Phys. Chem., Acad. Sci. U.S.S.R., Moscow). *Kolloid Zhur.* 16, 425–38; *Colloid J.* (U.S.S.R.) 16, 403–15(1954)(English translation); cf. following abstr.—The interaction of two diffuse elec. double layers is calcd. for an asym. binary electrolyte. Curves for potential as function of the distances between two charged walls, at a given value of the interaction, are shown. When the potentials of the 2 walls are const. and have identical signs, gradual mutual approach of the walls first causes repulsion which reaches a max. and decreases to zero; on a further approach, the walls attract each other, and the attraction increases to infinity when the distance tends to zero. The max. value of the repulsion depends on the smaller of the 2 potentials only; this is true also when the walls are neither plane nor parallel. When the 2 potentials have opposite signs, the walls attract each other at any distance. Approximations for small potentials are calcd. Introduction of van der Waals' forces leads to the rules: (1) when these forces cause a repulsion between 2 particles in an ionic soln., the particles can adhere to each other only if they carry potentials of 2 opposite signs; (2) when these potentials are high, adhesion can occur only in dil. solns. The theory explains adherence of Hg to glass in salt solns., dyeing in the absence of coagulation, etc. J. J. Bikerman

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

USSR/Physics - Adhesion FD-915

Card 1/1 Pub 153-24/26

Author : Deryagin, B. V. Krotova, N. A. and Karasev, V. V.

Title : Role of electric phenomena in adhesion of films

Periodical : Zhur. tekh. fiz. 24, 1354-1357, Jul 1954

Abstract : Letter to the editor. Criticize the article on adhesion by M. S. Skinner et al. (J. Appl. Phys. 24, 438 (1953)) as repeating the subject which they themselves published six years ago (Deryagin et al., DAN 61, 849 (1948)). Seven references, including 2 foreign.

Institution : --

Submitted : February 25, 1954

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DOMAGIN, B. V. DERYAGIN, B. V.

USSR/ Chemistry - Physical chemistry

Card : 1/1

Authors : Deryagin, B. V., Memb. Corres. of Acad. of Sc. USSR, Krotova, N. A. and Kirillova, Yu. M.

Title : Adhesion of high-polymers to glass and its dependence upon pressure and nature of the surrounding gas medium

Periodical : Dokl. AN SSSR, 97, Ed. 3, 475 - 478, July 21, 1954

Abstract : A method of determining the discharge potential, discharge gaps and surface density of electrization, by studying the polymer-glass adhesiograms, is described. The effect of pressure and nature of the surrounding gas on the adhesion of high-polymers to glass was determined by the Paschen law. By studying the effect of various factors, including the molecular structure of the adhesive and liner, it is possible to make a rational selection of gluing and lacquer forming polymers and form conditions increasing the adhesion. Eight USSR references. Graphs.

Institution : Acad. of Sc. USSR, Institute of Physical Chemistry

Submitted : May 12, 1954

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.

USSR/Chemistry - Physical chemistry

Card 1/1 : Pub. 22 - 24/44

Authors : Deryagin, B. V., Memb. corresp. of Acad. of Sc. USSR; and Zorin, Z. M.

Title : Optical investigation of the adsorption and surface condensation of vapors close to the saturation point

Periodical : Dok. AN SSSR 98/1, 93-96, Sep 1, 1954

Abstract : Polymolecular adsorption and condensation of vapors of n-alcohols, water, CCl_4, benzene, etc., on smooth surfaces were investigated to determine the phase conversions taking place between the volume and liquid layers close to the wall of the test vessel. The device used in this optical investigation is described. The adsorption on smooth surfaces in a range of relative pressures higher than 0.95 - 0.97, was found to be of a polymolecular nature. In other pressure ranges the adsorption acquires a mono- or bimolecular nature. Ten references: 9-USSR and 1-German (1885-1953). Graphs; drawings; illustrations.

Institution : Acad. of Sc. USSR, Institute of Physical Chemistry

Submitted : July 12, 1954

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

USSR/Chemistry - Physical chemistry

Card 1/1 : Pub. 22 - 27/44

Authors : Deryagin, B. V., Memb. Corresp. of Acad. of Sc. USSR, and Levich, V. G.

Title : Theory of repelling forces in electrolyte layers between non-uniformly charged surfaces

Periodical : Dok. AN SSSR 98/6, 985-988, October 21, 1954

Abstract : The development of an ion-electrostatic theory, regarding the repulsion forces in electrolyte layers between uniformly and non-uniformly charged surfaces, is discussed. The formulation of the first quantitative physical-theory, of the stability of lyophobic colloids and dispersion systems, is described. Formulas, determining the repulsion forces in electrolyte layers, are included. Eight references: 6-USSR and 2-USA (1937-1953). Graphs.

Institution : Academy of Sciences USSR, Institute of Physical Chemistry

Submitted : July 7, 1954

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

USSR/ Physics - Physical chemistry

Card 1/1 Pub. 22 - 38/63

Authors : Deryagin, B.V., Memb. Corresp. of Acad. of Sc. USSR; and Nerpin, S.V.

Title : Equilibrium, stability and kinetics of free liquid films

Periodical : Dok. AN SSSR 99/6, 1029-1032, Dec 21, 1954

Abstract : The method and mathematical formulas applied in determining the equilibrium, stability and kinetics of free liquid films, are described. The stability of a liquid film investigated in this report pertains to the rupture or sharp increase in the thickness of the film down to such values where the stability of the film can be secured by its elasticity connected with the propertis of adsorption mono-layers. Equilibrium of the film was found to be of a timely nature depending upon the kinetic process of slow settling of the film up to a point when it reaches a critical thickness at which it loses its stability. Eight references: 7-USSR and 1-USA (1935-1954). Graph.

Institution: Acad. of Sc. USSR, Inst. of Phys. Chem. and Institute of Water Transport Engineers, Leningrad

Submitted: July 7, 1954

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B. V.

"Influence of Dissolved Substances on the Viscosity and Properties of the Boundary Phases", a paper presented at the second conference on the Liquid State of Matter, Kiev, 30 May to 3 June 1955, Usp. Fiz. Nauk, April 1955

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022

DERYAGIN, B.V.; DUKHIN, S.S.; MIKHEL'SON, M.L.; KAGANER, V.M.

Utilization of the condensation method for the precipitation of the ore dust. Bor'ba s sil. 2:22-31 '55. (MLRA 9:5)

1. Chlen-korrespondent Akademii nauk SSSR (for Deryagin). 2. Institut fizicheskoy khimii Akademii nauk SSSR (for Deryagin) 3. Krivorozhskiy Nauchno-issledovatel'skiy gornorudnyyinstitut (for Dukhin, Mikhel'son, Kaganer)
(DUST--REMOVAL)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00031022(