Investigation of Mechanical Properties of Non-Metals. Conference in Leningrad SOV/30-58-9-41/51

Yu.N.Ryabinin on the results of researches on plasticity.
A.N.Orlov, Yu.M.Plishkin on the results of theoretical calculations on stability conditions of a crystal model.
T.A.Kontorova on the influence of anharmonic oscillations of a lattice on plastic deformation.
M.V.Klassen-Neklyudova, V.A.Indenbom, A.A.Urusovskaya, G. Ye. Tomilovskiy on the results of optical crystal research.
M.P.Shaskol'skaya, Sun'Zhuyfan on observation of plastic deformation in rock-salt.
A.A.Chernov on a kinetic equation for "steps" on the crystal surface.
G.G.Lemleyn, Ye.D.Dukova presented a film on the formation of displaced growth centers and the vaporization of crystals.
V.N.Rozhanskiy, Yu.V.Goryunov, Ye.D.Shchukin, N.V.Pertsov observed the emersion of dislocations on the crystal surface as well as the development of fissures.
R.I.Garber, Ye.A.Tsinzerling, M.A.Chernysheva on Problems of mechanic twin formation of crystals.
Ye.M.Yelistratov gave values obtained by radiographic examinations of mixed crystals and metallic alloys.

Card 2/4

Investigation of Mechanical Properties of Non-Metals. SOV/30-58-9-41/51
Conference in Leningrad

D.M.Vasil'yev examined micro-voltage occurring at plastic deformation in crystals.

M.I.Bessonov, S.K.Zakharov, G.A.Lebedev, Ye.A.Kuvshinskiy on the strength of amorphous bodies, especially polymers.

S.N.Zhurkov, V.A.Marikhin, A.I.Slutsker on the submicroscopic porosity of deformed polymers.

A.S.Akhmatov, L.V.Koshlakova, M.V.Vol'kenshteyn, A.I.Kitaygorodskiy on defective crystallic states.

A.F.Ioffe, Member, Academy of Sciences, USSR, closed the conference.

Card 3/4
3

DERYAGIN, B.V.; ZAKHAVAYEVA, N.N.; FILIPPOVSKIY, V.V.; TALAYEV, M.V.

Determining total specific surface areas of powdered and porous bodies [with summary in English]. Inzh.-fiz.zhur. 1 no.8:98-101 Ag '58. (MIRA 11:8)

1. Institut fizicheskoy khimii AN SSSR, Moskva.
(Surfaces--Measurement)

AUTHORS: Dukhin, S.S.; Deryagin, B.V. 69-20-3-11/24

TITLE: On a Method of Computing the Deposition of Disperse Particles From a Flow on an Obstacle (K metodike rascheta osazhdeniya dispersnykh chastits iz potoka na prepyatstviya)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 326-328 (USSR)

ABSTRACT: In the physics of aerosols the problem of the seposition of aerosols from a flow on an obstacle is very important. For the calculation of the particles deposited in the time unit on the obstacle, it is sufficient to determine the coefficient of capture E equal to the relation of the cross section of the flow to the largest cross section of the obstacle. If the inertia of the aerosol or colloidal particle circumventing the obstacle is negligible and the field of external forces is solenoidal, then the computed concentration of the particles along their trajectory is constant. This theorem permits, in a simple manner, the calculation of the deposition speed of particles on obstacles, e.g. emerging bubbles or descending balloons.
There are 2 references, 1 Soviet and 1 English.

Card 1/2

Inst. Phys. Chem AS USSR

DERYAGIN, B.V

SOV-69-20-5-23/23

AUTHOR: 0 3,4 Taubman, A.B.

TITLE: The Fourth All-Union Conference on Colloidal Chemistry (Chetvërtaya vsesoyuznaya konferentsiya po kolloidnoy khimii)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 5, pp 677-679 (USSR)

ABSTRACT: The Fourth All-Union Conference on Colloidal Chemistry took place in Tbilisi from May 12-16, 1958. More than 150 papers were presented. A.V. Dumanskiy read a paper on the history of colloidal-chemical investigations in the USSR. The conference heard the following reports: V.A. Kargin, V.N. Tsvetkov, S.M. Lipatov, on polymers, their solutions and semicolloids; A.I. Yurzhenko, P.M. Khomikovskiy, on the mechanism of emulsion polymerization; B.A. Dogadkin, on the production and the properties of the interpolymer of natural and butadienestyrene rubber; P.I. Zubov, on the mechanism of the formation of polymer films in gluing processes; S.S. Voyutskiy and D.M. Sandomirskiy, on colloid properties of latex systems; A.S. Kuz'minskiy and A.P. Pisarenko, on the properties of rubber and resin solutions; V.A. Pchelin, on the structural-mechanical properties of gelatine gels; N.A. Demchenko, on solubilization in soap solutions; A.V. Dumanskiy, on new methods for investigating the structures of

Card 1/4

The Fourth All-Union Conference on Colloidal Chemistry SOV-69-20-5-23/23

soaps and gels; P.A. Rebinder and his school on structure formation in solidification processes of binding materials; A.A. Trapeznikov, S.S. Voyutskiy, B.Ya. Yampol'skiy, G.V. Vinogradov, on problems of rheology and structure formation in oleophilic systems; L.A. Kozarovitskiy on the mechanism of the printing process and the influence of the rheological properties of printing dyes; I.N. Vlodavets, P.A. Rebinder on the process of structure formation in food stuffs; V.I. Likhtman, G.M. Bartenev, Ye.D. Shchukin, P.A. Rebinder, on deformation processes, the rheological conduct and the destruction of solids and metals; P.A. Tissen (GDR), on the surface dispersion of solid bodies; Linde (GDR), on the influence of surface layers on the kinetics of heterogeneous processes of diffusion exchange; M.Ye. Shishniashvili, M.P. Volarovich, N.N. Serb-Serbina, N.Ya. Denisov, Z.Ya. Berestneva, A.S. Korzhuyev, S.P. Nichiporenko, G.V. Kukoleva, F.D. Ovcharenko, I.N. Antipov-Karatayev, on structure formation in the colloidal chemistry of clays and peat; B.V. Deryagin, on the interaction of twisted metal threads in solutions of electrolytes; A.D. Sheludko, M.B. Radvinskiy, on the resistance of free films and foams; S.V. Nerpin, on the hydromechanics and thermodynamics of thin films and their influence on soil properties; S.Yu. Yelovich, on catalytic processes

Card 2/4

SOV-69-20-5-23/23

The Fourth All-Union Conference on Colloidal Chemistry

in foams; Yu. M. Glazman, on the first mathematical theory of ion antagonism; O.N. Grigorov, D.A. Fridrikhsberg, S.G. Teletov, on the electrokinetic properties of colloids in connection with their coagulation by electrolytes; Ye.M. Napobashvili on radiation colloidal chemistry; B.A. Dogadkin, on the chemical sorption of sulfur and rubber on carbon black; S.G. Mokrushin, on the formation of thin colloidal films, N.A. Krotova, on the influence of an electrical field on the dispersion of a liquid; E.M. Natanson, V.G. Levich, L.Ya. Kremnev, A.B. Taubman, on the resistance of emulsions and suspensions in connection with the stabilizing action of structure-mechanical properties of protective surface layers; P.S. Prokhorov, B.V. Deryagin, G.I. Izmaylova, S.S. Dukhin, on the adsorption of vapors by condensation nuclei and their influence on the formation of water aerosols; P.I. Kaishev, O.M. Todes, on the kinetics of formation and destruction of aerosols; A.B. Taubman, on the kinetic wetting in the process of collecting dust by use

Card 3/4

of solutions of surface-active substances; A.N. Frumkin, M.M. Dubinin, B.P. Bering, V.V. Serpinskiy, V.M. Luk'yanovich, L.V. Radushkevich, G.V. Tsitsishvili, N.F. Yermolenko, on the adsorption from vapors and liquids.

1. Chemistry--USSR 2. Colloids--Chemical properties

USCOMM-DC-55808

SOV/69-20-6-5/15

AUTHORS: Dukhin, S.S., Deryagin, B.V.

TITLE: The Secondary (Diffusion) Electrical Double Layer (Vtorichnyy (diffuzionnyy) dvoynoy elektricheskiy sloy)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol 20, Nr 6, pp 705-707 (USSR)

ABSTRACT: On the mobile interface of two media, of which at least one is an electrolyte, an ordinary (diffusion) electrical double layer appears due to the interaction of diffusion and ionic migration in an electric field. There is also a secondary (diffusion) electrical double layer arising from the interaction between convective diffusion and ionic migration in an electric field. The charge of the inner layer is due to deviation from electrical neutrality. The charge of the outer layer is located in the electrolyte layer adjacent to the interface and is equal in magnitude and opposite in sign.

~~Card 1/2~~ There is 1 Soviet reference.

Kavkaz (Caucasian) Inst. Mineral Raw Materials

76-32-2-31/38

AUTHORS: Deryagin, B. V., Abrikosova, I. I.

TITLE: The Direct Measurement of the Molecular Attraction of Solids (Pryamyye izmereniya molekulyarnogo prityazheniya tverdykh tel)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 2, pp. 442-453 (USSR).

Received: April 2[illegible], [illegible].

ABSTRACT: Summarizing, the following is stated. 1. - The authors found a method for the measurement of the forces of interaction of comparatively smooth transparent solid bodies in dependence on the distance between them; this method is performed by means of beam microbalances with negative photoelectromagnetic feedback. The distance between the bodies is computed according to the diameters of Newton rings. The range of measured forces is $1 - 2 \cdot 10^{-4} - 20$ dyn, the distance is $10^{-5} - 10^{-3}$ cm. 2. - The molecular attraction between the quartzglass samples was stated and measured. The energy of attraction between two platelets u (H) per 1 cm^2 changes with the distance H between them according to a law closely proportional to H^{-3} and amounts to about $1 \cdot 10^{-5}$ erg at $H = 1{,}5 \cdot 10^{-5}$ cm.

