REBINDER, P.A.

PA-2920

AUTHOR SEGALOVA E.E., SOLOVYEVA E.S. and REHBINDER P.A., Member of Academy.

TITLE Development of crystallization structures in tricalcium aluminate suspensions. (Kristallizatsionnoye strukturoobrazovaniye v suspenziyakh trekhkal'tsievogo aluminata.- Russian)

PERIODICAL Doklady Akademii Nauk SSSR 1957, Vol 113, Nr 1, pp 134-137 (U.S.S.R.)

Received: 6/1957 Reviewed: 7/1957

ABSTRACT The peculiarities of the processes of structure formation in water suspensions of Portland cement are determined generally in the first stages after their production by aluminate minerals, escpecially by tricalciumaluminate. The study of these processes becomes particularly interesting by the circumstance that just in this stage the system water - cement can be easily influenced in such a way as to regulate the structure of the cement stone. In the case of a mixture of 1 - 5 % tricalciumaluminate and 99 - 95 % quartz sand, only the former substance is responsible for the formation of the structure. The great amount of inert filling substance facilitates the study and approaches the hydration conditions of C_2H to those of the cement dough. The authors characterized

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...reason the authors studied the

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influence of the wash- admixture in suspensions of tricalcium-aluminate. On the one hand, this admixture slows down the structure formation and the hydration as well as the crystallization of the new forms, on the other it causes an adsorption peptization and a dispersion of the initial particles of the C_3A. By this these processes are accelerated. Furthermore, the wash blocks off the points of possible contact and loosens the strength of the crystal structure. The total influence of thewash depends on the predominance on one of these two factors, in the case of one or the other concentration. Hydration slows down and dispersion increases with growing concentration of the wash. No water is bound during an induction period. Not before this period is terminated does an intensive hydration commence. In connection with this process plastic strength increases and leads to the formation of hydroaluminate. In the case of large admixtures of wash strength may increase to 8-10 times its original value. On this occasion the hydroaluminate crystals

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Development of crystallization structures in tricalcium aluminate suspension.

become so small that they cannot be distinguished in the electron microscope with a magnification of 40.000. The highest degree of adsorption of wash amounts to 4,5 g per 1 gram of C_3A. In the case of a further increase of the amount of wash the strength of the crystal structure of the hydro-aluminate again decreases.
(With 2 illustrations, 1 table with 6 micro photographs and 1 table)

ASSOCIATION: Department of Colloidal Chemistry of Moscow State University "M.V. Lomonosow". (Kafedra kolloidnoy khimi i Moskovskogo gosudarstvenoho Universiteta im. M.V. Lomonosova)
PRESENTED BY: -
SUBMITTED: 27.9. 1956.
AVAILABLE: Library of Congress.

CARD 4/4

20-1-40/64

AUTHOR TsETLIN, B.L., YaNOVA, L.P., SIBIRSKAYA, G.K., REBINDER, P.A., Member of the Academy.

TITLE The properties of plastic masses filled with graphite and the effect produced by high filling. (Svoystva napolnennykh grafitom plastmass i effekt vysokogo napolneniya - Russian)

PERIODICAL Doklady akademii nauk SSSR. 1957, Vol 114, Nr 1, pp 146-148 (U.S.S.R.)

ABSTRACT The properties of various materials can, as is known, be considerably improved by the introduction of active fillers. In the present case the effect produced by graphite as an active filler was investigated in connection with a number of systems. The mechanic strength, heat conductivity, and heat storage were investigated. The results obtained are shown by two drawings. Also the course of the lines showing the heat-storing capacity is understandable, which proves that at high temperatures the strengthening effect is more pronounced.
Technological research work carried out on the basis of this paper proved the correctness of the results obtained by the investigations. (with 2 drawings)

CARD 1/2

20-114-3-39/60

AUTHORS: Segalova, Ye. Ye., Izmaylova, V. N., Rebinder, P. A., Member of the AN USSR

TITLE: Investigation of Supersaturation Kinetics in Connection With the Development of Crystallization Structures in the Solidification of Gypsum (Issledovaniye kinetiki peresyshcheniya v svyazi s razvitiyem kristallizatsionnykh struktur pri tverdenii gipsa)

PERIODICAL: Doklady Akademii Nauk SSSR,1957,Vol 114,Nr 3,pp 594-597(USSR)

ABSTRACT: In the dispersion systems, two types of structures can be formed: coagulation structures and crystallization structures. A mechanical destruction of the crystallization structure during the process of its formation is irreversible even if hydration still is far from being completed. In this context, the continuous hydration and the connected crystallization of the dihydrate do not lead to the formation of a crystallization structure. This can only be explained by the circumstance that in this case the favorable conditions for the formation of the crystallization contacts between the different microcrystals of the dihydrate gypsum are lacking. This, in turn,

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Investigation of Supersaturation Kinetics in Connection With the Development of Crystallization Structures in the Solidification of Gypsum

is probably caused by the excessive amount of dihyrate accumulated in the suspension. The value of oversaturation and the kinetics of its change can be observed conductiometrically in the suspension of the semihydrate gypsum. In all suspensions of the semihydrate gypsum, made of over 8 g $CaSO_4$/1 liter, the same maximum oversaturation is observed, corresponding to the $CaSO_4$ concentration of 8.0 g/l in the liquid phase of suspension. This again corresponds to the value which conventionally is assumed as 'solubility' of the semihydrate. The maximum oversaturation remains constant as long as the supply velocity of the ions Ca^{++} and SO_4^{--} into the solution compensates the loss velocity of the same ions as a result of the crystallization of the dihydrate. It can be seem from figure Nr 1,as contained in the paper under review, that the higher the concentration of the suspension the sooner the reduction in the oversaturation begins and the more quickly it is reduced. The decrease in the highest solidity of the crystallization structure of gypsum, as observed in the experiments conducted by the authors of the paper under review, can be explained by the reduction in the maximum level of the oversaturation, which is attained in the presence of the di-

Investigation of Supersaturation Kinetics in Connection With the Development of Crystallization Structures in the Solidification of Gypsum

hydrate additions. The latter reduction (of only short duration) decreases the probability of the growing together of the microcrystals, i.e. the formation of crystallization contacts. If the concentration of the dihydrate in the suspension is high, only small oversaturations take place, lasting only a short while. Under these circumstances virtually no crystallization contacts are formed and thus no solidification structure is created. It is exactly this circumstance which, at a sufficient amount of the new formation accumulated in the suspension - of the dihydrate - prevents further hydration solidifcation after the not yet fully formed crystallization structure has been destroyed. From this point of view it becomes clear that in suspensions of a highly dispersing dihydrate gypsum, proposed by some authors as a binding material with particular properties, the crystallization solidification is impossible under normal circumstances. The solidity in such systems - if density is sufficiently high - as well as in the case of clays, is caused by the dehydration

REBINDER, P A

AUTHORS Abrosenkova,V.F.,Logginov,G.I.,Rebinder ,P.A., 20-3-24/59
Member of the Academy

TITLE Binding of Lime Into Calcium Hydrosilicate Under Normal Conditions. (Svyazyvaniye izvesti v gidrosilikat kal'tsiya pri normal'nykh usloviyakh - Russian)

PERIODICAL Doklady Akademii Nauk SSSR,1957,Vol 115,Nr 3,pp 509-511(U.S.S.R.)

ABSTRACT It is usually said that the formation of calcium hydrosilicate on the occasion of the interaction between limestone with silica in the water medium by hardening of the binding calcareous-silicious building materials can only take place by hydrothermal treatment in autoclaves at temperatures of an order of magnitude of 170°.At normal temperatures this process is assumed not to take place i.e.it is not expressed in a noticeable increase of strength of the formedproduction. Some building productions,as e.g. wall blocks,which are used more and more in low buildings, do not need the strength obtainable in autoclaves. On the other hand,the papers of the authors confirm the assumption that,besides a hydration hardening of the calcareous-arenaceous binding substance,the binding of the calcium hydroxide gradually develops in the surface strata of the sand grains.The better this surface was developed and the more it was activated in the common breaking process,the greater is the quantity of limestone bound into calcium hydrosilicate.By means of the radioactive isotope Ca^{45} (as $Ca^{45}(OH)_2$) it was determined that the bound quantity of cal-

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Rebinder, P. A.

20-3-18/46

AUTHORS: Veyler, S. Ya. , Likhtman, V. I. , Rebinder, P. A., Academician

TITLE: Adsorption Plastification of a Surface Layer Under the Influence of Lubricants at the Pressure Working of Metals (Adsorbtsionnoye plastifitsirovaniye poverkhnostnogo sloya pod vliyaniyem smazok pri obrabotke metallov davleniyem)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 3, pp. 415 - 418 (USSR)

ABSTRACT: The authors illustrated the following: The essential part of the effect of liquid active lubricants at pressure working of metals is not the exterior friction but the resistance of the treated metals against the flow in a quite thin surface layer. This resistance determines the intensity of the tangential stress which occurs in the surface layer of the deformed metals. The liquid active lubricants reduce strongly the additional shearing deformation of the surface layer of the treated metal. The strong reduction of the "effective" friction coefficient (of the tangential stress) is caused by the localisation of the plastic friction in a thin layer of the softer covering metal. Stronger thinner coverages (nitration, carburization, chromium plating) impair upon the drawing process by intensification of the tangential stress. The shearing resistance τ_1 of the layer as computed by the measurements

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Adsorption Plastification of a Surface Layer Under the Influence of ... ... the Pressure Working of Metals

of the authors does not depend on the properties of the principal metal. Inactive metals (oktane, vaseline-oil) lead to an increase of σ at an effected increase of the degree of deformation at drawing. The surface-active lubricants cause a decrease of σ_1 at an increase of the deformation degree. A diagram illustrates these changes for aluminum bands which are drawn out in active lubricants. These data show clearly that the effect of the surface-active liquid lubricants upon the adsorption plastification of a very thin surface layer of the treated metal is reduced. To estimate the thickness of the plastificated layers "model experiments" on the influence of thin coverage of a soft metal upon the stress of a wire which is drawn out were carried out. A diagram illustrates this influence on example of a wire which has been covered with copper before. The influence of the oxide film has to be brought into consideration on occasion of the investigation. To a large extent the adsorption plastification can explain the influence of the surface-active media at boundary friction. (Particularly at high temperatures). There are 5 figures, 1 tables, and 12 references, 11 of which are Slavic.

