TRAPEZNIKOV, A., polkovnik yustitsii; MALAMUD, G., podpolkovnik yustitsii

Observe Soviet laws strictly and unswervingly. Tyl i snab. Sov. Voor. Sil. 21 no.8:9-13 Ag '61. (MIRA 14:12)
(Justice, Administration of) (Military law)

TRAPEZNIKOV, A.

USSR/ Electronics

Card 1/1 Pub. 89 - 30/40

Authors : Freydlis, A.; Kotel'nikov, N.; Pavlenko, V.; Tyushnikov, E.; Trapeznikov, A.; Vorob'yev, V.; Tkachenko, L.; and Nechay, V.

Title : Exchange of experiences

Periodical : Radio 10, 42-43, Oct 1954

Abstract : Several small articles, sent in by local radio operators, are featured under the above title. Each author offers, for the benefit of the others, the results of his experience in the field of electronics. The following equipment and subjects are dealt with: an automatic safety device for the protection of rural radio-center personnel against electric shock; a miniature signal generator; an "interference-free" receiving antenna; a radio-relay station of the Urozhay type; a piezoelectric pickup for an electric guitar, and others. Diagrams; drawings.

Institution: .....

Submitted: .....

SAPRONOVA, M.; TRAPEZNIKOV, A.; SOBOLEVA, Ye.; ZAYTSEV, I.; KHMELEVA, V.

Today you hibernate, tomorrow you rush. Okhr. truda i sots. strakh. 4 no.8:20-23 Ag '61. (MIRA 14:11)

1. Zaveduyushchaya zdravpunktom zavoda khimicheskogo machinostroyeniya, g. Yaroslavl' (for Sapronova). 2. Vneshtatnyy tekhnicheskiy inspektor Yaroslavskogo Dorozhnogo komiteta professional'nogo soyuza rabotnikov zheleznodorozhnogo transporta (for Trapeznikov). 3. Zamestitel' predsedatelya zavodskogo komiteta shinnogo zavoda, g. Yaroslavl' (for Soboleva). 4. Glavnyy inzh. Yaroslavskogo oblastnogo otdela zdravookhraneniya (for Zaytsev). 5. Spetsial'nyy korrespondent zhurnala "Okhrana truda i sotsial'noye strakhovaniye", g. Yaroslavl' (for Khmeleva).

(Yaroslavl Province--Hospitals--Construction)

TRAPEZNIKOV, A. A.

Degradation of polymer molecules in a solution (polyisobutylene, polymethyl methacrylate) when passing the prestationary stage of deformation. Dokl. AN SSSR 155 no. 2:430-433 Mr '64.
(MIRA 17:5)