Card 1/4

The Direct Measurement of the Molecular
Attraction of Solids

76-32-2-31/38

3. - The authors proved experimentally that the force of attraction between the spherical and plane surface is proportional to the spherical radius which fact corresponds to the conceptions on the molecular nature of these forces. 4. - An analysis of the present stage of development of the problem concerning the forces of molecular interaction is given. It is shown that the usually applied idea on the additivity of the molecular forces of attraction in condensed media appears to be founded neither theoretically nor experimentally. 5. - Experimentally the authors prove the incorrectness of the computations of molecular attractions of macro objects by means of adding the interaction of the molecular pairs computed according to London's formula (reference 4) when the distance between the surfaces is $1 \cdot 10^{-5}$ cm and more. Better results are obtained when the electromagnetic retardation of the propagation of the respective forces is taken into account. 6. - The experimental data agree with Ye. M. Lifshit's theory. This agreement proves the hypothesis of P. N. Lebedev on the electromagnetic nature of molecular forces. 7. - The molecular attraction between samples of a thallium-halide mixed crystal and the chromium-quartz pair was also measured. The results of these

Card 2/4

76-32-2-31/38

The Direct Measurement of the Molecular Attraction of Solids

measurements (also within the limits of experimental errors) coincide with Ye. M. Lifshit's theory. According to this the forces in these cases with the same distances are 4 - 5 times greater than in the case of the quartz-quartz pair. 8. - As long as the H^{-a} law for u (H) of London-Hamaker (references 4 and 7) follows as a boundary case from the theory of Ye. M. Lifshit for small distances, where the electromagnetic retardation does not become manifest, the proof of this theory makes it possible to apply the corresponding H^{-a} law to small distances. The deviation from the H^{-a} law observed with great distances (10^{-5}cm) tending towards a decrease points at a small influence of molecular forces on the coagulation velocity of aerosols with a particle diameter exceeding $3 \cdot 10^{-5}$ cm. 9. - The authors point out that the values of measurement for the forces of molecular attraction between the bodies in the experiments of J. Th. G. Overbeek and M. I. Sparnay (references 3 and 14) exceed the theoretical values as well as those of the authors by 3 - 4 orders of magnitude; this is apparently the case because in these measurements the effects not connected with molecular forces did not show

Card 3/4

76-32-2-31/38

The Direct Measurement of the Molecular
Attraction of Solids

up. 1o. - The results obtained with quartz samples coincide with the results of the measurements of Y. A. Kitchener and A. P. Prosser (carried out according to the method of Overbeek and Sparnay) (reference 15).
There are 1o figures, and 24 references, 11 of which are Soviet.

ASSOCIATION: A S USSR, Institute for Physical Chemistry, Moscow (Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva)

SUBMITTED: June 1o, 1957.

1. Solids--Theory 2. Molecules--Electromagnetic properties
3. Microbalances--Equipment

Card 4/4

53-64-3-5/8

AUTHORS: Deryagin, B. V., Abrikosova, I. I. Lifshits, Ye. M.

TITLE: The Molecular Attraction of Condensed Bodies (Molekulyarnoye prityazheniye kondensirovannykh tel)

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1958, Vol. 64, Nr 3, pp. 493-528 (USSR)

ABSTRACT: The present survey is divided into: introduction, the theories of molecular interaction between micro-objects, and a critique of their use with macro-objects, the theory of molecular attraction between condensed bodies, the method of measurement (the principal scheme of measurement, the objects of measurement, the microweights with inverse binding for the measurement of the interaction force between solids, the beam of balance, compensating and follow-up systems, the constructive shape of the apparatus, the process of measurements, the adjusting, the regulation and calibration of weights, the method of measurement of the distance between the bodies to be investigated, the preparation of the surfaces to be investigated), the results of the measurements. The discussion of

Card 1/2

53-64-3-5/8

The Molecular Attraction of Condensed Bodies

the results (the analysis of the measuring results, the comparison with theory, a comparison with the macroscopic theory of molecular attraction, the use in the theory of coagulation and in the theory of dampening). There are 19 figures, 1 table, and 27 references, 12 of which are Soviet.

1. Molecules--Magnetic properties 2. Molecules--Theory

Card 2/2

AUTHORS: Abdrakhmanova, I. F., Deryagin, B. V., SOV/20-120-1-24/63
Corresponding Member, Academy of
Sciences , USSR

TITLE: The Surface Conductivity of Quartz in the Presence of
Adsorbed Layers (Poverkhnostnaya provodimost' kvartsa v
prisutstvii adsorbirovannykh sloyev)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 1, pp.
94 - 97 (USSR)

ABSTRACT: The present paper investigated the surface conductivity of quartz in steam, benzene vapors, CCl_4, and in alcohols.

The apparatus for the investigation of the electric conductivity at the surface was produced of quartz glass. The pin-shaped samples with a diameter of 1 - 3 mm were drawn from cylinders of optical glass in the flame of a burner. The conductivity at the surface in vacuum was smaller than the sensitivity of the measuring method both in the samples treated in a retarded discharge and the quartz purified by annealing, this is to say, that it was

Card 1/3 smaller than $10^{-17}\Omega^{-1}$. At constant relative pressure

The Surface Conductivity of Quartz in the Presence SOV/20-120-1-24/[illegible]
of Adsorbed Layers

p/p_s (p or p_s respectively denote the pressures of the saturated vapors at the temperatures T and T_c, where T_c denotes a constant temperature) the conductivity at the surface first quickly increases, reaches a maximum and then gradually decreases and reaches a constant value after 10 to 20 minutes, which corresponds to the given value of p/p_s. Such kinetic curves were plotted for all investigated substances. A diagram shows the kinetic curves for ethylalcohol, butylalcohol, hexylalcohol, and octylalcohol. Whithin the interval of the relative pressures from 0,8 to 1 the electric conductivity of alcohols changes by the 2 - 3-fold, only in the case of ethylalcohol this increase is considerably greater. Within one and the same interval of the change of the relative pressure the density of the deformed film increases quicker than the conductivity. In the beginning an adsorption layer being not in equilibrium is formed at the surface of the quartz. Then the orientation of the adsorbed molecules and their transition to places with greater adsorption energy begins. The results obtained do not yet

Card 2/3

The Surface Conductivity of Quartz in the Presence of Adsorbed Layers SOV/20-120-1-24/63

make it possible to draw any definite conclusions as to whether a surface conduction dependent on ions and electrons actually takes place. There are 3 figures, 1 table , and 9 references, 8 of which are Soviet.

ASSOCIATION: Laboratoriya poverkhnostnykh yavleniy Instituta fizicheskoy khimii Akademii nauk SSSR (Laboratory of Surface Phenomena of the Institute of Physical Chemistry, AS USSR)

SUBMITTED: January 21, 1958

1. Quartz--Surface properties 2. Quartz--Conductivity 3. Vapors--Applications 4. Alcohols--Applications

Card 3/3

5(4) SOV/20-121-3-30/47

AUTHORS: Dukhin, S. S., ~~Deryagin, B. V.~~, Corresponding Member, Academy of Sciences, USSR

TITLE: The Diffusional Electrical Potential of a Falling Drop With an Adsorption Layer (Diffuzionno elektricheskiy potentsial padayushchey kapli s adsorbtsionnym sloyem)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 3, pp. 503 - 506 (USSR)

ABSTRACT: This paper carries out a qualitative investigation of the adsorption of two types of ions from the solution of an electrolyte on the movable surface of a drop. The approximate conservation of the electroneutrality of the double layer (dvoynoy sloy) (which is constantly regenerated) requires approximately equal numbers of the positive and negative charges which abandon the volume of the solution. If the diffusion coefficients of the positive and of the negative charges do not coincide an electromagnetic field will compensate the migration of the positive and negative ions to the surface. The phenomena of this kind are analogous to the diffusion potentials. This paper

Card 1/3

SOV/20-121-3-30/47

The Diffusional Electrical Potential of a Falling Drop With an Adsorption Layer

investigates the diffusional electrical effects occurring during the falling of an electrolyte drop in a liquid or gaseous medium (for example, in oil or air). For the sake of simplicity, this medium is assumed to be free from ions. In order to determine the electric potential in the volume of the drop, it is necessary to investigate the continuity equations for the ion flows in the volume of the electrolyte. The normal component of the current on the surface of the drop is (in first approximation) equal to zero. It can be shown by analyses or by thermal analogy that the problem under discussion has only a trivial solution. Authors then investigate the problem of the electric field of a drop for the special case of small differences of ion concentration. A condition is then given for the diffusion within the drop, it determines the order of magnitude of the ratio between convective and diffusion flow. Finally, an expression is derived for the distribution of the potential. The calculation values of electric field strength do not occur in concrete experimental conditions since the electrocapillary influence

Card 2/3

The Diffusional-Electrical Potential of a Falling Drop With an Adsorption Layer SOV/20-121-3-30/47

of the surface was not taken into account. There are 3 references, 3 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR(Institute of Physical Chemistry AS USSR)

SUBMITTED: April 5, 1958

Card 3/3

5(4)

AUTHORS: Deryagin, B. V., Corresponding Member, Academy of Sciences, USSR, Smigla, V. P. SOV/20-121-5-31/50

TITLE: The Electron Theory of the Adhesion of Metals Connected by a Semiconductor Layer (Elektronnaya teoriya adgezii metallov, soyedinennykh poluprovodnikovoy prosloykoy)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 5, pp 877 - 880 (USSR)

ABSTRACT: Hitherto, the double layer and the adhesion forces of a thin semiconducting sheet (which is inclosed between two different metals) have been investigated only qualitatively. The authors use the mathematical analogy of this problem with the problem of the electrostatic interaction of two differently charged surfaces which are separated by a electrolyte layer. This paper deals only with the case in which there are only carriers of one kind in the semiconductor. Only a small part of the impurity centers is assumed to be ionized. In this case, the equilibrium distribution of the

Card 1/3

The Electron Theory of the Adhesion of Metals Connected SOV/20-121-5-31/50
by a Semiconductor Layer

charges is determined by the equation of Poisson (Puasson) - Boltzmann (Bol'tsman). The adhesion force of the film with respect to any metal is equal to $F=\varepsilon^2 E^2_{boundary}/8\pi$ where $E_{boundary}$ denotes the field strength within the semiconductor on the boundary with the corresponding metal. The problem, therefore, consists of the determination of E on the right and left boundaries of the films. Then boundary conditions for the above mentioned Poisson-Boltzmann equation are given explicitly. This equation together with the boundary conditions is absolutely equivalent to the corresponding problem in the theory of the heterocoagulation of colloids for the interaction through a binary symmetric electrolyte. A certain difference between the 2 analogous metals is then discussed. By a variation of the thickness of the film the adhesion force is changed equally for both of the metals. The mathematical calculations may be carried out as in the papers on the theory of heterocoagulation. The adhesion

Card 2/3

The Electron Theory of the Adhesion of Metals Connected by a Semiconductor Layer SOV/20-121-5-31/50

of the film increases monotonously if H decreases. The following interesting conclusion may be drawn from the above given considerations: If the thickness of the film (enclosed between 2 different metallic surfaces) is adequately diminished, the density of the double layer (and therefore also the adhesion forces) can always be increased. There are 4 figures and 4 references, **all** of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry AS USSR)

SUBMITTED: April 8, 1958

Card 3/3

5(4) SOV/20-122-6-26/49

AUTHORS: Smilga, V. P., **Deryagin**, B. V., Corresponding Member, AS USSR

TITLE: The Rôle of the Surface Properties of a Semiconductor in Adhesion Phenomena (Rol' poverkhnostnykh svoystv poluprovodnika v yavleniyakh adgezii)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 6, pp 1049-1052 (USSR)

ABSTRACT: On the basis of various earlier papers the authors first give a short report on the present stage of the problem. It is known that the surface states of semiconductors can be produced by stripping of the periodic structure (surface zones by I. Ye. Tamm) and by the presence of a large number of impurity centers on the surface. In the scheme investigated, the surface levels of the second type (surface zones according to I. Ye. Tamm) are taken into account, and the presence of 2 types of surface states (donors and acceptors) is assumed. This scheme agrees essentially with that of V. Bratten and J. Bardeen (Dzh. Bardin) (Ref 4). The model used in this case permits a good classification of quantitative regularities. The present paper investigates a semiconductor with carriers

Card 1/~~3~~2

SOV/20-122-6-26/49

The Rôle of the Surface Properties of a Semiconductor in Adhesion Phenomena

of a single type. To be precise, an electron-semiconductor is investigated. The position of the surface levels is shown by a schematical drawing. This scheme corresponds to a negatively charged surface. A second drawing shows the d-zone-scheme for the case in which contact between the semiconductor and the metal is established through a narrow gap. Another case is, however, possible, in which electric field strength has different signs on the two sides of the semiconductor surface. According to the authors' opinion, it is convenient to subdivide all cases of contact between a semiconductor an a metal into two groups: 1) The electric field has the same direction on both sides of the semiconductor surface; 2) It has different directions. Calculations are followed step by step and numerical results are given by a table. Field strength in the gap increases rapidly with an increasing number of centers. At the point of contact fields occur which cause an adhesive force amounting to a two-figure number of kilograms per cm^2. There are 3 figures, 1 table, and 4 references, 3 of which are Soviet.