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20-3-18/46

Adsorption Plastification of a Surface Layer Under the Influence of Lubricants at the Pressure Working of Metals

ASSOCIATION: Institute for Physical Chemistry of the AN USSR (Institut fizicheskoy khimii Akademii nauk SSSR)

SUBMITTED: June 29, 1957

AVAILABLE: Library of Congress

Card 3/3

Rozhanskiy, V. N.

AUTHORS: Rozhanskiy, V. N., Pertsov, N.V., Shchukin, Ye. D., Rebinder, P. A., Academician

20-5-14/48

TITLE: Effect of Thin Mercury Coatings on the Strength of Metallic Monocrystals (Vliyaniye tonkikh rtutnykh pokrytiy na prochnost' metallicheskikh monokristallov).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 5, pp. 769-771 (USSR)

ABSTRACT: At first the authors shortly report on respective literature. In the present works the monocrystals of zinc, tin, cadmium and lead (degree of purity 99.99 %, diameter 0.5 mm, length about 10 mm) were investigated. As surface-active substance served mercury which was applied in form of a thin coating by means of immerging the sample into an $Hg_2(NO_3)_2$-solution. The mercury covered the monocrystal with an equal film of about 0.1 μ thickness and was rapidly saturated with the metal to be investigated. The investigation of the strength properties of the amalgamated monocrystals in their expansion with constant velocity showed that the strength of the zinc- and tin- monocrystals covered with mercury was a few times less than the strength

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of the non-amalgamated monocrystals. Such an abrupt decrease of strength is obviously connected with the important decrease of surface tension at the metal/mercury boundary as well as with the decrease of the production operation of a new surface at the crack. The investigation of axial ground sections of amalgamated zinc-monocrystals according to their deformation showed the following: The cracks can develop on the surface as well as in the interior of the monocrystal, which can be seen in observing the axial ground sections. The development of the cracks in the inner part can be connected with a noticeable diffusion of mercury into zinc (at room temperature) with subsequent decrease of the surface tension on the developing inner separation surfaces. The rise of temperature up to 160° C annihilates the above-mentioned phenomena of catastrophic brittleness with the zinc-monocrystals investigated and reconstitutes completely the plasticity and the strength. Also the decrease of the deformation velocity causes phenomena which are similar to those developing with the rise of temperature. The strength of the body decreases with the

decrease of the surface tension on the just produced crack surface, but it increases with the creation of conditions which prevent the accumulation of great dislocation avalanches near the possible potential barriers. There are 4 figures, and 11 references, 6 of which are Slavic.

ASSOCIATION: Chair for Colloidal Chemistry of the Moscow State University imeni M. V. Lomonosov (Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova).

SUBMITTED: July 10, 1957.

AVAILABLE: Library of Congress

20-1175-32/54

AUTHORS: Segalova, Ye. Ye., Sokov'yeva, Ye. S., Rebinder, P. A., Member of the Academy.

TITLE: A Determination of the Supersaturation Value of Tricalcium Aluminate Suspensions in Water Medium, and the Kinetics of its Variation (Opredeleniye velichiny peresyshcheniya v vodnoy srede suspensiy trekhkal'tsiyevogo alyuminata i kinetiki yeye izmeneniya).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 5, pp. 841-844 (USSR).

ABSTRACT: No systematical investigations exist up to now of the value of supersaturation and of the kinetics of its variation. The purpose of the present paper is such an investigation of suspensions of tricalcium aluminate. The measurement of the kinetics of supersaturation in these suspensions was conducted by means of a conductometric method in a nitrogen atmosphere at an optimum velocity of mixing. A diagram illustrates the modification of the specific electric conductivity at 20°C in tricalcium aluminate suspensions with differing concentrations. In all suspensions with a sufficient concentration a constant level of the electric conductivity is arrived at, corresponding to the maximum supersaturation. This constant level is reached comparatively slowly, that is to say, the faster, the higher the concentration of the suspension. At low concentrations it is easily possible to divide the

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A Determination of the Supersaturation Value of Tricalcium Aluminate Suspensions in Water Medium, and the Kinetics of its Variation.

curve of the kinetics of the electric conductivity into two parts. Initially, the electric conductivity increases quickly, until it reaches a sharp salient point, and afterwards it increases much more slowly. Then the mechanism is described, on which these kinetics are based, that is to say, that protective films are formed on the surface of the particles of the tricalcium aluminate consisting of newly formed substances. This may be verified by the following means; 1) By the introduction of small crystals of previously produced, finished hydroaluminate. 2) By the introduction of small admixtures of surface active substances. A diagram illustrates the kinetics of the electric conductivity in suspensions of tricalcium aluminate in the presence of admixtures of finished hydroaluminate of varying quantities and of small admixtures of sulfite-alcohol grains. The admixture of hydroaluminate has a markedly accelerating effect on the increase of the concentration in the solution. The small admixtures of sulfite-alcohol grains (which are completely absorbed by the initially existent particles of tricalcium aluminate) do not modify the maximum level of the electric conductivity, but have an essential influence on the kinetics of the process.

Card 2/3 There are 3 figures, and 7 Slavic references.

A Determination of the Supersaturation Value of Tricalcium 20-117-5-32/54
Aluminate Suspensions in Water Medium, and the Kinetics of its Variation.

ASSOCIATION. State University imeni M. V. Lomonosov, Moscow (Moskovskiy gosudarst
vennyy universitet imeni M. V. Lomonosova).

SUBMITTED. July 19, 1957.

Card 3/3

REBINDER, P A

20-6-32/47

AUTHORS: Luk'yanova, O. I., Segalova, Ye. Ye., Rebinder, P. A., Academician

TITLE: On the Nature of the Induction Period in the Hydration of Portland Cement With Additions of a Hydrophilic Plastifier (O prirode indukt-sionnogo perioda gidratatsii portlandtsementa s dobavkami gidrofil'nogo plastifikatora).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 6, pp. 1034-1036 (USSR).

ABSTRACT: The interaction between Portland cement with water takes place without a perceptible induction period. The hydrophilic plastifiers (ligno-sulphonates of the "sulphite distiller's wash", in the following called SSS) bring about an induction period. This fact is beside other favorable influences of these additions used for the consolidation of the disperse structure of the cement stone. In spite of several works dealing with the part played by the SSS (references 1-5) the causes of the induction period remain unknown. It is the object of the present paper to determine the part played by the adsorption of the surface-active substance from the water medium of the suspension on the developing small crystals and points of formation of the new phase, the new hydrate formations. The authors found that the initial adsorption of the lignosulpho-

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On the Nature of the Induction Period in the Hydration of Portland Cement With Additions of a Hydrophilic Plastifier.

nates in the cement suspension may be considerably reduced and its content in the water medium correspondingly increased. This can be done by the introduction of small quantities of salt which form insoluble compounds at the surface of the cement particles and can therefore be better absorbed by cement than lignosulphonates. Carbonates of alkali metals expecially act in this manner. Alone, without SSS, they are not capable of bringing about the induction period. The calorimetrical investigation of the cement hydration leads to the determination of the kinetics of the separation of heat (figure 1). The addition of 0,5 % SSS leads to a shorter induction period, after which the hydration takes place more intensively than without such additions. The induction period is rapidly prolongued by increasing K_2CO_3-additions. The separation of heat during this period increases almost proportional with the duration, and the total separation of heat during the induction period increases with increasing content of SSS in the liquid medium. The same rules are also noticed for the separation of heat with increasing total content of SSS in the cement suspension in the case of an equal effective carbonate content (figure 2). By effective quantity is to be understood that which remains after deduction of the

On the Nature of the Induction Period in the Hydration of Portland Cement With Additions of a Hydrophilic Plastifier.

quantity consumed in the exchange reaction with the Ca-lignosulphonates. The phenomena described raise the assumption that the beginning of the induction period is caused by the presence of a hydrophilic surface-active substance in the liquid medium of the suspension. Thus the chief factors determining the duration of the induction period of the cement hydration in the presence of SSS are: a) the initial concentration of the plastifier in the water medium of the cement suspension which is dependent on its total content and on the quantity of adsorption at the primary cement particles, b) the velocity of the binding of the plastifier by developing crystallization points of the hydroaluminate. It has to be pointed out that the stabilizing action of the layers of adsorption of the lignososulphonates of the SSS also plays an obvious part in the plastifying total effect. Thereby the formation of the coagulation-structures is prevented. These layers may also slow down the dissolution of primary cement particles in the water.
There are 2 figures, and 7 references, 6 of which are Slavic.