1. Institut fizicheskoy khimii AN SSSR. Predstavleno akademikom S. I. Vol'fkovichem.

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

SA

A 53

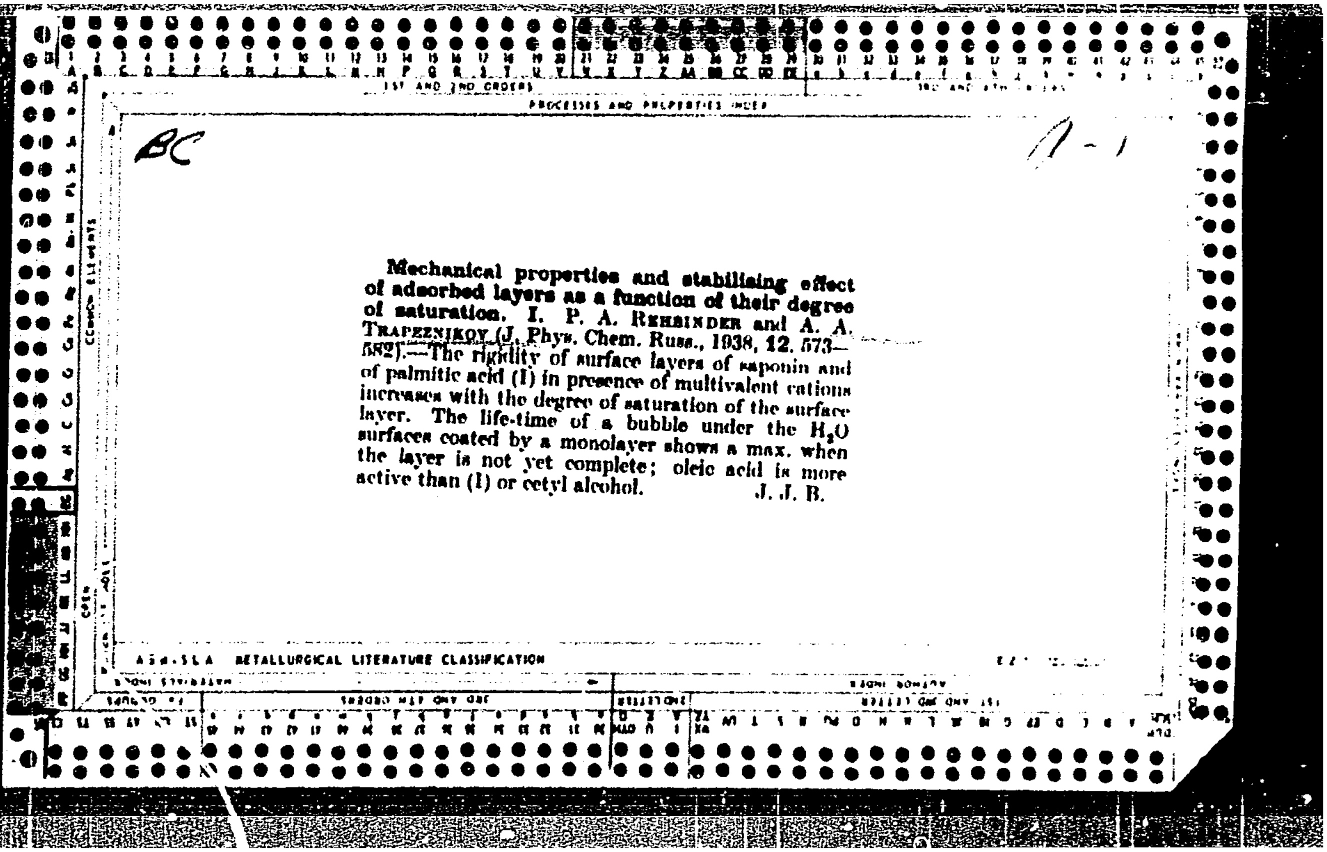
d

556. Mechanical Properties of Adsorption Layers. Part I. P. A. Rehbinder and A. A. Trapeznikov. Part II. A. A. Trapeznikov. *Acta Physicochimica*, 9, 2, p.p. 257-312, 1938. *In English.*—The mechanical properties of adsorption layers of soluble (saponin) and insoluble (cetyl alcohol, palmitic and oleic acids) surface-active substances have been determined. The surface elasticity is obtained by measuring the angular displacement of a disc suspended on a torsion wire and placed in the surface film, and the surface viscosity is found by observing the log. dec. of the oscillations of the disc. The mechanical properties improve as the surface layer becomes more saturated and the surface is more completely covered. The stabilising action of adsorption layers on films, bubbles in foam, or drops in emulsions is a maximum at surface concentrations somewhat less than saturation. In Part II methods of determining the mechanical properties of films on substrates of varying acidity are described. The maximum strength of a palmitic acid film is 10–12 dynes per cm. The effect of ageing on the strength of palmitic acid films was investigated. The mechanical properties do not change on a markedly acid or neutral substrate, but improve considerably on a slightly acid one. Cetyl alcohol films show, on ageing, a rise in viscosity followed by a spontaneous decrease resembling gelatinisation and synæresis in colloidal systems. A. J. M.

COMMON ELEMENTS

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



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A-1

Mechanical properties and stabilising effect of adsorbed layers as a function of their degree of saturation. I. P. A. Rehbinder and A. A. Trapeznikov (J. Phys. Chem. Russ., 1938, 12, 573–582).—The rigidity of surface layers of saponin and of palmitic acid (I) in presence of multivalent cations increases with the degree of saturation of the surface layer. The life-time of a bubble under the H_2O surfaces coated by a monolayer shows a max. when the layer is not yet complete; oleic acid is more active than (I) or cetyl alcohol. J. J. B.