Card 2/3

DERYAGIN, B. V.

"Original Devices for the Investigation of Disperse Systems or Surface Particles in the Flow (flow ultramicroscope, flowmeter of condensation nuclei etc)."

"The Peculiarities of Heterocoagulation, the Elements of the Theory of This Effect."

report presented at the Section on Colloid Chemistry, VIII Mendeleyev Conference of General and Applied Chemistry, Moscow, 16-23 March 1959.
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

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

"New Results in the Measuring of the Viscosity of Fine Wall (pristennyy) Layers of a Liquid With the Aid of the Viscometric Blowing Out Method."

report presented at the Section on Colloid Chemistry, VIII Mendeleyev Conference of General and Applied Chemistry, Moscow, 16-23 March 1959.
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

SMILGA, V. P. and DERYAGIN, B. V.

"The Role of Electrons In The Adhesion Theory."

report presented at the Section on Colloid Chemistry, VIII Mendeleyev Conference of General and Applied Chemistry, Moscow, 16-23 March 1959.
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

5(4)

PHASE I BOOK EXPLOITATION SOV/3054

Deryagin, Boris Vladimirovich, Corresponding Member, USSR Academy of Sciences, and Sergey Maksimovich Levi

Fiziko-khimiya naneseniya tonkikh sloyev na dvizhushchuyusya podlozhku (Physics and Chemistry of the Application of Thin Coatings to Moving Film Bases) Moscow, Izd-vo AN SSSR, 1959. 207 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agencies: Akademiya nauk SSSR. Institut fizicheskoy khimii, and Vsesoyuznyy nauchno-issledovatel'skiy kinofotoinstitut Ministerstva kul'tury SSSR.

Ed. of Publishing House: A. L. Bankvitser; Tech. Ed.: I. I. Guseva.

PURPOSE: This book is intended for technical personnel producing film and paper for photographic purposes.

COVERAGE: The book contains comprehensive data on the methods used in applying thin emulsive coatings to flexible, moving sub-layers (film bases) to obtain modern, high-quality color and black-white, light-sensitive materials.

Card 1/5

Physics and Chemistry (Cont.)

SOV/3054

Factors, besides the viscosity of the liquid , which affect coating thickness are considered: a) wetting kinetics as a function of the formation speed of a meniscus between the emulsion surface and the film base; b) the radian angle (formed by the meniscus) on the rate of flow of the meniscus, including the case at high film-base speeds where the radian angle reaches a limit value of 180° and begins to degrade the completeness of contact between the liquid and the film base; etc. Besides theories on the production, application, and check of coatings, methods for physicochemical investigations and wetting and non-wetting phenomena during the application of coatings are studied. A theory based on the attractive forces between liquid and film base is set forth and results are discussed. O. K. Smirnov assisted in compiling the monograph (Chapter VIII, article 6), and M. I. Shor, Chief Engineer of Photographic Paper Factory No. 4 wrote Chapter VII. References accompany each chapter.

TABLE OF CONTENTS:

Foreword

Introduction

Ch. I. Investigation of a Thin Liquid Film Deposited As It Flows From a Vertical Wall or When Carried Off by a Moving Substrate 9

Ch. II. The Theory of Wetting (Coating) a Moving Substrate With a Viscose Liquid 15

Ch. III. The Theory of Wetting (Coating) a Moving Substrate With a Visco-plastic Liquid 31

The thickness of a film deposited upon a surface drawn out of a liquid by a vertical wire or upon the walls of a capillary tube 39

The thickness of a liquid film held in quasi-equilibrium as a capillary meniscus due to shearing stress at the surface of contact 42

Ch. IV. Proof of the Wetting Theory for a Viscous Liquid and Problems of Applying the Theory to the Wetting (Coating) of Film 46

Production of Photographic Film Materials 56

Introduction 56

Proof of the wetting equation 59

Special features in the use of the wetting equation for technical purposes 63

Card 3/5

SOV/3054

Physics and Chemistry (Cont.)

Temperature conditions of wetting 68

Some technical peculiarities of wetting 71

Proof of the wetting theory under conditions of actual production 79

Ch. VI. Some Physicochemical Properties of Gelatin and Photographic Emulsions Which Determine Wetting Conditions 84

Introduction 84

The molecular structure of gelatin 84

Methods of measuring viscosity and shearing stress at the contact surface 91

A method of measuring surface tension 95

Measuring the viscosity of gelatin solutions depending upon some physicochemical and technical factors 98

Research in the field of replacing gelatin by high-molecular substances 113

Ch. VII. Technical Checking of the Wetting Process During Actual Production 132

Computational method of introducing the wetting process 133

The solution of some technical problems on the basis of the wetting theory 139

Card 4/5

Physics and Chemistry (Cont.)

SOV/3054

Computation of permissible variations when measuring viscosity 140
Computation of permissible variations when measuring temperature 141
Computation of permissible variations in the level of an emulsion in a cuvette 141

Ch. VIII. Wetting in the Process of Applying Photographic Emulsions to Flexible Substrates

Investigating the kinetics of non-wetting 143
The general theory of kinetic wetting 147
The influence of dynamic surface tension 150
Kinetics of adsorption at the "solution-air" interface 160
Chemical properties and structure of wetting agents suitable for applying photographic emulsions 164
Investigation of the wetting action of surface-active substances (wetting agents) during the application of photographic emulsions 169
Surface tension of water solutions and gelatin solutions of wetting agents and their adsorption 177
Influence of the structure of wetting agents on kinetic wetting 178
Anti-"comet" /locals of non-wetting/ action and the structure of wetting agents 192
200

AVIALABLE: Library of Congress

Card 5/5

TM/os
2/3/60

SOV/180-59-1-16/29

AUTHORS: Deryagin, B.V. and Dukhin, S.S. (Moscow)

TITLE: Theory of the Movement of Mineral Particles near a Rising Bubble Applied to Flotation (Teoriya dvizheniya mineral'nykh chastits vblizi vsplyvayushchego puzyr'ka v primenenii k flotatsii)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 1, pp 82-89 (USSR)

ABSTRACT: The authors distinguish two stages in the attachment of a mineral particle to a bubble in flotation. In the first stage the particle approaches the bubble surface so closely that forces promoting or hindering adhesion can develop. This stage has not previously received attention, and the authors now give a theoretical treatment, following the extensive work of one of them (Deryagin) in this field. They conclude that if "turbulization" (setting in turbulent motion) of the pulp and deviation of the bubble and mineral-grain shapes from spherical are ignored and the treatment is restricted to grains small compared with the bubbles the problem becomes similar to the trapping of mist droplets. They discuss the influence of the ratio of the particle size to the minimum size at which contact due

Card 1/3

SOV/180-59-1-16/29

Theory of the Movement of Mineral Particles near a Rising Bubble Applied to Flotation

solely to inertial forces is still possible, and of the values of the Reynolds number and another dimensionless group. The second stage, in which the particle becomes attached to the bubble, they show to depend on the point of contact and the contact velocity and give equations and data for the calculations. The equations obtained for the probability of contact are necessary for calculating the rate of flotation. Since the particle diameter greatly affects this probability, the authors emphasize that in considering the selectiveness of flotation the degree of dispersion of particles must be allowed for; this may be done by using the equations given.

Card 2/3

SOV/180-59-1-16/29

Theory of the Movement of Mineral Particles near a Rising Bubble Applied to Flotation

There are 8 references, 6 of which are Soviet and 2 are mixed English-Soviet.

ASSOCIATION: Kavkazskiy institut mineral'nogo syr'ya (Caucasian Mineral Raw-Materials Institute), Ministerstvo geologii i okhrany nedr SSSR (Ministry of Geology and Conservation of Mineral Resources of the USSR)

SUBMITTED: March 26, 1958

Card 3/3

SOV/180-59-2-25/34

AUTHORS: Deryagin, B.V., and Mikhel'son, M.L. (Moscow, Krivoy Rog)

TITLE: Condensation Method of Dust Catching for Precipitating Mine Dust (Kondensatsionnyy metod pyleulavlivaniya dlya osazhdeniya rudnichnoy pyli)

PERIODICAL: Izvestiya akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959,Nr 2,pp 124-138 (USSR)

ABSTRACT: The authors have participated in proposals for a type of condensation filter (Refs 1-3) which is effective but not suitable for underground use because of size and constructional complexity. They now describe a simpler and more compact variant in which supersaturation of dust-laden air is achieved by evaporation of dispersed hot water droplets under turbulent conditions. Fig 1 shows a schematic view of the condensation filter, consisting of an evaporation zone, followed by a diffuser in which condensation on the dust particles occurs, and finally some means for trapping the condensed droplets (with their dust particles). The authors discuss each of these zones in detail, using simplifying assumptions for their calculations. Fig 6 shows an installation, rated at 8 m3/sec, at the "Severnaya" mine of the im. Kirova RU

Card 1/3

SOV/180-59-2-25/34

Condensation Method of Dust Catching for Precipitating Mine Dust

(im. Kirov mine Management), of the "Dzerzhinskruda" trust. This is fitted with a type VM-670 fan and 6 type Mak-NII nozzles. Water passes to these via a 100-kW heater. The droplets are trapped in a mist trap, followed by a multi-layer metal mesh for trapping larger particles. For studying the effectiveness of the installation a Deryagin - Vlasenko (Ref 11) flow ultramicroscope was used. The mean dust-particle radius was 0.12 microns, initial air temperature 12.8 - 13.6 °C and initial humidity 96 - 98%. The results without and with condensation for this and also a similar 1.5 m^3/sec installation are shown in Table 3. The energy consumption to achieve over 99% efficiency was about 3 KWH/1000 m3. The authors maintain that their work on the development of the condensation method for mines will facilitate its adoption in industry. Its use in the metallurgical and chemical industries would be very

Card 2/3

SOV/180-59-2-25/34

Condensation Method of Dust Catching for Precipitating Mine Dust

promising, particularly with the use of free sources of heat.