SUBMITTED: July 19, 1957.
AVAILABLE: Library of Congress.
Card 3/3

REBINDER, P. A. (Moscow)

"Structure Formations in Dispersed Systems; Structure Types and Their Rheological Properties."

report submitted Third Intl. Congress of Rheology, Bad Oeyngausen, GFR, 23-30 Sep 58.

REBINDER, P. A., MIKHAYLOV, N. V. and IVANOVA-CHUMAKOVA, L. V.

"Rheological Examination Methods of the Formation and Development of Volume Structures in Colloidal and Polymer Solutions and the Results of the Application of these Methods."

report submitted Third Intl. Congress of Rheology, Bad Oeyngausen, GFR, 23-30 Sep 58.

SERB-SERBINA, N. N. and REBINDER, P. A.

"Physical and Chemical Basis for Regulating Structures and Mechanical Properties of Clays and Clay Rocks,"

paper distributed at the International Clay Mineralogy Congress in Brussels, Belgium, 1 - 5 Jul 58.

Comment: B-3,116,859.

MIKHAYLOV, N. V. and REBINDER, P. A. (Moscow)

"The Rheological Properties of Bitumen and Influence of Temperature, Filler, Additions, Solvents (Plasticizer) and Surface-Active Substances on the Same."

report submitted Third Intl. Congress of Rheology, Bad Oeyngausen, GFR, 23-30 Sept 58.

REBINDER, Petr Aleksandrovich, akademik; FAYNBOYM, I.B., red.; GUBIN, M.I., tekhn.red.

[Physicochemical mechanics; a new branch of science] Fiziko-khimicheskaia mekhanika; novaia oblast' nauki. Moskva, Izd-vo "Znanie," 1958. 63 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.4, nos.39/40) (MIRA 11:3)
(Mechanics)

Card 1/5

5(4) PHASE I BOOK EXPLOITATION SOV/2610

Akademiya nauk Ukrayins'koyi RSR. Instytut mashynoznavstva ta avtomatyky

Deyaki pytannya fizyko-khimichnoyi mekhaniky metaliv (Physical, Chemical, and Mechanical Properties of Metals) Kyyiv, 1958. 142 p. 1,000 copies printed.

Resp. Ed.: H.V. Karpenko, Doctor of Technical Sciences; Ed. of Publishing House: V.I. Pechkovs'kyy; Tech. Ed.: V.I. Yurchyshyn.

PURPOSE: The collection is intended for metallurgical engineers desiring information on fatigue and corrosion.

COVERAGE: The collection of 15 articles in Ukrainian compiled by 9 authors engaged in fatigue and corrosion research, is devoted to the subject of engineering practices in testing the fatigue properties of metals, mainly steel, with a particular emphasis on the phenomenon of corrosion fatigue and the effect of various liquid media upon such fatigue. Methods of investigation are described

and the results evaluated. The collection is dedicated to the sixtieth anniversary of the Academician Petro Oleksandrovych (Petr Aleksandrovich) Rebinder, an eminent metallurgist. The tests were conducted at the Instytut budivel'noyi mekhaniky (Structural Mechanics Institute), Kiyev, Instytut mashynoznavstva ta avtomatyky (Machine-building and Automation Institute), L'vov, both under the sponsorship of the Ukrainian Academy of Sciences, and at the Politekhnicheskiy institut (Polytechnical Institute), Khar'kov. References follow each article.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress (TA465.A42)

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12-22-59

REBINDER, P.A.

AUTHORS: Titov, A.I.; Vlodavets, I.N.; Rebinder, P.A. 69-20-1-13/20

TITLE: The Processes of Structure Formation in Milk Fat and Their Significance in the Manufacture of Butter (Protsessy strukturoobrazovaniya v molochnom zhire i ikh znacheniye dlya proizvodstva slivochnogo masla)

PERIODICAL: Kolloidnyy Zhurnal, 1958, Vol XX, # 1, pp 92-101 (USSR)

ABSTRACT: A study has been made of the strength characteristics of milk fat and butter. It was found that in order to satisfy the consistency of butter, the fat must form a mixed crystallization-coagulation type of structure with the coagulation structure predominating. The specificities of structure formation in the production of butter by churning, and by the continuous chilling of high fat content cream, have been examined. Two major ways have been indicated for improving the butter consistency: controlling the crystallization temperature of the milk fat, which allows changes to be made in the total solid phase content of the system, and regulating the mechanical treatment in the hardening process, which allows changes to be made in the character of the structure formed so as to bring it closer to the crystallization or to the

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The Processes of Structure Formation in Milk Fat and Their Sifnificance in the Manufacture of Butter

coagulation type.
There are 6 figures, and 15 references, 11 of which are Soviet, 3 English and 1 Dutch.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut molochnoy promyshlennosti, Moskva (All-Union Scientific Research Institute of the Milk Industry, Moscow)

SUBMITTED: July 19, 1957

AVAILABLE: Library of Congress

AUTHOR: Rebinder, P.A. SOV-69-20-5-2/23

TITLE: Current Problems of Colloidal Chemistry (Sovremennyye problemy kolloidnoy khimii)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 5, pp 527-538 (USSR)

ABSTRACT: All two-phase disperse systems can be divided in two groups according to the value of the specific interfacial free energy σ which may be higher or lower than the border value σ_t. The aggregate instability of lyophobic systems increases with the decrease in particle size and with an increase in their number per unit volume, i.e. with the increase of Brown's movement and the probability of effective collisions. In lyophobic emulsions, further dispersion is impeded by the increase of the reverse processes of coalescence. The differences between lyophobic and lyophilic systems are especially pronounced for systems with liquid interfaces, i.e. emulsions or semicolloids. These may be formed continuously from the lyophobic systems, type "oil in water", by introducing a surface-active component, like soap, in suffi - cient quantities. Solutions of surface-active substances with a hydrophilic polar group and with a sufficiently long hydrocarbon chain are lyophilic colloids. The volume con-

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tent of the solid disperse phase is considerably increased by stabilization. The high elasticity, i.e. the strongly developed elastic after-action is a property of the coagulation structure. The transitional colloidal systems easily form thixotropic coagulation structures, i.e. gils, already at small concentrations of the disperse phase. The mechanical properties of coagulation structures may be controlled by increasing the degree of filling of the system introducing stabilizers and coagulating agents. The particles of the filler form a suspension which favors the development of a three-dimensional structure. The electric conductivity is influenced by the active filler, e.g. carbon black in rubber, and increases with the increase of the potentials. The processes of destruction of solid bodies and the foregoing deformation processes are very sensitive to physical-chemical factors /Ref. 30/. The destruction process, i.e. the appearance of new surfaces with corresponding surface enrgy, takes place at the expense of the elastic energy accumulated during the preceding deformation. Under the same mechanical conditions of destruction, the newly formed surface is larger in a surface-active medium than in an inactive one. The investigation of the dispersion pro-

cesses, permits the continuous transition from the mechanical destruction to spontaneous dispersion. There are 34 references, 33 of which are Soviet and 1 German.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Otdel dispersnykh sistem (Institute of Physical Chemistry of the USSR Academy of Sciences, Department of Dispersed Systems). Moskovskiy universitet, Kafedra kolloidnoy khimii (Moscow University Chair of Colloidal Chemistry)

SUBMITTED: June 16, 1958

1. Chemistry--USSR 2. Colloids--Analysis 3. Colloids--Properties

SOV-69-20-5-13/23

AUTHORS: Segalova, Ye. Ye., Sarkisyan, R R, Rebinder P. A.

TITLE: The Effect of Hydrophilic Plasticizer Additions on the Kinetics of Structure Formation in Cement Hardening (Vliyaniye dobavok gidrofil'nogo plastifikatora na kinetiku strukturoobrazovaniya pri tverdenii tsementa)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 5, pp 611-619 (USSR)

ABSTRACT: The influence of hydrophilic organic surface-active substances of the sulfite-alcohol slops type on the properties of cement, concrete, etc. is investigated. A Portland cement suspension passes three phases during mixing: 1) The appearance of a coagulation structure of the cement particles. 2) The appearance of a complex loose crystallization structure of hydro-aluminate. 3) The appearance of a coagulation structure of the initial cement particles and the newly formed micro-crystals. Figure 1 shows the increase in the plastic stability at various intervals of mixing in the presence of sulfite-alcohol slops SSB. The stability decreases due to a prolongation of the induction period of structure formation, then it increases rapidly due to the formation of a hydro-aluminate crystallization structure. Figure 2 shows that the plastic stability increases with the quantity of SSB added. The greatest plasticizing effect is

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The Effect of Hydrophilic Plasticizer Additions on the Kinetics of Structure Formation in Cement Hardening

obtained in phase 1 during mixing (Figure 3). Figure 4 shows the water-cement ratios necessary for the production of an equally plastic cement in the presence of SSB. The greatest plasticizing effect, i.e. the greatest decrease of the water-cement ratio is observed in phase 1 of the mixing. This minimal water-cement ratio does not depend on the mineralogical composition of the cement. The duration of phase 1 with various additions of SSB is given in Table 2 for the two cement types ARM and KMS. Various specimens of cement with different additions of SSB were tested for resistance after 3, 28, and 90 days. The results are given in Figures 5 and 6. The resistance curves for cement with preliminary hydration (Figure 6) show a drop which begins at an earlier stage than in the curves of phase 1 (Figure 5). The final resistance of cement prepared by SSB is always lower than without SSB, if the water-cement ratio is constant (Figure 7). If the initial plasticity is the same (Figure 8), the resistance of the cement is increased in the presence of

SOV-69-20-5-13/23

The Effect of Hydrophilic Plasticizer Additions on the Kinetics of Structure Formation in Cement Hardening

SSB. There are 3 tables, 10 graphs, and 4 Soviet references.