PROCESSES AND PROPERTIES INDEX

Mechanical properties (viscosity, rigidity, and strength) of adsorption layers and their relation to the area per molecule and to the nature of the underlying liquid. A. A. Trapeznikov and P. Rehbinder (Compt. rend. Acad. Sci. U.R.S.S., 1938, 18, 185—189).—Measurement of the period of oscillation of a disc suspended by a torsion wire in a monolayer of a surface-active, H_2O-insol. substance affords a quant. method for the study of the relation between the mechanical properties of the films and the area per mol. The surface viscosity or strength of adsorption layers increases with the surface concn. and reaches a max. on complete saturation. The resistance to shear increases continuously as the film is compressed and shows a very sharp rise on transition to the condensed state. On pure H_2O palmitic acid remains viscous up to the saturation point, whilst the presence of multivalent cations results in the formation of elastic films with a tensile strength of 10—11 dynes per cm. Acidification of the underlying liquid, however, gradually transforms the film from the elastic state through a plastic region into the viscous state, whilst, for a const. p_H val., an increase in cation concn. involves the solidification of the film. An increase in the length of the hydrocarbon chain in homologous series results in a gradual enhancement of the resistance to shear on transition from viscous to plastic and, finally, to elastic films.

W. R. A.

BC

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

SA

A53d

3556. Mechanical Properties of Films and Stability of Foams. P. A. Rehbinder and A. A. Trapeznikov. *Comptes Rendus (Doklady) de l'Acad. des Sciences, U.S.S.R.* 18, 7, *pp.* 423-426, 1938. *In English.*—Attempts to measure the surface viscosity of sodium oleate solution by means of a horizontal oscillating disc [see Abstract 1493 (1938)] failed to show any such viscosity. That of such solutions of concentration $c = 1\cdot05–0\cdot03\%$, was, however, measured (I) within 2 days of preparation, and (II) after 50 days ageing, by determining the logarithmic decrement (λ) of the oscillation of a ring (5·39 cm. dia.) of Pt wire (1 mm. thick) oscillating within a fixed similar concentric ring 6·12 cm. dia., both being horizontal in the surface of the solution. λ is plotted against c. In both curves λ shows a maximum for $\lambda = 0\cdot045$, but the whole curve for (II) lies well below that for (I). The stability of the foam formed by such solutions was also determined after intervals of 30 sec. to 22 hr. from time of preparation, and plotted against c. The stability decreases with lapse of time, and after 22 hr. shows a distinct maximum for $c = 0\cdot04\%$ approximately. [See following Abstract.] C. A. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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S A

A 55
d

3557. **Stabilising Effect of Adsorption Layers and Their Mechanical Properties.** **A. A. Trapeznikov and P. A. Rehbinder.** *Comptes Rendus (Doklady) de l'Acad. des Sciences, U.S.S.R.* 18. 7. *pp.* 427–430, 1938. *In English.*—The stabilising action of adsorption layers as functions of their surface concentrations was investigated by determining the life of bubbles at the surface of water (or 0·01-*N*-HCl) covered with films of an insoluble acid (lauric, myristic, palmitic and oleic were used), alcohol or ester. Results are shown by curves, and generally indicate a maximum effect for a smaller area per molecule than that obtained by previous investigators. [See Abstract 1395 (1931) and preceding Abstract.]

C. A. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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The mechanical properties of monolayers of fatty acids, alcohols and esters and the effect produced upon them by the acidity and cations of the substrate. III. A. A. Trapeznikov. *Acta Physicochim. U. R. S. S.* 10, 65-82 (1939) (in English).—Measurements made on the oscillation and rotation of a *paraffin* disk in a film of surface-active material on highly purified water absolutely *free of* Al^{+++} *ions*, using a paraffin trough, show that cerotic acid films are elastic, tripalmitin and cetyl stearate plastic, cetyl alc., Et palmitate and arachidic acid viscous and those of palmitic and oleic acids, cholesterol and triolein only slightly viscous. Data for these substances on solns. of $Al_2(SO_4)_3$ + HCl, $CuSO_4$ + HCl, HCl and NaOH at pH from 7.5 to 2 are given in 14 figs. and 2 tables. T. shows that the increased strength of palmitic acid films is due to formation of a soap film on salt solns. in the order Na < Ca, Cu < Al, and that in a cation-free substrate the film retains its low viscosity up to its destruction. The direct effect of the pH of the substrate on the film strength is relatively very small. On going up a homologous series the films change from slightly viscous to viscous, plastic and elastic. F. H. R.