Card 3/3 There are 6 figures, 3 tables and 13 references, 12 of which are Soviet and 1 English.

SUBMITTED: October 8, 1958

5(0), 24(0) SOV/30-59-5-9/43

AUTHOR: Deryagin, B. V., Corresponding Member, Academy of Sciences, USSR

TITLE: The Role of the Surface Forces in the Kinetics of Surface Phenomena (Rol' poverkhnostnykh sil v kinetike poverkhnostnykh yavleniy)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 5, pp 35 - 42 (USSR)

ABSTRACT: The problem investigated has to be solved by methods of physico-chemical kinetics. In this connection the author of the present paper refers to the paper by V. G. Levich and his own paper according to Smolukhovskiy's method (Footnote 1). The task of investigating the forces of surface interaction was for the first time set by the author in the Laboratory of Surface Phenomena of the Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR.) In the course of experiments the existence of repulsive forces was discovered, of which S. V. Nerpin, M. K. Mel'nikova made use in their investigations as well as the author and L. D. Landau. G. T. Kroyt (Footnote 3) reports in his book on the theory of colloid stability. The rheological properties of the colloid- and dispersion systems are of great importance apart from stability. In the Soviet Union these investigations are carried out by

Card 1/3

M. P. Volarovich and his school, D. S. Velikovskiy, M.M. Kusakov. The phenomena of thixotropy are in the USSR investigated by the school of P. A. Rebinder and G. V. Vinogradov. In connection with this the papers by D. M. Tolstoy, S. V. Nerpin, I. F. Yefremov are mentioned. A. N. Frumkin and B. N. Kabanov emphasized for the first time the importance of the thin liquid layers between bubbles and mineral particles. S. S. Dukhin and the author of the present paper pointed out the existence of an electric interaction between the moving bubbles and the particles and refer in this connection to the papers by A. N. Frumkin, V. G. Levich (footnote 5). By means of the model method S. M. Levi and O. K. Smirnov succeeded in obtaining a marked increase of the critical moistening velocity (kriticheskaya skorost' smachivaniya) of nitrocellulose cells and, thus secured a more rapid and perfect applying of the light-sensitive emulsion. The papers by N. I. Shishkin (footnote 7), P. S. Prokhorov, G. I. Izmaylova, L. Krystanov, and R. Kaishev (Bulgaria) investigate the effect of the surface forces upon clouds. P. S. Prokhorov, L. F. Leonov, S. S. Dukhin, S. P. Bakanov, and the author of the present paper showed by means of experiments and theoretical methods that diffusion currents of the moisture evaporating in the capillaries and alveolae of the lung prevent the precipitation of dust ✓

Card 2/3

66300

SOV/136-59-11-12/26

18.6100

AUTHORS: Deryagin, B.V., Yermin, V.N., Grechnyuk, R.L., Zakhavayeva, N.N., Filippovskiy, V.V., Funke, V.F. and Lopatina, A.M.

TITLE: Determination of the Specific Surface Area of Powders in the Production of Hard Alloys

PERIODICAL: Tsvetnyye metally, 1959, Nr 11, pp 55-60 (USSR)

ABSTRACT: This work has been carried out in order to see whether it is possible to determine more accurately the specific surface of powders by using relatively simple methods. The following gas porosity methods were used: Carman's method, using Poiseil's system of gas flow through a layer of powder, and B.V. Deryagin's method with Knudsen's (molecular) system. The results of the determination of the specific surface area by the gas porosity methods were compared with those of the methyl alcohol vapour adsorption method. The low temperature adsorption of nitrogen method used by Brunauer (Ref.1) was used as the control method for the determination of the specific surface area of powders of below 10μ grain size. The specific surface area of coarser powders was calculated from their

Card 1/5

66300

SOV/136-59-11-12/26

Determination of the Specific Surface Area of Powders in the Production of Hard Alloys

granulometric compositions which can be determined by means of a microscope. In this article the practical results of the application of the four above methods for the determination of the specific surface area of powders in the manufacture of hard alloys are given. The determination of the specific surface area of H_2WO_4, WO_3,W, WC, TiO_2; TiCWC, Co powders and a VK6A mixture (mixture of WC and 6% Co powders) using Foiseil's system of gas flow across the specimen (in the form of a compressed tablet of powder) was carried out in an apparatus designed for the measurement for the specific surface area of powders by Carman's method. In practice the results of the determination of the specific surface area are usually converted to average diameter or grain size, assuming that the particles have a spherical shape. In Table 1, grain sizes of powders are shown for different porosities. The results of determination of the specific surface area of a few powders in the manufacture of hard alloys

Card 2/5

4

66300

SOV/136-59-11-12/26

Determination of the Specific Surface Area of Powders in the Production of Hard Alloys

by Deryagin's method for different porosities and different weights are shown in Table 2. The results of determination of the surface area of H_2WO_4, WO_3, W, WC, TiO_2, TiCWC, Co, VK6A powders by gas porosity methods, using Poiseil and Knudsen (Deryagin's instrument) systems of gas flow across the specimen, were compared with the results of adsorption determinations. Low temperature adsorption of nitrogen (BET method) was used as the control method (Table 3). The granulometric composition of tungsten W_{10} powder (small surface area, average diameter = 28μ) was determined by means of an optical microscope at a magnification of x600 (the determination of the specific surface area of such coarse powder by the nitrogen adsorption method is inaccurate). The results are shown in Table 4. The authors arrive at the following conclusions: 1. The method of nitrogen adsorption, although sufficiently accurate, cannot be widely used for the determination of the specific surface of powders because of its clumsiness and the complexity of its

Card 3/5

4

66300

SOV/136-59-11-12/26

Determination of the Specific Surface Area of Powders in the Production of Hard Alloys

apparatus. Besides, any adsorption method giving the total surface area of particles gives an incorrect powder grain size value in the case of particles with internal pares. This method proved to be useful for the selection of a simpler and easier method, by comparing the values of specific surface obtained by this method with those obtained by other simpler methods. 2. It has been shown that the methods and instruments which are based on the filtration of air at atmospheric pressure and use Cozeni-Carman's formula, give incorrect lower values for the specific surface area of powders of high and medium dispersion. These methods can only be used for the determination of the specific surface area of coarsely dispersed powders. 3. The determination of the specific surface area of powders by the resistance to filtration of discharged nitrogen (Deryagin's method) is the most convenient. This method and the apparatus based on it, enable the external specific surface area of highly dispersed

Card 4/5

4

66300

Determination of the Specific Surface Area of Powders in the Production of Hard Alloys SOV/136-59-11-12/26

powders of hard alloys to be determined quickly and sufficiently accurately and the average particle size to be calculated. This is extremely important in the manufacture of hard alloys. This method is theoretically well-founded and in practice enables the external specific surface area of different powders of any degree of dispersion from a particle size of 100μ and less onwards, to be measured without limitation. Therefore this method can be successfully applied for the determination of the specific surface area and particle sizes of powders of hard alloys. There are 4 tables and 8 references, of which 6 are Soviet and 2 English.

Card 5/5

4

~~24(6)~~ 24,7000

66331
SOV/181-1-10-5/21

AUTHORS:	Deryagin, B. V., Metsik, M. S.
TITLE:	The Role Played by Electric Forces in Mica Splitting Along the Cleavage Planes
PERIODICAL:	Fizika tverdogo tela, 1959, Vol 1, Nr 10, pp 1521 - 1528 (USSR)

ABSTRACT: The results published by Obreimov and Lazarev, and various Western authors are supplemented by a number of experiments. The authors first measured the charge density resulting from the Kerr effect in nitrobenzene, which had been introduced into the crystal crack (for the device see figure 4). The mean charge density of Mama muscovites and Aldan phlogopites did not exceed 50 absolute charge units per cm^2. In some surface sections the charge density of muscovite and phlogopite attained 200-250 and 300 absolute charge units per cm^2, respectively. The potentials occurring in the cleavage planes are measured by means of fixed and movable probes of different size (for the device and measuring arrangement see figure 5). This series of measurements indicates that an electrostatic

Card 1/3

66331

The Role Played by Electric Forces in Mica Splitting Along the Cleavage Planes SOV/181-1-10-5/21

mosaic with elementary surface < 1 mm^2 and a mean charge density of 20 absolute charge units per cm^2 is formed in the new crystal planes. Figure 6 distinctly shows the abrupt behavior of the potentials. The charges effected at the instant of crystal cleavage were measured by means of an oscilloscope. The authors obtained also for this case ≈ 50 absolute charge units per cm^2. When the crystal is cleft in humid air, the charge recorded depends on the cleavage rate (cf. Fig 8). When the cleavage rate increases and humidity drops, the actual charge density on the cleft face rises and approaches a limit σ_0, which has a characteristic value for each crystal. If the crystal is cleft in a medium of a small degree of surface conductivity, or if the cleavage rate is high, the mosaic charge density does not vary throughout the cleavage and retains the value σ_0. The electrostatic part of the cleavage then reaches a maximum, it may be defined by:

Card 2/3

4

The Role Played by Electric Forces in Mica Splitting Along the Cleavage Planes

66331
SOV/181-1-10-5/21

$$A_E = \frac{2\pi\sigma_0^2 y_m}{\varepsilon}$$, where ε denotes the dielectric constant of the medium in which the cleavage occurred, and y_m the maximum distance at which the mosaic planes still act on one another. There are 8 figures, 1 table, and 12 references, 11 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry of the AS USSR). Irkutskiy gosudarstvennyy universitet (Irkutsk State University)

SUBMITTED: January 11, 1959

Card 3/3

DUKHIN, S.S.; DERYAGIN, B.V.

Electric field of a moving drop. Part 1: Theory of the electric field of a drop containing an ionogenic surface-active substance. Koll.zhur. 21 no.1:37-49 Ja-F '59. (MIRA 12:5)

1. Institut fizicheskoy khimii AN SSSR, Laboratoriya poverkhnostnykh yavleniy, Moskva i Khar'kovskiy pedagogicheskiy institut im. G.S.Skovorody.

(Drops--Electric properties) (Surface-active agents)

5(4)

SOV/69-21-4-1/22

AUTHOR: Bakanov, S.P. and Deryagin, B.V.

TITLE: On the Theory of Thermoprecipitation of High Dispersion Aerosol Systems.