ASSOCIATION: Moskovskiy universitet, Khimicheskiy fakul'tet, Kafedra kolloidnoy khimii (Moscow University, Dept. of Chemistry, Chair of Colloidal Chemistry)

SUBMITTED: April 18, 1958

1. Coment--Hardening 2. Cement--Chemical reactions
3. Alcohols--Chemical reactions 4. Sulfides--Chemcial reactions

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AUTHORS: Shchukin, Ye.D., Rebinder, P.A. SOV-69-20-5-18/23

TITLE: The Formation of New Surfaces During the Deformation and Rupture of a Solid in a Surface Active Medium (Obrazovaniye novykh poverkhnostey pri deformirovanii i razrushenii tverdogo tela v poverkhnostno-aktivnoy srede)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 5, pp 645-654 (USSR)

ABSTRACT: The adsorption of surface-active substances by a solid body which is being deformed, may influence its deformation and resistance properties. This is true for the deformation of monocrystals of tin, zinc, and other metals in solutions of non-polar vaseline oil. In comparison to the free surface energy of these monocrystals (500-1,000 erg/cm^2), the reduction amounts to only some tens of erg/cm^2. This effect is explained by the movement of dislocations and their interaction with the surface energy. The dislocation is a thermodynamically unstable defect. It is attracted to the surface and the attraction force is reversely proportional to the distance from the surface. Brittleness and a decrease in resistance may be observed in monocrystals of metals in the presence of a covering of a low-melting metal, like tin or mercury. The decrease of the free surface energy on the border between the metal and its saturated solution is con-

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The Formation of New Surfaces During the Deformation and Rupture of A Solid in a Surface Active Medium

siderable. It amounts to hundreds of erg/cm^2. The actual rupture stresses on the cleavage planes are lower than the calculated values. This is due to micro-cracks in the crystal. The change in deformation and resistance properties under the influence of adsorption is also observed in glass. It has been established that the presence of water vapor reduces the rupture stress of glass fibers. Under the influence of adsorption, the free surface energy of a solid body may be reduced to some tenths of erg/cm^2. In such a case, a spontaneous dispersion of the body into particles of colloidal size with 10^{-6} cm in diameter takes place. There are 2 sets of graphs and 28 references, 19 of which are Soviet, 7 English, and 2 German.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Otdel dispersnykh sistem, Moskva (Institute of Physical Chemistry of the USSR Academy of Sciences, Department of Dispersed Systems, Moscow)

SUBMITTED: June 16, 1958

1. Single crystals--Deformation 2. Metal crystals--Properties

SOV-69-20-5-19/23

AUTHORS: Bartenev, G.M., Yudina, I.V., Rebinder, P.A.

TITLE: A Contribution to the Theory of the Spontaneous Dispersion of Solid Bodies (K teorii samoproizvol'nogo dispergirovaniya tverdykh tel)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 5, pp 655-664 (USSR)

ABSTRACT: The cause for the resistance decrease of a solid in a surface-active medium is the reduction of surface energy on the border solid-medium. Media which are similar in their molecular nature decrease the surface tension of the solid and rupture takes place. For metals, such media are low-melting metals and alloys. Spontaneous dispersion takes place along wakened borders, whereas destruction from outside moves along the plane of greatest stress. The growth of cracks proceeds with increasing speed under outside stress. In spontaneous dispersion, the speed is more uniform, although low. In Figure 2 the left minimum of potential energy corresponds to the stable condition of the particles in the body, the right minimum to the stable condition on the new free surface. In every crystal, there are surface defects and micro-cracks which appear during the growth of the crystal. During spontaneous dispersion the active me-

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REBINDER P.A.

AUTHOR: Taubman, A.B. SOV-69-20-5-23/23

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

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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; N.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. Shel'dko, 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

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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

Card 3/4 the kinetic wetting in the process of collecting dust by use

The Fourth All-Union Conference on Colloidal Chemistry

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

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5(4)

AUTHORS: Segalova, Ye. Ye., Kontorovich, S. I., SOV/20-123-3-36/54
Rebinder, P. A., Academician

TITLE: The Characteristic Features of the Kinetics of Supersaturation in Aqueous Suspensions of Calcium Oxide (Osobennosti kinetiki peresyshcheniya v vodnykh suspenziyakh okisi kal'tsiya)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 3, pp 509-512 (USSR)

ABSTRACT: The authors investigate the above-mentioned kinetics in order to find the characteristic features of its hydration hardening and the nature of the supersaturations in these suspensions. The above-mentioned kinetics were determined conductometrically in a special vessel with blackened platinum electrodes, a stirrer, and a thermometer. The experiments were carried out in a nitrogen atmosphere at a temperature of 21.6 ± 0.05°. A diagram shows the variation of the electric conductivity (concentration) of an aqueous suspension of CaO as a function of the rate of intermixing of the suspension. According to this diagram, the rate of intermixing has an influence not only on the rate of obtaining the maximum value of the electric conductivity, but also on its

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absolute value. Even at an angular velocity of 1600 revolutions p/m of the mixer, no steady supersaturation was observed. The natural way of detecting the stable level of supersaturation is by introduction of surface-active substances into the aqueous suspensions of CaO. These admixtures practically do not change the solubility and can stabilize the generated nuclei and prevent their growth. In this way, the supersaturation in the liquid phase of the suspension is decreased. The authors introduced admixtures of sulfite-alcohol vinasse (barda) and glucose. By the addition of surface-active admixtures into aqueous suspensions of CaO, their electric conductivity sharply increases. A stable level of supersaturation is obtained by introduction of a sufficient quantity of admixtures. Moreover, it was necessary to investigate the dependence of the obtained maximum supersaturations on the batch of CaO. The greatest increase in temperature (0.5°) was observed only after the introduction of the first batch of CaO. The increase in temperature caused by the introduction of the following batches decreases the number of the introduced batches. The introduction of CaO into the solution of the surface-active substance sharply increases the electric conductivity which then remains constant for some

minutes. The fact that the maximum value of electric conductivity is independent of the batch of CaO shows that there is a constant level of supersaturation which can be considered as the relative dissolubility of calcium oxide. The dissolution of CaO proceeds until the maximum supersaturation is attained. A further dissolution proceeds only if the hydrate of calcium oxide crystallizes out from the solution. The concentration of solutions which contain colloid particles can be determined potentiometrically by means of a hydrogen electrode. There are 3 figures, 1 table, and 12 references, 9 of which are Soviet.

ASSOCIATION: Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Colloid Chemistry of Moscow State University imeni M. V. Lomonosov) Otdel dispersnykh sistem Instituta fizicheskoy khimii Akademii nauk SSSR (Branch of Dispersed Systems of the Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: July 18, 1958

SOV/20-123-4-24/53

18(7)
AUTHORS: Yepifanov, G. I., Glagolev, N. I., Rebinder, P. A., Academician

TITLE: The Influence of Surface-active Media on the Surface-Hardening of Metals (Vliyaniye poverkhnostno-aktivnykh sred na poverknostnyy naklep metallov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 4, pp 663-666 (USSR)

ABSTRACT: When investigating the hardening of metals it is necessary to distinguish between true and effective hardening. The true hardening of the slipping surfaces means increase of the shearing strength along a given surface with growing absolute shearing. The effective strengthening of a single grain as a single crystal characterizes the increase of the resistance of the metal to plastic deformation with increasing deformation and is expressed by the effective hardening coefficient $\lambda = d\tau/da$, where a denotes the specific crystallographic displacement in the grain. For the true hardening coefficient k it holds that $k = d\tau/ds$, where τ denotes extreme tangential tension and s - the absolute shear. Between k and λ the connection $\lambda = hk$ holds , where h denotes

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the average density of the slipping layers. The effective coefficient of hardening thus depends not only on the true strengthening capacity of the slipping surfaces but also on the degree of dispersion of the crystal during deformation. The present paper describes the results obtained by the complex investigation of the kinetics of the formation of the hardened layer in the surface hardening of technically pure iron in air and in some active media. In this connection, the influence exercised by some given effects produced by the hardening instrument (small roll) upon the microhardness of the sample surface, the frictional force, the structure of the hardened surface of the sample, the specific work of hardening, and the temperature at the place of contact between roll and sample, are investigated. These investigations were carried out by the method developed by T. Yu. Lyubimova (Ref 3) in an improved form. A diagram shows, by way of an example, the results obtained by experiments carried out in air and in a 0.2% solution of stearic acid in Decalin. The microhardness H increases with an increase of the number of hardening actions: this increase is irregular and passes

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through several maxima. A very characteristic quantity is the differential work of the plastic pressing-in of a hole ($a = dA/dV$). This quantity conveys an idea of the degree of resistance offered by the sample to growing plastic deformation. Surface-active media exercise a dual influence upon the process of metal surface hardening: As a result of the reduction of strength due to adsorption, they facilitate the development of plastic deformation during the first stages of hardening and they cause an intense strengthening of the surface layer during the following stages of hardening. The strengthening and plasticizing effect produced by surface-actice media is able to influence the process of metal cold-working considerably. In the cutting of metals the strengthening and plasticizing effects of these metals usually lead to to the same result, viz. to a reduction of the degree of volume-deformation of the cuttings and of the surface layer of the workpiece. There are 3 figures and 3 Soviet references.