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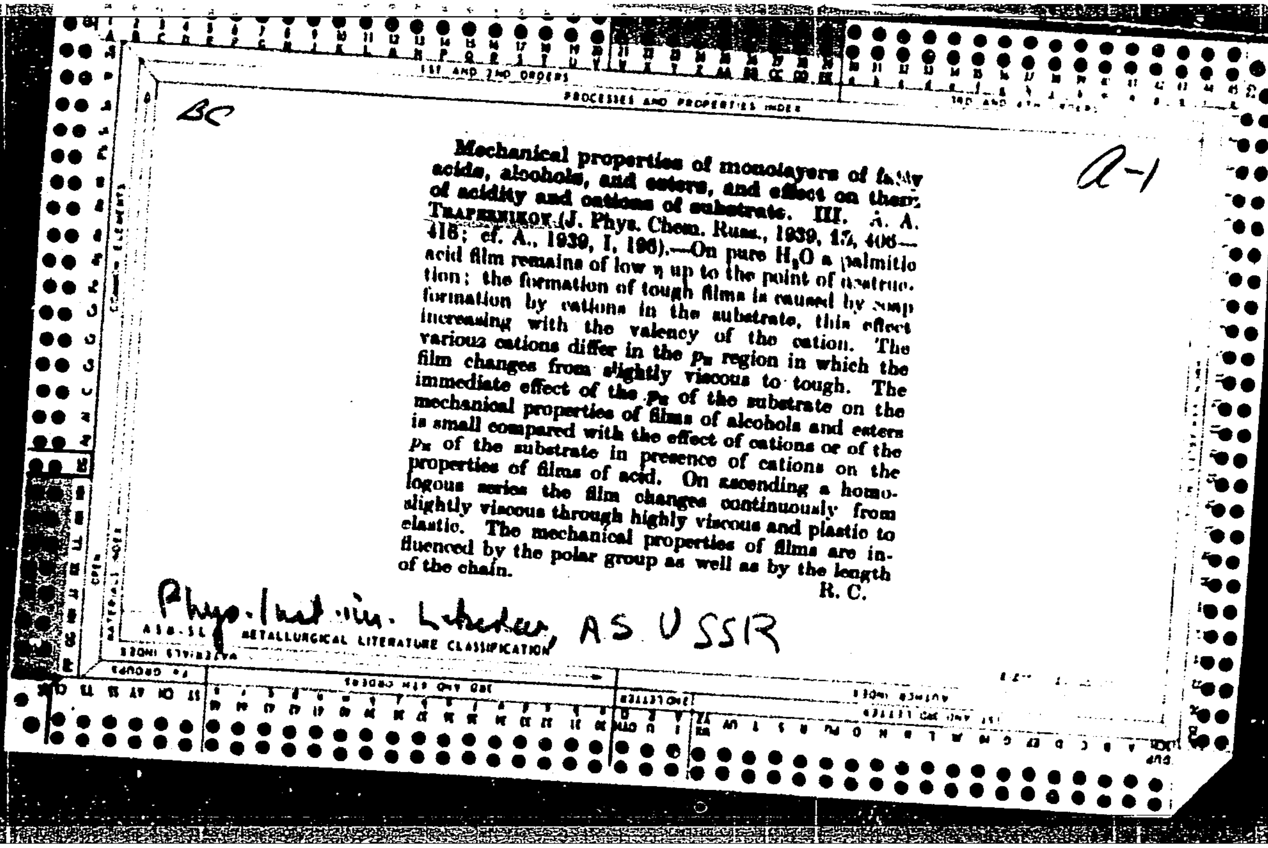

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

BC

a-1

**Mechanical properties of monolayers of fatty
acids, alcohols, and esters, and effect on them
of acidity and cations of substrate. III.** A. A.
Trapeznikov (J. Phys. Chem. Russ., 1939, 13, 406—
418; cf. A., 1939, I, 196).—On pure H_2O a palmitic
acid film remains of low η up to the point of neutra-
tion; the formation of tough films is caused by soap
formation by cations in the substrate, this effect
increasing with the valency of the cation. The
various cations differ in the p_H region in which the
film changes from slightly viscous to tough. The
immediate effect of the p_H of the substrate on the
mechanical properties of films of alcohols and esters
is small compared with the effect of cations or of the
p_H of the substrate in presence of cations on the
properties of films of acid. On ascending a homo-
logous series the film changes continuously from
slightly viscous through highly viscous and plastic to
elastic. The mechanical properties of films are in-
fluenced by the polar group as well as by the length
of the chain.