PERIODICAL: Kolloidnyy zhurnal, 1959, Vol XXI, Nr 4, pp 377-384 (USSR)

ABSTRACT: This is a study of thermoprecipitation of high dispersion aerosol systems, in which the measures (σ) of the suspended particles are considerably smaller than the medium length (λ) of the free run of the gas molecules $(\sigma \ll \lambda)$. Under atmospheric pressure, this corresponds quantitatively to aerosol particles of 10^{-5} cm and less in size. The authors consider this high dispersion aerosol system, in which a small temperature gradient is maintained, as a mixture of two gases (in reality it is a mixture of gas and dust). The separation of the mixture, therefore, is carried out through the separation of two gases by thermal diffusion. The study of the authors is divided into two parts. In the first they determine the rate of movement of the particles with regard to the center of gravity of the to-

Card 1/4

SOV/69-21-4-1/22

On the Theory of Thermoprecipitation of High Dispersion Aerosol Systems.

tal of gas molecules. For this purpose, they use the Chapman-Enskog formula (1), which was obtained as a result of the solution of the Bolzmann ("Bol'tsman") kinetic equation. An equation (12) shows that the rate of thermal precipitation $\vec{u}$ does not depend on the dimensions of the particles. It is inversely proportional to the square root of medium temperature and gas pressure. The magnitude u holds for atmospheric pressure, T (absolute temperature) = 300° C and grad T = 30°C/cm for air of the category 0.25 mm/sec. The authors observe that Einstein obtained a similar formula (13), the coefficient of which is approximately threefold smaller than that of the authors' formula. In the second part of the article, the authors approach the problem with another method analogous to that which was used by them for the solution of a problem concerning diffusional particle transport. This method consists in the computation of the resultant force, by which an unevenly-heated gas acts on a suspended particle. The use of this method resulted in the ascertainment of a well-regulated additional velocity compo-

Card 2/4

SOV/69-21-4-1/22

On the Theory of Thermoprecipitation of High Dispersion Aerosol Systems.

nent $\vec{u}$ (equations (41) and (42)) of a suspended particle, which does not noticeably disturb the velocity distribution of the gas molecules. The velocity component $\vec{u}$, which has to be added to the velocity of the Brownian movement, is due to the effect of the collision of the molecules. The magnitude of $\vec{u}$ is proportional to the value of grad T, inversely proportional to the gas pressure and also to the square root of medium temperature and molecular weight of the gas. It does not depend on the dimensions of the particle. The numerical value of thermophoretic velocity depends, under the assumption of stability of the other conditions, in the character of interaction of gas molecules and particle surface. This velocity is identical (if the absolute velocity values are preserved) during elastic and diffusional reflection of the molecules and by ~ 25% less in the case of diffusional dispersion of the molecules. There are 4 references, 2 of which

Card 3/4

SOV/69-21-4-1/22

On the Theory of Thermoprecipitation of High Dispersion Aerosol Systems.

are German, 1 Soviet and 1 English.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of Physical Chemistry of the AS USSR, Moscow).

SUBMITTED: 15 July 1958.

Card 4/4

~~5(4)~~ 15.9300, 15.1124

66200

SOV/69-21-5-10/23

AUTHORS: Deryagin, B.V., Zherebkov, S.K. and Medvedeva, A.M.

TITLE: A Study of Adhesion Phenomena in Rubber to Metal Bonding With Leykonat Cement. 2. Bonding of Metal and Unfilled Rubbers

TITLE: Kolloidnyy zhurnal, 1959, Vol 21, Nr 5, pp 558-563 (USSR)

ABSTRACT: This is a study of the adhesion phenomena observed in the bonding of unfilled rubbers to metals with the aid of the isocyanate cement: Leykonat. Table 1 gives a survey of the rubbers and their ingredients. The rubbers were bonded to metal plates (cleaned with emery paper Nr 100) during the vulcanization process. The bonding strength was characterized by the resistance to the separation of the rubber from the metal, and was expressed in kilograms per centimeter of the width of the specimen (erg/cm^2). The results of preliminary experiments showed that in a number of

Card 1/5

66200

SOV/69-21-5-10/23

A Study of Adhesion Phenomena in Rubber to Metal Bonding with Leykonat Cement. 2. Bonding of Metal and Unfilled Rubbers

cases the bonding strength exceeds the strength of the rubbers themselves, and the rupture has a cohesional character. In order to obtain in all cases an adhesional character of rubber-metal separation, the authors reduced the thickness of the cement film. The experiments revealed however, that this reduction in thickness affects differently the bonding strength of rubbers prepared on the basis of different natural rubbers. The data given in table 2 and graph 1 shows that with the aid of leykonat cement (on the basis of triisocyanate triphenyl methane) it is possible to bond to metal rubbers prepared on the basis of polar as well as non-polar natural rubbers. In proportion to the growing of the chemical activity and polarity of the natural rubbers, a growth in the intensity of interaction of the cement film can be observed with rubbers prepared on the basis of these natural rubbers, whereas the intensity of interaction of the cement film with the metal remains constant.

Card 2/5

66200

SOV/69-21-5-10/23

A Study of Adhesion Phenomena in Rubber to Metal Bonding with Leykonat Cement. 2. Bonding of Metal and Unfilled Rubbers

The experimental results however, show that in the given case the bonding strength does not grow monotonously in proportion to the increase in chemical activity and polarity of the natural rubbers. After an initial growth it passes through a maximum, and subsequently drops. The authors have shown that the bonding strength of rubber to metal will be high only in the case of an approximate equality of the intensities of interaction at the cement-metal and cement-rubber interfaces. If when one of the surfaces is in contact with the cement film the intensity of interaction is considerably higher, the bonding strength of rubber to metal will be low. The authors already showed in a previous publication /Ref 1/ that there is an increase in intensity in the interaction of a cement film with a sandblast-treated metal surface. Bonding of the mentioned rubbers to such surfaces therefore, will bring about a change. The authors

Card 3/5

66200

SOV/69-21-5-10/23

A Study of Adhesion Phenomena in Rubber to Metal Bonding with Leykonat Cement. 2. Bonding of Metal and Unfilled Rubbers

ascertained this phenomenon on the basis of two characteristic examples: bonding of unfilled rubbers prepared from butyl rubber and SKN-40. Whereas the bonding strength of the first rubber did not change, the bonding strength of the second rubber was increased by approximately ten times. On the whole, the experiments have shown that the strength of the rubber to metal bonding, due to the cement film, is controlled by the ratio of intensities of interaction of the latter with the contacting surfaces at the cement-rubber and cement-metal interfaces. In the case of an approximate equality of both intensities, the bonding strength will be low. One of the factors affecting the intensity of interaction of the cement film with the rubber is the reduction in thickness of the cement film. Such a reduction results in a drop in the intensity of interaction of film and rubber, which differently reflects on the strength

Card 4/5

66200

SOV/69-21-5-10/23

A Study of Adhesion Phenomena in Rubber to Metal Bonding with Leykonat Cement. 2. Bonding of Metal and Unfilled Rubbers

of the rubbers to metal bonding, this strength increasing in some cases and decreasing in others. Use of the isocyanate cement leykonat makes possible a solid bonding to metal of unfilled resins prepared on the basis of most of the existing polar and nonpolar natural rubbers. It was ascertained that an increase of polar groups in natural rubber results in an increase in the intensity of interaction of the film with the rubber containing this natural rubber. There are 2 tables, 2 graphs and 2 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti, Moskva (Scientific Research Institute of the Rubber Industry, Moscow)

SUBMITTED: Oct. 2, 1958

Card 5/5

5(4) SOV/76-33-1-17/45

AUTHORS: Karasev, V. V., Deryagin, B. V.,

TITLE: Measurements of Limiting Viscosity According to the Kinetics of the Thinning of Wetting Liquid Films in the Blowing-Off Process (Izmereniya granichnoy vyazkosti po kinetike uton'sheniya smachivayushchikh plenok zhidkostey v protsesse sduvaniya)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 1, pp 100 - 106 (USSR)

ABSTRACT: A report was given on the results of this investigation at the Conference on Liquid State in Kiyev, in June 1955. As already shown (Refs 1-5) the structural properties of the liquid and the variations with the distance from the surface of the solid can be determined by viscosity. Thus it was found that up to a distance of 10^{-7} cm from the vessel wall the structure of the liquid (viscosity) maintains spatial values if no polar molecules are present. Difficulties arose on further tests as with structural differences between the limit and main phase of the liquid the effect of the boundary angle influenced the determinations.

Card 1/3

Measurements of Limiting Viscosity According to the Kinetics of the Thinning of Wetting Liquid Films in the Blowing-Off Process SOV/76-33-1-17/45

A new way of determining viscosity, the blowing-off method, has been worked out for unsteadily wetting liquid films. For determining the thickness of the films modulation-polarimetric method was used and (Ref 4) a special prism adjustment was carried out (Fig 2). A photoelectric amplifier FEU with a decoherer, a standard cathode-oscillograph, and amplifiers with filters were used. The surface to be wetted was given a preliminary treatment and thus a higher degree of wetting was obtained. For this purpose a special device was used (Fig 4). Palmitic acid butyl ester (Fig 5) was examined and a limit phase of 1000-1200 Å was found. Sebacic acid amyl ester (in vacuum oil amoyl'-S) (Fig 6), phthalic acid dibutyl ester (produced by G. M. Zhabrova)(Fig 7), oleic acid (on a surface previously treated, with hexadecane dicarbonic acid) (Fig 8), hydrated "benzontrone" (Fig 9), and a number of substances synthesized at the laboratory of P. I. Sanin (Ref 5) were also tested (solved in paraffin oil) on metallic surfaces. For purifying the paraffin the S. Yu. Yelovich method was used. Mono, tri, and hexachloro paraffin (0.01% in paraffin oil) showed a limit phase of

Card 2/3

Measurements of Limiting Viscosity According to the SOV/76-33-1-17/45
Kinetics of the Thinning of Wetting Liquid Films in the Blowing-Off Process

250 Å (Figs 11,12,13). There are 13 figures and 6 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of Physical Chemistry, AS USSR, Moscow)

SUBMITTED: June 20, 1957

Card 3/3

05829

SOV/76-33-10-27/45

5(4)

AUTHORS: Deryagin, B. V., Dukhin, S. S., Lisichenko, V. A.

TITLE: Kinetics of the Attachment of Mineral Particles to Bubbles During Flotation. I. The Electric Field of the Moving Bubble

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 10, pp 2280 - 2287 (USSR)

ABSTRACT: The generation of an electric field during the motion of a liquid separating layer was investigated for the first time by A. N. Frumkin and V. G. Levich (Ref 3) by means of a mercury drop sinking in an electrolyte. It is shown here that during the motion of bubbles in liquid media an electric field is always generated which extends far beyond the ion sheath. The production of such forces of a relatively large range of action is further indicated in investigations made by V. A. Lisichenko et al (Ref 4). This article is intended to give a theoretical explanation of this new effect in the field of electrokinetics produced by stretching or compression of the separating layers and at different diffusion coefficients of the ions. The authors calculated the electric field generated as a result of the afore-mentioned effect when a bubble rises

Card 1/2

05829

Kinetics of the Attachment of Mineral Particles to Bubbles During Flotation. I. The Electric Field of the Moving Bubble SOV/76-33-10-27/45

freely. The effect of the electric field exceeds the ion sheaths of the electric double layer and affects the approach of the mineral particles toward the moving particles in flotation. There are 9 Soviet references.