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SOV/20-123-6-30/50

5(4)

AUTHORS: Pertsov, N. V., Rebinder, P. A., Academician

TITLE: On the Surface Activity of Liquid Metallic Coatings and Their Influence on the Strength of Metals (O poverkhnostnoy aktivnosti zhidkikh metallicheskikh pokrytiy i ikh vliyanii na prochnost' metallov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 6, pp 1068 - 1070 (USSR)

ABSTRACT: One and the same coating of easily fusible metals diminishes the strength of some metals but exercises no influence on other metals. On the other hand, also the behavior of one and the same metal depends on the chemical nature of the metallic coating. The decrease in strength can by no means be ascribed to the dissolving effect of the molten coating, nor need it be connected with the selective effect on the grain boundaries. Experimental data on the influence exercised by easily fusible metal coatings upon the mechanical properties of metals are divided into two distinctly separated groups: 1) The strength of the investigated metal is considerably reduced. 2) There

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is no such reduction of strength. A comparison of these data with the diagrams for the fusibility of the corresponding binary systems metal-coating shows that to the decrease of the strength of a solid metal under the influence of a liquid coating there always corresponds the existence of a sufficiently narrow but absolutely finite domain of the formation of a solid solution. Corresponding to the complete lack of strength reduction, there corresponds, in this diagram, a wide range to which there corresponds the formation of a solid solution of the metal coating in the investigated metal. Seen from this point of view, the results obtained appear to be trivial. If, however, the range characterizing the production of the solid solution is so narrow that also the system metal coating is outside this range, the deformation of the metal takes place in the presence of the liquid phase of the coating. The reduction of the strength of the solid body (of the metal) may be explained by the absorptive effect of the molten metal coating. In polymolecular transition layers to the film of

the liquid phase on the surface the work of formation on the discontinuity surfaces decreases with an increase of reciprocal fusibility. There are 1 figure, 1 table, and 8 references, 7 of which are Soviet.

ASSOCIATION: Kafedra khimii Moskovskogo stankostroitel'nogo instituta (Chair of Chemistry of the Moscow Machine Tool Institute) Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Colloid Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 16, 1958

PHASE I BOOK EXPLOITATION SOV/3604

Akademiya nauk SSSR. Institut mashinovedeniya

Povysheniye effektivnosti tormoznykh ustroystv. Svoystva friktsionnykh materialov (Increasing the Efficiency of Braking Devices. Properties of Friction Materials) Moscow, Izd-vo AN SSSR, 1959. 183 p. Errata slip inserted. 1,800 copies printed.

Resp. Ed.: V.S. Shchedrov, Doctor of Technical Sciences, Professor; Ed. of Publishing House: P.N. Belyanin; Tech. Ed.: T.V. Polyakova.

PURPOSE: This collection of articles is intended for engineers and scientific workers specializing in brakes and friction materials.

COVERAGE: The first group of articles deals with basic design measures for increasing the life and efficiency of brakes, the second group with problems related to the development and fields of application of new friction materials, the third group with testing methods and the results of investigations of friction

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pairs and brakes, and the fourth group with the design of brakes and calculation data. No personalities are mentioned. References accompany most of the articles.

TABLE OF CONTENTS:

LYSIKHINA, Aleksandra Ivanovna, starshiy nauchnyy sotrudnik; REBINDER, P.A., akademik; retsenzent; SERB-SERBINA, N.N., kand.khim. nauk, starshiy nauchnyy sotrudnik, retsenzent; KHOTUNTSEV, L.L., kand.tekhn.nauk, starshiy nauchnyy sotrudnik, red.; ZUBKOVA, M.S., red.izd-va; DONSKAYA, G.D., tekhn.red.

[Surface activating additives for increasing water-resisting properties of pavements made with bitumens and tars] Poverkhnostnoaktivnye dobavki dlia povysheniia vodoustoichivosti dorozhnykh pokrytii s primeneniem bitumov i degtei. Moskva, Nauchno-tekhn.izd-vo M-va avtomobil'nogo transp. i shosseinykh dorog RSFSR, 1959. 232 p. (MIRA 13:2)
(Pavements, Bituminous)

REBINDER, P.A.

PHASE I BOOK EXPLOITATION SOV/3559

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. 5 (Investigations of Heat-Resistant Alloys, Vol 5) Moscow, Izd-vo AN SSSR, 1959. 425 p. Errata slip inserted. 2,000 copies printed.

Ed. of Publishing House: V.A. Klimov; Tech. Ed.: I.F. Kuz'min; Editorial Board: I.P. Bardin, Academician, G.V. Kurdyumov, Academician, N.V. Ageyev, Corresponding Member, USSR Academy of Sciences (Resp. Ed.), I.A. Oding, I.M. Pavlov, and I.F. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgical engineers, research workers in metallurgy, and may also be of interest to students of advanced courses in metallurgy.

COVERAGE: This book, consisting of a number of papers, deals with the properties of heat-resisting metals and alloys. Each of the papers is devoted to the study of the factors which affect the properties and behavior of metals. The effects of various elements such as Cr, Mo, and W on the heat-resisting properties of various alloys are studied. Deformability and workability of certain metals as related to the thermal conditions are the object of another study described. The problems of hydrogen embrittlement, diffusion and the deposition of ceramic coatings on metal surfaces by means of electrophoresis are examined. One paper describes the apparatus and methods used for growing monocrystals of metals. Boron-base metals are critically examined and evaluated. Results are given of studies of interatomic bonds and the behavior of atoms in metal. Tests of turbine and compressor blades are described. No personalities are mentioned. References accompany most of the articles.

AVAILABLE: Library of Congress

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REBINDER, P. A., ZHIGACH, K. F., [illegible]RB-GORBINA, N. N., ALTI, I. B.,
MUKHIN, L. K., [illegible], F. F., MENISHEV, V. N., LISTER, [illegible]. G. (SECTION III)

"Physico-Chemical and Technological Investigations of Mud Fluids Used for Drilling Wells."

Report submitted at the Fifth World Petroleum Congress, 30 May - 5 June 1959. New York.

REBINDER, P. A.

"Basic Problems of Physico-chemical Mechanics of Disperse and High-Molecular Structures."

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)

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 khimicheskikh nauk Akademii nauk SSSR (Section of Chemical Sciences, Academy of Sciences, USSR), in common with the Akademiya nauk

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Gruzinskoy SSR (Academy of Science, Gruzinskaya SSR). The research work by M. Ye. Shishniashvili in the field of suspensions of betonite clay-types, as well as agrocolloids - new organomineral preparations to increase soil fertility - is mentioned. G. V. Tsitsishvili reported on adsorptive properties of natural and activated aluminum-silicate adsorptives, in connection with their structure and their use as catalysts. Ye. M. Nanobashvili spoke about radiation colloid chemistry. The Conference was attended by about 400 representatives of nearly all the centers for colloid-chemical research at schools, universities, and industrial enterprises of the country, as well as by representatives from Bulgaria (R. Kaishev, A. Sheludko), the German Democratic Republic (P. Tissen, G. Linde), Poland (A. Waksmundzki), and Czechoslovakia (K. Spurný). About 160 reports were discussed. The resolutions of the 2. Vsesoyuznoye soveshchaniye stroiteley v Kremle (2nd All-Union Conference of Building Experts in the Kremlin), which was dedicated to the development of the building material industry, were of great importance to the work of the Conference. The author of this article reported on modern problems of colloid chemistry.

Further, the following talks were given:
V. A. Kargin determined an analogy between the properties of colloid solutions and polymeric solutions.
B. V. Deryagin reflected on the importance of surface forces in the kinetics of dispersion systems.
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,

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.
V. I. Likhtman reported on the appearance of adsorptive plastification of lead and tin at normal temperatures.
L. A. Kozarovitskiy 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.
V. A. Kargin, Z. Ya. Berestneva described the synthesis of aluminum-silicon jelly of crystalline structure.
V. N. Tsvetkov et al. examined the optical properties of macromolecular solutions and their structural peculiarities.
B. A. Dogadkin and collaborators reported on questions of compatibility of polymers and their solutions.
V. A. Kargin, P. I. Zubov and collaborators discussed the process of gelatin formation and its role in sticking processes.
S. M. Lipatov, S. I. Meyerson referred to the coincidental results of thermochemical and dilatometrical examination methods of the transition of gelatine jelly into a liquid

solution at a rise in temperature.
A. I. Yurzhenko and collaborators (L'vov), P. M. Khomikovskiy reported on the clarification of polymerization processes in the state of dispersion.
B. Ya. Yampol'skiy, Wu Shu-ch'iu, S. S. Voyutskiy, A. P. Pisarenko and collaborators examined the process of the influence of active fillers on the processes of structural formation of polymers.
A. V. Dumanskiy with his school, A. A. Trapeznikov, G. V. Vinogradov and collaborators examined the properties of soap solutions in connection with their structural peculiarities and the theory of consistent lubricants.
The reports on questions of dispersion systems in polymers showed the utility of a combination of problems of colloid chemistry and the physical chemistry of polymers. The results of the Conference indicate that, besides limited consultations on individual scientific problems, comprehensive congresses are also useful and necessary, uniting the investigators and comprising the results of achievements in wide fields of science. There is 1 Soviet reference.