R. C.

Phys. Inst. im. Lebedev, AS USSR

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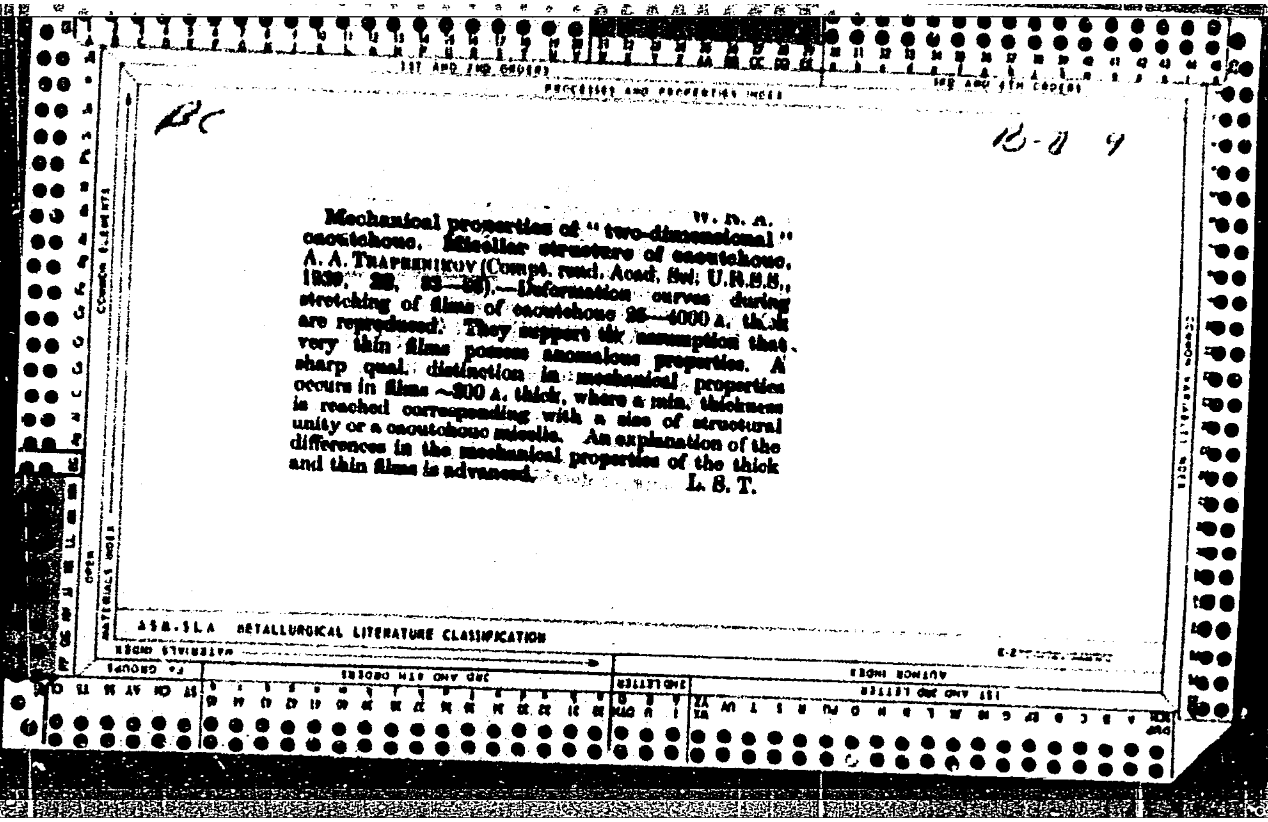

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10-8 9

Mechanical properties of "two-dimensional" caoutchouc. Micellar structure of caoutchouc. A. A. Trapeznikov (Compt. rend. Acad. Sci. U.R.S.S., 1939, 22, [illegible]).—Deformation curves during stretching of films of caoutchouc 25—4000 A. thick are reproduced. They support the assumption that very thin films possess anomalous properties. A sharp qual. distinction in mechanical properties occurs in films ~300 A. thick, where a min. thickness is reached corresponding with a size of structural unity or a caoutchouc micelle. An explanation of the differences in the mechanical properties of the thick and thin films is advanced. W. D. A.