ASSOCIATION: Kavkazskiy institut mineral'nogo syr'ya (Caucasus Institute for Mineral Raw Materials)

SUBMITTED: March 26, 1958

Card 2/2

5 (4) SOV/20-128-2-28/59

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, Batova, G. A.

TITLE: Investigation of Capillary Osmosis in Gases

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 2, pp 323-325 (USSR)

ABSTRACT: The osmosis through a membrane which is permeable for both gas components is the definition given for capillary osmosis. In this case pressure differences caused by different diffusion rates of the components may occur, which vanish however when the thermodynamical equilibrium is reached. One of the discoverers of the capillary osmosis was F. Shidlovskiy (1886, Ref 1). The diffusion depends on the ratio between the mean free path of the gas molecules and the diameter of the membrane pores as well as on the mixture processes within the pores according to the laws by Fick and Poiseuille. Hygrometers (Ref 2) constructed in the below cited institute take both laws into account, but neglect the surface effects caused by the impact of molecules against the walls of the pores. The theory of the motion of aerosol particles in a diffusion field due to B. V. Deryagin and S. S. Dukhin (Ref 3) requires therefore a correction which was recommended by Deryagin and

Card 1/2

Investigation of Capillary Osmosis in Gases SOV/20-128-2-28/59

S. P. Bakanov (Ref 4). The present paper investigated a gas mixture passing through a porous membrane and measured the arising pressure differences. Figure 1 shows the used equipment, figure 2 the results of measurement for argon-helium, nitrogen-helium and argon-nitrogen gas mixtures. The pressure difference increases according to the difference of the atomic weights of the gases. The results already known for gases with equal molecular weight (ethylene-nitrogen), where only the difference of the molecular radius is effective, show that in this case the pressure differences are smaller but still measurable. There are 2 figures and 5 references, 4 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: June 5, 1959

Card 2/2

~~5(4)~~ 5.4600

66180

SOV/20-128-5-34/67

AUTHORS: Voropayeva, T. N., Deryagin, B. V., Corresponding Member, AS USSR, Kabanov, B. N.

TITLE: An Investigation of the Interaction of Crossed Polarized Metallic Filaments in Electrolyte Solutions for the Modeling of Coagulation Phenomena and Measurement of the Zero-charge Potential and the Constant of the van der Waals Forces

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 5, pp 981-984 (USSR)

ABSTRACT: Direct experiments (Ref 1) and the theory of the durability of lyophobe colloids indicate that repulsive forces act between charged surfaces in electrolyte solutions which, at distances of the order of ion sheaths, may be stronger than molecular attractive forces. In order to bring two crossed filaments into direct electric contact, a certain energy threshold N_m is to be surpassed. This process may easily be seen from the abrupt drop of electric resistance between the two filaments as soon as contact has been established. Such measurements were made by the authors by means of platinum filaments 300μ thick (Fig 2). One filament was pivoted, loaded with a weight whose angle of rotation

Card 1/3

4

was recorded on a photoelectric relay by means of a mirror. With the help of a motor and mechanical gears the other filament was shifted slowly and continuously toward the first filament. The wires were placed in a hermetically sealed vessel which was filled with the electrolyte to be investigated. A circuit diagram in figure 3 demonstrates the manner in which the two wires are charged to a certain potential. The article further gives a detailed description of the cleaning of the wires and the vessel as well as of the polarization of the wires. As soon as the first wire had sufficiently approached, the second wire began to turn aside by rotation. A galvanometer indicated the passage of the energy threshold and the establishment of contact. The angle of rotation of the first wire at that instant was a measure of the amount of N_m. The latter was measured at various potentials in KCl solutions of a concentration of 10^{-3} N, 10^{-2} N, and 10^{-1} N. Results are given in figure 4. At the potential 0.2±0.02 v N_m passes through a minimum the ordinate of which is independent of

4

66180

An Investigation of the Interaction of Crossed Polarized SOV/20-128-5-34/67
Metallic Filaments in Electrolyte Solutions for the Modeling of Coagulation Phenomena and Measurement of the Zero-charge Potential and the Constant of the van der Waals Forces

the concentration. The constant of molecular attraction was computed with the help of a formula deduced by the second-mentioned author (Ref 3) for the action of hydrophobe, curved surfaces in electrolytic solutions: $A = 6.6 \cdot 10^{-12}$ erg for an electrolyte concentration of 10^{-3} mol/l, and $A = 7.3 \cdot 10^{-12}$ erg for a concentration of 10^{-2} mol/l. The theoretical dependence of N_m on the potential is illustrated in figure 4. The deviation of the experimental curves indicates the presence of neglected forces of a third kind. The value 0.2 ± 0.02 v corresponds to the platinum zero charge. The method suggested is therefore suited also for measuring metal zero charges. In conclusion, mention is made of an article by A. N. Frumkin (Ref 6) on electrostatic repulsion of films. There are 4 figures and 8 references, 7 of which are Soviet.

Card 3/3

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of Electrochemistry of the Academy of Sciences, USSR) and Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: June 30, 1959

4

66494

~~5(4)~~ 5.3830, 15.1100

SOV/20-129-1-41/64

AUTHORS: Krotova, N. A., Morozova, L. P., Deryagin, B. V., Corresponding Member, AS USSR

TITLE: An Investigation of the Adhesion of a Polymer to Modified Glass Surfaces in Connection With the Reversal of Its Charge Sign in Tearing off

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 1, pp 149-152 (USSR)

ABSTRACT: In reference 1 the authors observed that polymers severed from glass surfaces in the course of changes in the reaction surface reverse the sign of their charge. The present paper investigates the relationship between the mechanical and electrical values of adhesion to bases the chemical character of which had been modified. The base employed consisted of glass the surface of which was first cleaned by means of a glow discharge and then treated with organosilicic compounds of the series $(CH_3)_{4-n}SiCl_n$ $(n = 1, 2, 3, 4)$. The following polymers were applied to the surface: nitrocellulose, benzyl- and alkyl cellulose, polyvinyl alcohol, gutta-percha, perchlorovinyl- and carboxyl-containing

Card 1/3

4

66494

SOV/20-129-1-41/64

An Investigation of the Adhesion of a Polymer to Modified Glass Surfacesin Connection With the Reversal of Its Charge Sign in Tearing off

methyl and hydroxyl groups on the surface reaches a certain value. The authors thank A. Ya. Korolev in whose laboratory the modification of the glass surfaces was carried out. There are 3 figures, 2 tables, and 4 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: July 2, 1959

Card 3/3

D~~ERYAGI~~N, B.V.

15(6)

AUTHOR: Rebinder, P. A., Academician SOV/30-59-1-5/57

TITLE: New Trends of Colloid Chemistry (Novyye puti razvitiya kolloidnoy khimii)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 1, pp 44-51 (USSR)

ABSTRACT: At present, colloid chemistry plays an especially important part in political economy as it is a physical-chemical science concerning substances of modern engineering. It is of great practical importance that at present it is possible to carry on uninterrupted transitions from lyophobic to lyophilic systems. Thus, it is possible to obtain technically important substances with the required structural-mechanical properties. The theory of highly molecular substances and their solutions has developed into an independent branch of colloid chemistry. The vitality of modern colloid chemistry is proved by the fact that it produces many new independent branches of science. Further, the author describes the course of the 4th All-Union Conference of Colloid Chemistry which took place in Tbilisi on May 13-16, 1958. It was organized by the Otdeleniye khimiches-

E. M. Natanson (Kiyev) reported on the present state of research in the field of colloid metals.
A. D. Sheludko (Bulgaria) determined theoretically and experimentally the regularities of synaeresis in foams.
M. P. Vollarovich with collaborators spoke about the results of examination of water properties and structure of peat by means of radioactive isotopes.
M. Ye. Shishniashvili considered questions of adsorption and chemosorption of electrolytes in colloid dispersion systems.
B. V. Deryagin and his collaborators reported on the development of the electrostatic stability theory as well as the coagulation of dispersion systems, and on the theory of formation and the properties of aerosols.
L. Ya. Kremnev, A. B. Taubman reported on the role of the structural-mechanical barrier as a factor of practical guarantee for a full stabilization of dispersion systems,

Card 3/6

as P. A. Rebinder showed it in his investigations (Ref 1).
V. G. Levich theoretically showed that an increased viscosity of the protective coverings of the stabilizer is sufficient to prevent a coagulation of particles.
M. M. Dubinin and his pupils dedicated a series of reports to examinations in the field of structural characteristics.
A. N. Frumkin with collaborators examined new appearances of adsorption in the theory of electrode processes.
B. A. Dogadkin, A. Ya. Korolev discussed questions of adsorptive interaction of active fillers with polymers, as well as of the chemical modification of the surfaces of solid particles (soot).
Ye. Ye. Segalova, P. A. Rebinder and collaborators reported on the clarification of the process of formation of crystallization structure in the hardening of mineral binding agents.
G. M. Bartenev showed that the appearance of high elasticity is connected with the formation of dispersion structure.
L. S. Palatnik (Khar'kov) examined the colloidal state of aging alloys in thin films and massive samples.
Ye. D. Shchukin, V. V. Yudina clarified the theoretical criteria of spontaneous dispersion of solid bodies, especially metals, in surface-active surroundings.

Card 4/6

V. I. Likhtman reported on the appearance of adsorptive plastification of lead and tin at normal temperatures.
L. A. [illegible] and collaborators examined the influence of rheological properties of printing colors on their behavior in the printing process.
I. N. Vlodavets reported on the regulation of crystallization and coagulation structures in the production of best table-butter.

21

5 (4)

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, Batova, G. A. SOV/20-128-2-28/59

TITLE: Investigation of Capillary Osmosis in Gases

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 2, pp 323-325 (USSR)

ABSTRACT: The osmosis through a membrane which is permeable for both gas components is the definition given for capillary osmosis. In this case pressure differences caused by different diffusion rates of the components may occur, which vanish however when the thermodynamical equilibrium is reached. One of the discoverers of the capillary osmosis was F. Shidlovskiy (1886, Ref 1). The diffusion depends on the ratio between the mean free path of the gas molecules and the diameter of the membrane pores as well as on the mixture processes within the pores according to the laws by Fick and Poiseuille. Hygrometers (Ref 2) constructed in the below cited institute take both laws into account, but neglect the surface effects caused by the impact of molecules against the walls of the pores. The theory of the motion of aerosol particles in a diffusion field due to B. V. Deryagin and S. S. Dukhin (Ref 3) requires therefore a correction which was recommended by Deryagin and

Card 1/2

/ Investigation of Capillary Osmosis in Gases SOV/20-128-2-28/59

S. P. Bakanov (Ref 4). The present paper investigated a gas mixture passing through a porous membrane and measured the arising pressure differences. Figure 1 shows the used equipment, figure 2 the results of measurement for argon-helium, nitrogen-helium and argon-nitrogen gas mixtures. The pressure difference increases according to the difference of the atomic weights of the gases. The results already known for gases with equal molecular weight (ethylene-nitrogen), where only the difference of the molecular radius is effective, show that in this case the pressure differences are smaller but still measurable. There are 2 figures and 5 references, 4 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: June 5, 1959

Card 2/2

DERYAGIN, B.V.