15(0) SOV/29-59-3-7/23

AUTHOR: Rebinder, P. A., Academician

TITLE: On the Threshold of Three Sciences (Na styke trekh nauk)

PERIODICAL: Tekhnika molodezhi, 1959, Nr 3, p 13 (USSR)

ABSTRACT: The author of this article, Academician Petr Aleksandrovich Rebinder, has dedicated many years of his life to research work in the field of physical and colloid chemistry. His principal works deal with the investigation of surface layers on the boundary surface between solids and liquids. Rebinder and his co-operators opened a new neighboring field of science, named physico-chemical mechanics. The new science makes it possible to give desired properties to substances produced on the basis of polymers. In this article Rebinder writes that the near future is unthinkable without new technical methods and new materials. A large number of technical fields requires substances with definite properties, such as space travelling, building trade, aircraft construction, ship-building, the motor-vehicle and machine-building industry, etc. This indicates that metals will lose their leading position as construction material, which does not mean, however, that they will be superfluous. They will

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in many articles that people who have lost their way cannot go straight on but move always in circles. That seems mysterious to me. Answer: This phenomenon is not only observed in man. It was found that blindfold dogs also move in circles and the same holds for infusoria. That is, however, nothing mysterious as it results from the geometrical asymmetry of the body and the irregular development of muscles. 3) R. Raspilov, Veselinovo,Nikolayevskaya oblast', asks: How is a looping calculated? Answer: The circus performance called looping is based on a known mechanical law. The motorcycle or the car are pressed against the wall by the centrifugal force, which is caused by the motion of a body on a curved line at a certain minimum speed. The quantity of centrifugal force is computed by the formula $F = \frac{mV^2}{R}$.

KOCHANOVA, L.A.; LIKHTMAN, V.I.; REBINDER, P.A.

Effect of fusible metal melts on the mechanical properties of single crystals of higher melting metals. Biul. Inst. metaloker. i spets. splav. AN URSR. no. 4:72-78 '59.
(MIRA 13:11)

(Metal crystals--Thermal properties)

REBINDER, P., akademik

Promising branch of science. Izobr.i rats. no.7:3-5
Jl '59. (MIRA 12:11)
(Technology)

SOV/126-8-2-19/26

AUTHORS: Kochanova, L.A., Likhtman, V.I. and Rebinder, P.A.

TITLE: Influence of Low Melting-point Fused Metal on the Mechanical Properties of Monocrystals of Higher Melting-point Metals

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 2, pp 288 - 293 (USSR)

ABSTRACT: Single crystals of zinc (99.99%) and cadmium (99.99%) were used in fused tin and lead. Samples were deformed at 10-15% per minute with a temperature constant to ± 5 °C. The metallic medium (Sn or Pb) was deposited on the sample electrolytically (thickness 5 μ), which was then placed in a tube with powdered graphite to prevent oxidation. Figure 1 shows true stress-strain diagrams for pure zinc and zinc with a coating of tin. At room temperature the influence of tin is small but at higher temperatures tin causes a decrease in strength and plasticity. The relation between temperature and magnitude of the effect of tin is shown in Figure 2. The sharp increase in effect at 300 - 400 °C is connected with an increase in solubility of zinc in tin. The

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Influence of Low Melting-point Fused Metal on the Mechanical Properties of Monocrystals of Higher Melting-point Metals

character of the fracture also changes from plastic in air to brittle in tin. Lead-tin mixtures were also used. The effect of pure lead is very slight but with increase of tin content in the lead up to 20%, there is a sharp decrease in strength and plasticity of zinc (Figure 3). With further increase of tin content, the effect is much slighter. It was shown that if zinc coated with tin is held in lead at 400 °C for long priods, the strength of the zinc recovers (Figure 4). This shows the absence of any marked diffusion of tin in zinc. A decrease in plasticity and strength of cadmium in tin was also found (Figures 5,6). The results on single crystals show that the decrease in strength is not connected with any grain-boundary effect.

There are 6 figures and 21 references, of which 12 are English and 9 Soviet.

SOV/126-8-2-19/26

Influence of Low Melting-point Fused Metal on the Mechanical Properties of Monocrystals of Higher Melting-point Metals

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry of the Ac.Sc., USSR)

SUBMITTED: October 15, 1957

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5(4) SOV/69-21-4-12/22

AUTHOR: Logginov, G.I., Rebinder.P.A. and Abrosenkova, V.F.

TITLE: The Interaction at Ordinary Temperatures of Calcium Hydroxide With Sand of Various Degrees of Dispersity

PERIODICAL: Kolloidnyy zhurnal, 1959, Vol XXI, Nr 4, pp 442-448 (USSR)

ABSTRACT: This is a study of the interaction of calcium hydroxide with sand in aqueous solution. The experiments were carried out with the aid of isotope Ca^{45}, used in the form of $Ca^{*}(OH)_2$. The binding kinetics of the lime were studied with the chemical methods employed for the determination of free CaO. Object of the investigation was sand (quartz sand) of the Vol'sk deposit of different dispersity (specific surface S_1). The dispersity varied from S_1=0.11 m^2/g (natural state) to S_1 values equal to 0.62; 0.95; 2.6 and 5.4 m^2/g(finely ground). The experiments, which continued for 6 months, were carried out at a temperature of $17^{\circ} \pm 1^{\circ}$ C. Figure 1 (graph) illustrates the binding kinetics of calcium ions from a saturated $Ca(OH)_2$ solution with sand of the above-mentioned S_1 values. The

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curves show that independently of the dispersity of the sand, the binding process always consists of two stages: 1) chemisorption, which ends within one hour after the start of the interaction, and 2) a very long period of chemical binding of CaO at constant rates. The second process, evidently, is connected with the formation of calcium hydrosilicate, the latter being a new phase crystallized from the gradually formed supersaturated solution. According to K.G. Krasil'nikov, this process will finally result in the full binding of CaO in the hydrosilicate, which corresponds to a final concentration of $\sim$0.006 g/l, i.e. to a hydrolytic equilibrium of the calcium silicate in the solution. In the case of concentrated suspensions, this process results in the development of a solid crystalline hydrosilicate structure [reference 11], as is shown by the authors' experiments with small solid blocks of lime-sand binder. The specific surface of finely ground sand was determined on the basis of adsorption at low temperature. The medium values for

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each dispersity served for the calculation of the space occupied by a CaO molecule (table 1). The medium value (So) of this space was found to be 10.2 Å. On the basis of the medium value S_0, and the value of CaO sorption, the authors also calculated the values S_1 of coarsely-dispersed sand, which cannot be determined on the basis of nitrogen adsorption. Both methods, i.e. the method of investigating the CaO binding process with the aid of isotope Ca^{45} and the method of determining the active specific surface of sand through chemisorption of the same isotope, permit determination of the surface of sands of any dispersity. Low-temperature adsorption of nitrogen serves only for the determination of the surface of highly-dispersed sands ($> 1\ m^2/g$). The remaining part of the study can be summarized as follows. The dependence of the rate of CaO binding on the dispersity of sand is subject to the equation of the semicubical parabola (figure 2). The hardening of lime-silica binders

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can be intensified (by 50%) by activation processes, i.e. by passing the limesilica binder through a vibromill. The discovery of the mechanism of CaO binding opens new technological possibilities to increase the strength of limesilica products by adding substances, which increase the rate of dissolving of silica in water. In addition to the above-mentioned scientist, the authors mention D.S.Sominskiy and G.S. Khodakov. There are 4 tables, 3 graphs and 16 references, 14 of which are Soviet and 2 English.

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

SUBMITTED: 15 November, 1958

SOV/20-124-4-41/67

5(4), 24(2)

AUTHORS: Segalova, Ye. Ye., Tulovskaya, Z. D., Amelina, Ye. A., Rebinder, P. A., Academician

TITLE: Causes of the Loss ofStrength of the Monocalcium Aluminate Crystal Structure Formed at High Temperature (O prichinakh snizheniya prochnosti kristallizatsionnoy struktury monokal'tsiyevogo alyuminata, obrazuyushcheysya pri povyshennoy temperature)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 4, pp 876-879 (USSR)

ABSTRACT: A short report is first given on the present stage of the problem and on earlier papers dealing with this subject. The formation of a crystallization structure of reduced strength and higher temperature is not due to the formation of another compound, but to a modification of the conditions of the crystallizing-out of the hydrate forming these compounds. The authors investigated the kinetics of oversaturations by employing the conductometric method at an optimum rate of mixing (400 rpm). In order to prevent carbonization of suspensions, all measurements were carried out in a nitrogen atmosphere. In all sufficiently concentrated suspensions