"Interparticle Adhesion in Liquids and Gases."

report to be presented at the Symposium on Powders in Industry, London, 29-30 Sep 1960.

USSR Academy of Sciences.

DERYAGIN, B. V. (Corres. Mbr. Acad. Sci. USSR)
"Modern Problems of Boundary Friction," p. 115 ;
with Toporov, Yu. P., and Futran, M. F., "New Experimental Foundation of the Correctness of the Two-Member Friction Law." p. 152.

Deryagin, B. V., [illegible], and Tolstoy, D. M.
"Theory of Self-Excited Frictional Vibrations with Periodical Stops" p. 132

Sukhoye i granichnoye treniye. Friktsionnyye materialy (Dry and Boundary Friction. Friction Materials) Moscow, Izd-vo AN SSSR, [illegible]. [illegible] p. Errata slip inserted. 2,500 copies printed. (Series: Its: Trudy, v. 3)

Sponsoring Agency: Akademiya nauk SSSR. Institut mashinovedeniya. [illegible].
Ed.: I. V. Kragel'skiy, Doctor of Technical Sciences, Professor; Ed. of Publishing House: N. I. [illegible]; Tech. Ed.: S. [illegible] Tikhomirova.

The collection published by the Institut mashinovedeniya, AN SSSR (Institute of Science of Machines, Academy of Sciences USSR) contains papers presented at the III Vsesoyuznaya konferentsiya po treniyu i iznosu v mashinakh (Third All-Union Conference on Friction and Wear in Machines, [illegible], [illegible].

DERYAGIN, B.V.

report presented at the 1st All-Union Congress of Theoretical and Applied Mechanics,
Moscow, 27 Jan - 1 Feb '60.

102. J. Dvorak (Prague): The state of stress and deformation of the turbine blades.

103. V. M. Dekt (Kharkov): On some new forms of the general solution of the three-dimensional problem of the theory of elasticity expressed in harmonic functions.

104. A. A. Dorkachev (Stalinabad): Generalization of the method of steepest descent in structural mechanics.

105. B. V. Deriagin (Moscow), S. V. Nerpin (Leningrad): Surface phenomena in the mechanics of clays.

106. A. E. Desov (Moscow): Experimental data concerning the propagation of vibrations of different frequencies in concrete mixtures.

107. G. Iu. Dzhanelidze (Leningrad): Almansi's problem.

108. M. I. Dlugach (Kiev): A finite difference analysis of cylindrical shells with rectangular holes.

109. M. I. Dlugach (Kiev): Generalization of Mohr's method of determining the displacements in problems of the theory of elasticity.

110. M. D. Dolberg (Kharkov): The construction of solutions of the equations of structural mechanics by means of special uniformly convergent series.

111. L. G. Drapkin (Leningrad): A method of investigating the states of stress and strain and the slip lines in anisotropic multilayer metals.

112. A. V. Diatlov (Dnepropetrovsk): The stability of an obliquely bent beam.

113. L. I. Diatlovitskii, L. B. Rabinovich (Kiev): A problem concerning elastic bodies whose configuration changes in the course of loading, with application to the erection of structures.

114. P. D. Evdokimov (Leningrad): On the shear strength of structural rock foundations.

115. P. D. Evdokimov (Leningrad): On friction in sandy soils and their shear strength.

116. K. E. Egorov (Moscow): The deformation of the ground under an annular foundation.

117. G. S. [illegible] (Moscow): On stresses and strains of thin-walled rods of variable cross section at normal and elevated temperatures.

118. Zh. S. Erzhanov (Dnepropetrovsk): Determination of the pressure on a tunnel facing taking account of the heriditary creep of soils.

119. Zh. S. Erzhanov (Dnepropetrovsk): The integral operator method of determining the creep characteristics of soils from observations in situ.

120. E. F. Ershov (Gorki): The elastic-plastic bending of a bar.

121. A. N. Zhukov (Moscow): Elastic properties of a plastically deformed metals under combined loading.

122. P. A. Zhuravlev, A. P. Zakharevich, N. P. Neronov (Leningrad): Application of the method of characteristics to the determination of the tension in the cable of a mine elevator.

123. M. A. Zadoian (Erevan): On the propagation of plastic zones in a beam under impulsive loading.

124. L. I. Zaitsev (Moscow): On the surface-head-wave.

125. B. V. Zverkov, Zh. N. Kots (Leningrad): An experimental study of creep-rupture characteristics of tubes under combined stresses.

126. N. V. Zvolinskii (Moscow): The propagation of an elastic wave due to an underground explosion.

127. A. N. Zelenin (Moscow): On the state of stress in compression and its effect on the construction of Mohr's circles.

128. T. K. Zilova, Ia. B. Fridman (Moscow): The laws of deformation and rupture kinetics.

129. P. L. Ivanov (Leningrad): Flow of water-saturated soils under dynamic loading

130. V. S. Ivanova (Moscow): The hypothesis of energetic similarity in fatigue fracture and the melting of metals.

131. D. D. Ivlev (Voronezh): On the anisotropy of elastic and plastic bodies.

132. L. M. [illegible], Iu. I Iagi (Leningrad): Plastic tension and torsion of thin-walled nickel tubes that have become anisotropic through prior plastic deformation.

133. Iu. N. Ilenko, B. S. Sokolov (Moscow): Investigation of elastic strains and vibrations in aircraft structures by means of electronic computers.

5/

DERYAGIN, Boris V.

"The mechanism of the controlling role of monolayers on the kinetics of some processes in heterogeneous systems."

report to be submitted at Gordon Research Conferences - New London, New Hampton, and Meriden, N.H., 13 June-2 Sep 60.

Institute of Physical Chemistry, USSR Academy of Sciences.

DERYAGIN, B.V. (Institute of Physical Chemistry, USSR Academy of Sciences, Moscow.)

"The theory of Forces Acting Upon Aerosol Particles in the Fields of Temperature."

paper submitted at the meeting of The Faraday Society, Bristol, England, 13-15 Sep '60

DERYAGIN, B. V., Prof., DR.

"The Present State of our Knowledge about Adhesion of Polymers and semiconductors."

Plenary lecture submitted for the III International Congress of Surface Activity, Cologne, 12-17 Sep 1960.

NERPIN, S.V. and DERYAGIN, B.V.

"Soil Mechanics."

report to be submitted at the Symposium on Powders in Industry, London, 29-30 Sep 1960.

Institute of Water Transport Engineers, Leningrad, for Nerpin.

DERYAGIN, B.V. and KUKHIN, S. S.

"The diffusion theory of electrokinetic effects and its application to the pr production of films and suspensions of latex, and in froth flotation"

report submitted at the General Conference of the Division of Chemical Sciences of the Academy of Sciences, USSR, 27-28 October 1960

So: Izvestiya Akademii nauk SSSR, otdeleniye khimicheskikh nauk, No 2 1961, Moscow, pages 378-380

SHELUDKO, Aleksey; SOLOMAKHIN, N.I. [translator]; DERYAGIN, B.V., red.;
VOYUTSKIY, S.S., prof., red.; KHODETSKAYA, Z.F., red.;
RYBKINA, V.P., tekhn.red.

[Colloid chemistry] Kolloidnaia khimiia. Pod red. B.V.Deriagina
i S.S.Voiutskogo. Moskva, Izd-vo inostr.lit-ry, 1960. 332 p.
Translated from the Bulgarian. (MIRA 14:3)

1. Chlen-korrespondent AN SSSR (for Deryagin).
(Colloids)

82880
S/120/60/000/02/011/052
E032/E314

24.6810

AUTHORS: Deryagin, B.V., Prokhorov, P.S., Velichko, M.V. and Leonov, L.F.

TITLE: A Diffusion Chamber 19 with Supersaturation Which is Constant Both in Space and Time

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No 2, pp 45 - 47 (USSR)

ABSTRACT: The supersaturation in a Wilson chamber disappears rather rapidly owing to the unavoidable condensation of vapour on the walls and also due to heat transfer. In diffusion chambers supersaturation is constant in time, but not in space. The method suggested in the present paper is free from these two disadvantages and can be used to obtain supersaturation which is constant both in time and in space. The idea is to use a periodic variation of the temperature of the walls of the chamber. The problem is formulated as follows. It is assumed that the walls are always moist and the flow of liquid down the walls can be neglected. Under these conditions the thickness of the layer of moisture is constant. If one neglects the heat transfer

Card1/5

82880

S/120/60/000/C2/011/052

E032/E314

A Diffusion Chamber with Supersaturation Which is Constant Both in Space and Time

associated with diffusion then the periodic change in the temperature of the walls will produce a heat wave propagated into the chamber. If the temperature of the walls is known then one can calculate the density of the vapour as a function of time. If the period of the temperature oscillations on the walls of the chamber is taken to be sufficiently short, then the temperature and diffusion waves are damped out in the neighbourhood of the walls and most of the volume of the chamber is maintained at an average temperature and density which can be expressed in terms of the temperature variation on the walls. If the amplitude of the temperature oscillations on the walls is small, the mean density of vapour in the chamber will be equal to the saturation vapour density at the average temperature of the walls and, consequently, the supersaturation will be equal to unity. At larger amplitudes of the temperature oscillations, the supersaturation will be greater than unity. 4

Card2/4

82880

S/120/60/000/02/011/052
E032/E314

A Diffusion Chamber with Supersaturation Which is Constant Both in Space and Time

The supersaturation will increase with the amplitude of the oscillations in the temperature of the walls. A chamber based on these ideas is shown in Figure 2. The working walls 1 were made of aluminium foil 0.05 mm in thickness and were in the form of squares 200 x 200 mm. These walls were attached to the perspex frame 2 which was 50 mm thick. The heat waves are practically damped out at a distance of 3 mm from the wall when the period of 1 sec is used. The side walls formed by the frame are kept at the average temperature of the chamber. This tends to reduce side effects but does not eliminate them altogether, so that the working volume is smaller than the geometrical volume. The heat was applied by passing short but large current pulses (of the order of a few hundred amperes) through leads in thermal contact with the aluminium walls. The heat was removed by copper vessels 6 (Figure 2) filled with a mixture of acetone or alcohol and solid carbon dioxide. The thermal contact between the refrigerator and the aluminium wall

Card3/9

4

82880
S/120/60/000/02/011/052
E032/E314

A Diffusion Chamber with Supersaturation Which is Constant Both in Space and Time

of the chamber was through a thin paper layer 7 . The rate of cooling could be adjusted by varying the thickness of this paper. This construction was used to obtain a temperature change of ± 3 °C with a period of 1 sec at an average temperature of 20 °C. The chamber was heated for 0.2 sec and cooled for 0.8 sec. The supersaturation in the chamber calculated from these data should be about 1%. In order to increase the degree of supersaturation, a larger amplitude in the temperature oscillations is required. The chamber can be used to reproduce slow atmospheric processes since the supersaturation in the formation of clouds is usually 0.1% and only relatively rarely exceeds 1%. Figure 3 shows the dependence of the supersaturation on the temperature amplitude for different average temperatures.
There are 3 figures.

Card 4/5 Inst. Phys Chem AS USSR

86765

24.4000 (1136, 1137, 1158)

S/120/60/000/006/041/045
E073/E335

AUTHORS: Toporov, Yu. P. and ~~Deryagin, B.V.~~

TITLE: Investigation of the Friction Properties of Solids at Elevated Hydrostatic Pressures

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No. 6, pp. 132 - 133

TEXT: The authors have studied systematically the influence of increased pressure from all sides on the dry and boundary friction of materials. The investigations were carried out by simple equipment which enabled investigating the external friction at pressures up to 100 atm. in the surrounding medium. Fig. 1 shows a sketch of the apparatus used; it is a modification of the Deryagin-Lazarev tribometer, placed into a steel bomb inside which an elevated pressure is generated. The tribometer permits measuring the force of static friction between the surface of a flat plate displaced in the horizontal plane and a slide block resting on 3 supports. In investigating dry and boundary friction it is possible to apply needles as well as steel balls which are soldered onto

Card 1/5

86765

S/120/60/000/006/041/045
E073/E335

Investigation of the Friction Properties of Solids at Elevated Hydrostatic Pressures

the surface of the slide block. The plate under investigation is displaced by means of a threaded nut which is operated by reversible electric motor using reductor gears and appropriate seals in the wall of the bomb. By using teflon as the seal material it became possible to reduce considerably the friction losses in the seal. On displacing the plate, the friction force which is generated between its surface and the slide surface brings about bending of a steel rod which is connected to the slide and acts as a dynamometer. The deformation is observed visually by means of a microscope which penetrates through the lid of the bomb. The window is made of perspex and fixed to the lid using a rubber packing ring. Increased hydrostatic pressure of the medium is produced by connecting the bomb to a flask containing compressed gas. Investigations at pressures up to 15 atm. were carried out using an ordinary oxygen reductor, which

86765

S/120/60/000/006/041/045
E073/E335

estigation of the Friction Properties of Solids at
ted Hydrostatic Pressures

ed maintaining constant pressure in the bomb even in case of high leakage. For higher pressures a special needle used. The instrument enables investigating static not only in a gaseous media but also in any liquid. hydraulic pump from a laboratory or school press can sed. Fig.1 shows a sketch of the equipment for investigating e friction properties of solids at elevated pressures:
- bomb; 2 - base; 3 - guide; 4 - nut; 5 - thread;
6 - pressure gauge; 7 - specimen under investigation;
- slide block; 9 - lid; 10 - illumination source;
- microscope; 12 - thread; 13 - sealing ring;
- ex window; 15 - dynamometer; 16 - reductor
17 - teflon seal; 18 - seal; 19 - seal housing;
- thread; 21 - teflon seal; 22 - coupling;
- motor.

X

Card 3/3 Inst. Phys Chem, AS USSR

84265

S/170/60/003/010/010/023
B019/B054

21.2181

AUTHORS: Deryagin, B. V., Zakhavayeva, N. N., Lopatina, A. M.

TITLE: A New Method of Determining the Liquid Filtration Coefficient and the Capillary Transfusion Rate in Powdered Materials 18

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 10, pp. 66 - 68

TEXT: In a previous paper (Ref. 1), B. V. Deryagin suggested a method of determining quickly the filtration coefficient at the initial stage of transfusion at which filtration is not yet slowed down by the liquid-saturated layers. By this method, filtration is measured by determining the air displaced by the liquid. The authors designed the apparatus shown in Fig. 2 for determining the liquid filtration coefficient according to this idea. The authors give a formula for calculating the filtration coefficient from experimental results. The principal part of the apparatus is a cylindrical cell to locate the sample. This cell is incorporated in a pipe system; water is pressed in on one side of the

Card 1/3

84265

A New Method of Determining the Liquid Filtration Coefficient and the Capillary Transfusion Rate in Powdered Materials

S/170/60/003/010/010/023
B019/B054

cell, and the air escaping on the other side is measured. The filtration coefficients measured by the apparatus described are compared with the values calculated theoretically according to Carman (Table 1).

Sample	Particle size in microns	Liquid	K_0	K_1	K_1/K_0
Sand	50.0	Water	$2.49\cdot10^{-6}$	$2.54\cdot10^{-6}$	1.02
Sand	20.0	Water	$1.18\cdot10^{-6}$	$1.25\cdot10^{-6}$	1.05
Sand	7.0	Water	$4.10\cdot10^{-8}$	$4.07\cdot10^{-8}$	0.99
Clay	0.1	CCl_4	$1.20\cdot10^{-10}$	$1.10\cdot10^{-10}$	0.91
Sand	1.0	"	$2.24\cdot10^{-9}$	$2.42\cdot10^{-9}$	1.08

X

K_0 are the experimental, K_1 the theoretical values of the filtration coefficients in the dimension cm^3sec/g; each of the experimental values

Card 2/3

84265

A New Method of Determining the Liquid Filtration Coefficient and the Capillary Transfusion Rate in Powdered Materials

S/170/60/003/010/010/023
B019/B054

was averaged over five measurements. There are 2 figures, 1 table, and 1 Soviet reference.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, g. Moskva (Institute of Physical Chemistry of the AS USSR, Moscow)

SUBMITTED: April 6, 1960

Card 3/3

15.9210
5(15.1123

69464
S/069/60/022/02/012/024
D034/D002

AUTHORS: Medvedeva, A.M., Deryagin, B.V., Zherebkov, S.K.

TITLE: Studies of Adhesion Phenomena in Rubber to Metal Bonding With "Leykonat" Glue, 3. Interaction Between Sodium Butadiene Rubber and Triphenylmethane Triisocyanate

PERIODICAL: Kolloidnyy zhurnal, 1960, Vol XXII, Nr 2, pp 217-222 (USSR)

ABSTRACT: The authors report on a study of the interaction between rubber and triphenylmethane triisocyanate in solutions and the effect of the isocyanate on rubber as a vulcanizing agent. The study was intended to verify the assumption that the cause of adhesion at the boundary rubber - "Leykonat" film ("Leykonat" is a glue representing a 20% solution of triphenylmethane triisocyanate in dichloroethane) consists in chemical interaction between the rubber and the

Card 1/4

69464
S/069/60/022/02/012/024
D034/D002

Studies of Adhesion Phenomena in Rubber to Metal Bonding With "Leykonat" Glue 3. Interaction Between Sodium Butadiene Rubber and Triphenylmethane Triisocyanate

isocyanate. Triphenylmethane triisocyanate can simultaneously interact with several rubber molecules, which necessarily must result in the formation of a structure similar to the network obtained by vulcanization. For their investigation the authors used sodium butadiene rubber of the type RShch. For the study of the formation of three-dimensional structures in the solutions a viscometer of the type PV-7 /Ref 3,4/ was used, which permits investigation of the properties of highly viscous liquids and concentrated disperse systems. This device makes possible to reveal anomalous structural viscosity of the systems and to determine simultaneously the ultimate deformation stress. The design of the device

X

Card 2/4

69464
S/069/60/022/02/012/024
D034/D002

Studies of Adhesion Phenomena in Rubber to Metal Bonding With "Leykonat" Glue 3. Interaction Between Sodium Butadiene Rubber and Triphenylmethane Triisocyanate

and the way to use it for experiments are minutely described by M.P. Volarovich and L.Ya. Ginzburg [Refs 4-6]. The authors' experiments have shown that the reaction of rubber solutions with a solution of isocyanate develops in dependence on the rubber and isocyanate content. The viscosity of 1-2% rubber solutions, to which during storage isocyanate was added, shows only little changes. The viscosity of 3-5% rubber solutions increases by several magnitudes after introduction of the additive. After a certain time three-dimensional structures can be observed in these solutions. The study further revealed that isocyanate-containing rubber films which were heated at 143°C assume the properties of vulcanizates as

69464
S/069/60/022/02/012/024
D034/D002

Studies of Adhesion Phenomena in Rubber to Metal Bonding With "Leykonat" Glue 3. Interaction Between Sodium Butadiene Rubber and Triphenylmethane Triisocyanate

can be seen from their behavior on swelling. On the whole the investigation confirmed the assumption of chemical interaction between rubber and isocyanate even at usual temperatures. A similar chemical interaction can be assumed, therefore, also in the rubber to metal bonding process during vulcanization at 143-151° C. The authors express their gratitude for help to M.P. Volarovich. There are 7 graphs and 11 references, 10 of which are Soviet and 1 English.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of Physical Chemistry of the AS USSR, Moscow)

SUBMITTED: September 30, 1959

Card 4/4

DERYAGIN, B.V.; TITIYEVSKAYA, A.S.; VYBORNOVA, V.Kh.

Mechanism of the stability of free films of solutions of sufrace active agents. Koll. zhur. 22 no.4:398-402 Jl-Ag '60. (MIRA 13:9)

1. Institut fizicheskoy khimii AN SSSR, Laboratoriya poverkhnostnykh yavleniy, Moskva.
(Films (Chemistry)) (Surface active agents)

64275

S/069/60/022/005/007/011
B015/B064

9.3000 (1031, 1143, 1331)
26.1420

AUTHORS: Dukhin, S. S. and Deryagin, B. V.

TITLE: The Electric Field of a Moving Uncharged Drop. 2. The Theory of the Electric Field of a Drop Containing a Non-ionogenic Surface-active Substance

PERIODICAL: Kolloidnyy zhurnal, 1960, Vol. 22, No. 5, pp. 587-592

TEXT: In continuation of a previous paper (Ref. 1), the author shows that an electric field is generated by the motion of the drop surface even in the absence of ions, if the drop contains a non-ionogenic surface active substance. The present paper was read at the IV Vsesoyuznaya konferentsiya po kolloidnoy khimii (IV All-Union Conference on Colloidal Chemistry) at Tbilisi in 1957. The mechanism of the effect investigated is simple. The electric double layer caused by the dipoles of the adsorbed molecules has a spherically-symmetric form in the drop at rest; thus no electric field is present outside the layer. Spherical symmetry is disturbed by the motion of the drop surface, which, in accordance with the laws of electrostatics, leads to the generation of an electric field

Card 1/2