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Causes of the Loss of Strength of the Monocalcium Aluminate Crystal Structure Formed at High Temperatures

a constant level of electric conductivity is established, which corresponds to the maximum oversaturation or to the conditioned solubility of CA (an abbreviation used by the authors for $CaO.Al_2O_3$). In suspensions of CA a constant level of oversaturation is more quickly attained than in tricalcium-aluminate suspensions, but it is still attained much more slowly than in suspensions of semi-aqueous gypsum. The rate at which maximum oversaturation is attained increases considerably with an increase of the concentration of the suspensions. The existence of stable oversaturations which are independent of the concentration of the suspension is also indicated by the results obtained by the quantitative determination of the concentrations of CaO and Al_2O_3 of the liquid phase of the suspension, provided that electric conductivity in this liquid phase has attained its maximum value. The samples used for analysis were chosen from the same suspension in which electric conductivity had been measured. The results obtained by analyses made it possible not only to determine the existence of stable oversaturations in the CA-suspensions, but also to characterize them quanti-

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tatively. According to the results obtained by the present paper CA is congruently solved: A concentration ratio of CaO and Al_2O_3 in the liquid phase of the suspension is equal to 1, which corresponds to their ratio in the arid compound. At the same time, the solubility of the hydrate 2 $CaO.Al_2O_3$. . aqu ($C_2A.aqu$) was determined, which was produced by the hydration of CA at 20°. It amounted to 0.49 g C_2A per 1 l of the solution, which is in good agreement with the data found in publications (Ref 8). The concentration ratio of CaO and Al_2O_3 corresponds to the dicalcium aluminate ($CaO/Al_2O_3 = 2$). The authors carried out similar experiments also at 60°. The curves for the variation of electric conductivity also have a distinct maximum, which increases considerably with an increase in concentration of the suspension, and which becomes noticeable already after a shorter time. In order to be able to determine the amount of stable over-

Causes of the Loss of Strength of the Monocalcium Aluminate Crystal Structure Formed at High Temperature

saturation , it is necessary considerably to reduce the rate at which CA is dissolved, without hereby varying the experimental temperature. For this purpose a surface-active substance was added to the suspension, viz. sulfite-alcohol-draff. Also at 60° stable oversaturations occur by the hydration of CA. The maximum value of concentrations does not depend on the concentration of the suspensions, but it is attained more quickly at higher concentrations. There are 3 figures, 1 table, and 11 references, 8 of which are Soviet.

ASSOCIATION: Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova
(Chair for Colloid-Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 15, 1958

5(4)

AUTHORS: Belugina, G. V., Zakiyeva, S. Kh., SOV/20-126-2-25/64
Rebinder, P. A., Academician, Taubman, A. B.

TITLE: On the Stability and Viscosity of Concentrated Suspensions in the Oleogels of Metallic Soaps (Ob ustoychivosti i vyazkosti kontsentrirovannykh suspenziy v oleogelyakh metallicheskikh myl)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 2, pp 318-321 (USSR)

ABSTRACT: In the course of the investigations discussed in the present paper the aluminum soaps of naphthenic acids were used as structure-forming additions. They form oleogels with peculiar structurally mechanical properties. These properties of oleogels depend on the molecular nature of the dispersive medium and may be regulated by variation of these factors. In this connection, the authors investigated the time-dependence of the viscosity of the gels of aluminum naphthenate in hydrocarbon media and in concentrated suspensions which are built up on the basis of such hydrocarbon media. Ordinary technical surface-hardened oxidized aluminum powder with particles of aluminum powder from 6 to 13 μ served

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On the Stability and Viscosity of Concentrated Suspensions in the Oleogels of Metallic Soaps

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as dispersive phase. The dispersion medium used was the purified basic paraffin-naphthene fraction of the fuel T - 1. The production of the aluminum soaps used for structure-formation is briefly described. A diagram shows the typical curves $\lg\eta - \tau$ for a 2% aluminum-naphthenate-gel. Here η denotes viscosity and τ - time. The introduction of a solid phase increases initial viscosity considerably, but without changing the character of its aging. Analogous curves of aging are given for 2%- and 4%-gels of an aluminum-naphthenate of other composition. If benzene is substituted for the paraffin-naphthene fraction, the initial viscosity of the gel is reduced, but the viscosity of the gel in the suspension undergoes practically no change for the duration of one month. The decrease of viscosity in the oleogels of the aluminum-naphthenate and in the corresponding suspensions is probably a consequence of the latent formation of aggregates. There are 2 figures, 1 table, and 10 references, 9 of which are Soviet.

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On the Stability and Viscosity of Concentrated Suspensions in the Oleogels of Metallic Soaps

SOV/20-126-2-25/64

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

SUBMITTED: February 26, 1959

Card 3/3

AUTHORS: Goryunov, Yu. V., Pertsov, N. V., SOV/20-127-4-19/60
Rebinder, P. A., Academician

TITLE: Reduction of Strength by Adsorption and Brittle Failure of Zinc and Cadmium Single Crystals

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 4, pp 784-787 (USSR)

ABSTRACT: The authors had already ascertained (Refs 1-3) that also highly plastic bodies can be destroyed under the influence of highly adsorbent metals; the metals form fine liquid inclusions in the plastic body. In the present paper, this process is investigated by means of Zn- and Cd-single crystals; gallium was used for the formation of inclusions. The gallium was precipitated on the crystals as a thin film so that a solution of the gallium in the crystals was impossible under the existing concentration conditions. The destruction of the single crystals was investigated at various initial orientations of the glide planes. The crystals were stretched at a constant elongation rate. The crystals treated with gallium were subjected to this process and showed a reduction in density, and were destroyed in all

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orientations investigated, thus forming basal glide planes. Figures 1 and 2 show the results of the investigations. The Zonke's law of the constancy of the normal stress at a fracture was not observed. Likhtman, Kochancva, and Bryukhanova had already pointed out this fact (Ref 5). The law of Likhtman and Shchukin (Ref 6) was observed, which assumes the constancy of the derivation of the normal and shearing stress. The effect of the gallium is based on its high surface activity. A mechanism of the formation of inclusions is indicated. There are 3 figures and 7 Soviet references.

ASSOCIATION: Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Colloid Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 23, 1959

5(4) SOV/20-127-5-38/58

AUTHORS: Khodakov, G. S., Rebinder, P. A., Academician

TITLE: The Investigation of the Fine Dispersion of Quartz and of the Influence of Added Liquids Upon This Process

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 5, pp 1070-1073 (USSR)

ABSTRACT: The effect produced by acetone, ethyl alcohol, water, benzene, triethanolamine and oleic acid upon the dispersion of quartz sand was investigated. Crushing was carried out in a laboratory vibration mill, and determination of the degree of dispersion by measuring the specific surface by means of adsorption of nitrogen at low temperatures according to reference 14. Figures 1-4 and tables 1 and 2 show the experimental results. The addition of liquids causes a considerable increase of the specific surface in comparison to dry-grinding. The effect produced by the individual liquids is about equal. This result is explained by the fact that, in the case of dry grinding, relatively solid particle complexes are produced, the tight packing of which prevents nitrogen from penetrating, so that a large part of the free surface is eliminated. Additions of liquids cause a considerable extent of desaggregation. As

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The Investigation of the Fine Dispersion of Quartz and of the Influence of Added Liquids Upon This Process

shown by figure 3, desaggregation depends upon the quantity of the liquid added. In water, a minimum occurs at an addition of 2-30%, which is followed, as a result of further additions, by a rapid increase of desaggregation. As shown by experiments, the described phenomena are confined not only to quartz alone, but in a different degree characteristic also of other solid substances, such as corundum, and calcite. There are 4 figures, 2 tables, and 19 references, 14 of which are Soviet.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut tonkogo izmel'cheniya Akademii stroitel'stva i arkhitektury SSSR (All-Union Scientific Research Institute for Fine Grinding of the Academy of Building and Architecture, USSR). Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: May 22, 1959

24(2), 18(6) SOV/20-128-2-13/59

AUTHORS: Goryunov, Yu. V., Pertsov, N. V., Shchukin, Ye. D., Rebinder, P. A., Academician

TITLE: Variation in the Structural and Mechanical Properties of the Single Crystals of Tin Under the Influence of a Strongly Adsorptionactive Medium

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 2, pp 269 - 272 (USSR)

ABSTRACT: This article deals with the influence exercised by a thin liquid gallium film upon the mechanical and structural properties of the single crystals of tin and upon their electrical conductivity. Differently oriented single crystals of tin (degree of purity 99.999 %, diameter 0.5 - 1 mm, length 10-25 mm) were bred by the method of zone crystallization. The liquid metallic gallium was mechanically applied to the surface of the samples in a quantity of from tenths of a milligram to 5-10 mg. As in the case of Zn-Hg and other pairs mentioned already earlier, plasticity and strength of the single crystals of tin decrease abruptly as soon as the gallium has been applied to the sample surface. However, they decrease even

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more in the course of time. After a few days, the sample is pulverized by the pressure of a finger-nail. A diagram illustrates the results obtained by measurement of the true tensions of the break resulting from an elongation of the gallium-coated single crystals of tin at a constant velocity of ~20% min^{-1} as a function of the period of time passed since the coating of the samples with gallium. The extreme relative prolongations increased by 30% (as a maximum value) immediately after the samples had been coated with gallium. This percentage dropped to some per cent after the samples had been exposed to room temperature for 24 hours, and after some days it was only very small. The strength of single crystals coated with gallium amounts to 1.5 kg/mm^2 approximately immediately after the coating, and drops to 50 g/mm^2 after 7-10 days. X-ray pictures taken before and after the coating showed that after the coating the single crystal gradually decomposes into distinctly disoriented blocks. After some days the initial stains on the X-ray picture vanish almost completely, and the picture resembles that of a polycrystalline metal. At a sufficient quantity of gallium and sufficiently long action of the

latter on the single crystal of tin, this phenomenon extends throughout the entire crystal volume. In the case of samples oriented in such a manner that their original resistance is only small (i.e. at large angles $\lambda_{[001]}$ between the tetragonal axis and the sample axis), resistance increases in the course of time, while it gradually drops after the coating of samples with high original resistance (if the tetragonal axis is near the sample axis). Gallium (or gallium saturated with tin) is a strong adsorbent for tin. During elongation in liquid nitrogen the strength of samples coated with gallium really increases as compared to single crystals without coating. The authors thank Professor V. I. Likhtman, who contributed to a discussion of the results of this article. There are 4 figures, 2 tables, and 27 references, 26 of which are Soviet.

Variation in the Structural and Mechanical Properties of the Single Crystals of Tin Under the Influence of a Strongly Adsorption-active Medium SOV/20-128-2-13/59

ASSOCIATION: Otdel dispersnykh sistem Instituta fizicheskoy khimii Akademii nauk SSSR (Institute for Disperse Systems of the Institute of Physical Chemistry of the Academy of Sciences, USSR)Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Colloid Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 5, 1959

Card 4/4

5(4) SOV/20-129-6-40/69

AUTHORS: Segalova, Ye. Ye., Kontorovich, S. I., Rebinder, P. A., Academician

TITLE: Features of Structural Crystallization in the Solidification of Calcium Oxide by Hydration

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 6, pp 1343-1346 (USSR)

ABSTRACT: The authors investigated the process of CaO hydration on suspensions which, besides CaO additionally contained 75% $CaCO_3$ as inert filling medium, so that the ratio between water and calcium was increased and structural development could be retarded and heating of the samples could be reduced. The pure $CaCO_3$ had a specific surface of 2000 cm^2/g, determined by Tovarov's apparatus. The strength of the suspensions was determined by means of a conical plastometer, and the rate of hydration was determined calorimetrically. Figure 1 and table 1 show the course of the strength and hydration of suspensions with a ratio between water and solid substance (W/S) of 0.4, 0.5, and 0.6. Strength at first increases rapidly as a result of crystallization of the main quantity of $Ca(OH)_2$, after which it decreases rapidly and only rises gradually with W/S = 0.4 until the end of hydration, as was also observed by G. I. Logginov (Ref 6).

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SOV/20-129-6-40/69

Features of Structural Crystallization in the Solidification of Calcium Oxide by Hydration

Figure 2 shows that the course of strength does not depend on temperature conditions. As a cause of these variations of strength, the destruction of structure by the occurrence of internal stresses during the growth of the crystals is given. The double character of this process (increase of strength by crystal growth, decrease by destruction of structure) causes the rise and fall of the strength curve, which is particularly marked with W/S = 0.4. On the other hand, the dissolution of crystallization contacts becomes effective only in the case of a large W/S. The assumption of several $Ca(OH)_2$ modifications going over into one another was refuted by thermograms and X-ray pictures. — O. V. Pyasetskaya collaborated. There are 2 figures, 1 table, and 9 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR). Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair for Colloidal Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: July 31, 1959

Card 2/2

VEYLER, S.Ya.; LIKHTMAN, V.I.; REBINDER, P.A., akademik, otv.red.

[Effect of lubrication in the press forging of metals] Deistvie smazok pri obrabotke metallov davleniem. Moskva, Izd-vo Akad. nauk SSSR, 1960. 231 p. (MIRA 13:8)
(Forging) (Metalworking lubricants)

REBINDER, P.A.

report presented at the 1st All-Union Congress of Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb '60.

234. O. I. Pahenitsnos (Moscow): Large deflections of reinforced shallow cylindrical shells.

235. V. P. Rabinovich (Moscow), Yu. N. Rabotnov (Novosibirsk): Creep strength of turbine discs.

236. A. I. Rabotnikov (Odessa): Flow and consolidation of sands under the action of seepage forces.

237. Yu. N. Rabotnov (Novosibirsk): Creep.

238. R. M. Rappoport (Leningrad): Some problems in the theory of elasticity concerning the design of rock foundations.

239. R. M. Rappoport (Leningrad): Some difference equations of structural mechanics.

240. Kh. A. Rakhmatulin (Moscow): On the propagation of elasti-plastic waves in a half-space.

241. Kh. A. Rakhmatulin (Moscow): Propagation of disturbances in continuous media.

242. V. V. Raiuk (Sverdlovsk): Earth pressure on flexible retaining walls.

243. V. L. Rvatsev (Berdiansk): On the pressure of a punch on an elastic half-space.

244. P. A. Rebinder (Moscow): Types of high molecular and disperson structures and their characteristic mechanical properties.

245. E. Reusa (Budapest): On the influence of the maximum principal stress on the fatigue strength.

246. V. G. Rekats (Moscow): The application of the method of homogeneous solutions to some two-dimensional problems of the theory of elasticity.

247. A. R. Rzhanitsin (Moscow): Some three-dimensional problems of limit equilibrium in rigid, plastic solids.

248. M. I. Rozovskii (Dnepropetrovsk): On the application of the Volterra-Rabotnov principle to Arutiunian's creep theory of concrete.

249. M. I. Rozovskii (Dnepropetrovsk): Some problems of the integral operator theory of creep.

250. A. G. Rozovtsev (Leningrad): Design of wide-flange beams for bending and temperature effects.

251. D. D. Sapegin (Leningrad): The experimental study of the deformations of rock foundations.

252. O. M. Sapondzhian (Erevan): The determination of the deflections of a simply supported plate by the method of successive approximations.

253. V. S. Sarkisian (Erevan): Torsion of anisotropic prismatic bars of elongated cross section.

254. V. A. Svekloe (Kaliningrad): The impact of a double punch on a half plane.

255. I. V. Svirskii (Kazan): The use of similarity considerations for improving the convergence in the design of shells by successive approximations.

256. A. M. Senkov (Leningrad): Stability of cellular structures built on soft ground.

257. B. V. Serebrianii (Moscow): Bending of thin hinge-joined slabs supported by an elastic layer of finite thickness.

258. B. R. Seth (Kharagpur): Finite bending of plates into cylindrical shells.

259. A. P. Sinitsin (Moscow): A beam on a two-layer half space beyond the elastic limit.

260. V. P. Sinitsin (Leningrad): Some problems of creep and consolidation of saturated soils.

261. N. G. Slobodianskii (Moscow): Determination of the natural frequencies of plates of constant and variable thickness.

262. N. K. Snitko (Leningrad): Dynamic problems of the design of retaining walls and soil foundations under impact loads.

263. N. K. Snitko (Leningrad): Solution of some dynamic problems of stringer structures by the method of initial parameters.

264. V. V. Sokolovskii (Moscow): On some problems of the theory of plasticity and soil mechanics.

265. M. A. Sopomnshch (Petrozavodsk): On a class of solutions of boundary value problems in plasticity.

266. E. S. Sorokin (Moscow): The effect of internal friction on the stresses in beams and plates under impulsive loading.

267. N. I. Spiridonova (Sverdlovsk): Stresses in ellipsoidal shells subjected to internal pressure.

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S/137/61/000/012/124/149
A006/A101

AUTHORS: Rebinder, P.A., Likhman, V.I., Shchukin, Ye.D., Kozhanova, L.A., Fermakov, N.V., Goryunov, Yu.V.

TITLE: Regularities and the mechanism of the effect of small surface active admixtures on deformation and strength properties of single crystal metals

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 12, 1961, 34-35, abstract 12Zh254 ("Tr. In-ta fiz. metallov, AN SSSR", 1960, no. 23, 147-161)

TEXT: Experiments were made with differently oriented Zn and Cd single crystals of 1 mm in diameter, coated with a thin film of surface active Sn and Hg metals. It is shown that at temperatures over T_s of "base metal-coating" eutectics, the presence of a molten surface-active metal layer strongly reduces deformability and strength of the specimen and promotes brittle failure. The brittle effect of the surface active metal is mainly a function of temperature and the deformation rate. Embrittlement and reduced strength are not connected with corrosion processes but are caused by a decrease of the work which is necessary for the development of crack nuclei due to the adsorption of surface-

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active metal atoms on the internal micro-surfaces. At a drop of the test temperature below T_s of the "base metal-coating" eutectics, the embrittling effect vanishes gradually, due to a reduced mobility of adsorption-active atoms. The embrittling effect vanishes also at sufficiently high temperatures and low tension rates, when the resorption of deformation micro-heterogeneities and local stresses prevents the failure nuclei to develop into dangerous cracks, even at a considerable decrease of free surface energy. There are 21 references.

V. Stepanov

[Abstracter's note: Complete translation]

Card 2/2

REBINDER, P.A., akademik; SERB-SERBINA, N.N., kand.khim.nauk; YATROV, S.N., kand.tekhn.nauk, dotsent

M.N. Shkabara's [doktor geol.-mineral.nauk] book "Drilling and grouting fluids in drilling mine shafts" and A.A. Linevskii's review of it. Shakht. stroi. 4 no. 5:30-31 My '60. (MIRA 14:4)
(Shaft sinking) (Drilling fluids)
(Shkabara, M.N.)

SEGALOVA, Ye.Ye., kand.khim.nauk; REBINDER, P.A., akademik

Modern physical and chemical representation of hardening processes in mineral binding materials. Stroi.mat. 6 no.1:21-26 Ja '60. (MIRA 13:5)
(Binding materials)