L. S. T.

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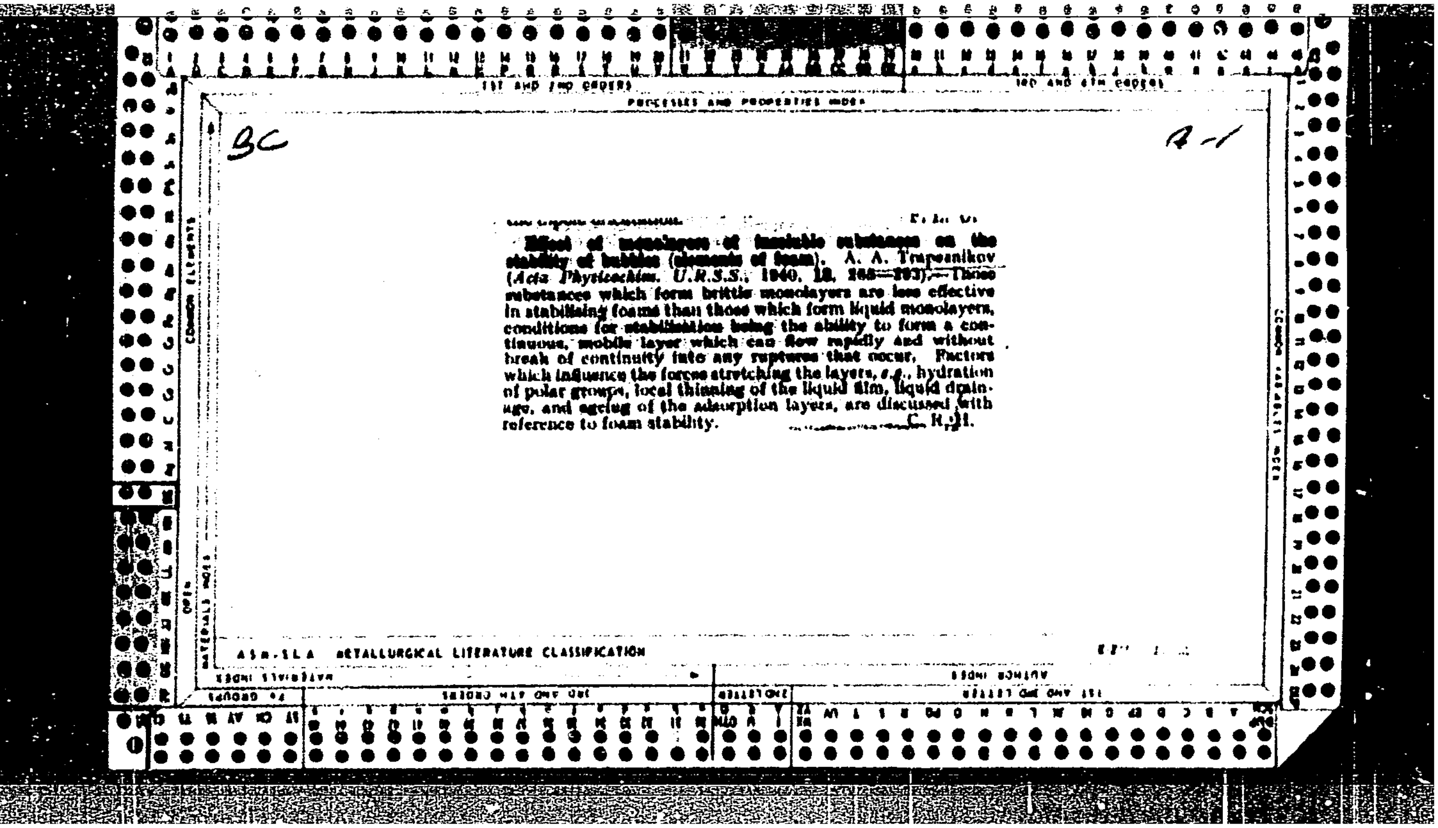


3C

A-1

Effect of monolayers of insoluble substances on the stability of bubbles (elements of foam). A. A. Trapeznikov (*Acta Physicochim. U.R.S.S.*, 1940, **13**, 265—293).—Those substances which form brittle monolayers are less effective in stabilising foams than those which form liquid monolayers, conditions for stabilisation being the ability to form a continuous, mobile layer which can flow rapidly and without break of continuity into any ruptures that occur. Factors which influence the forces stretching the layers, *e.g.*, hydration of polar groups, local thinning of the liquid film, liquid drainage, and ageing of the adsorption layers, are discussed with reference to foam stability. C. R. H.

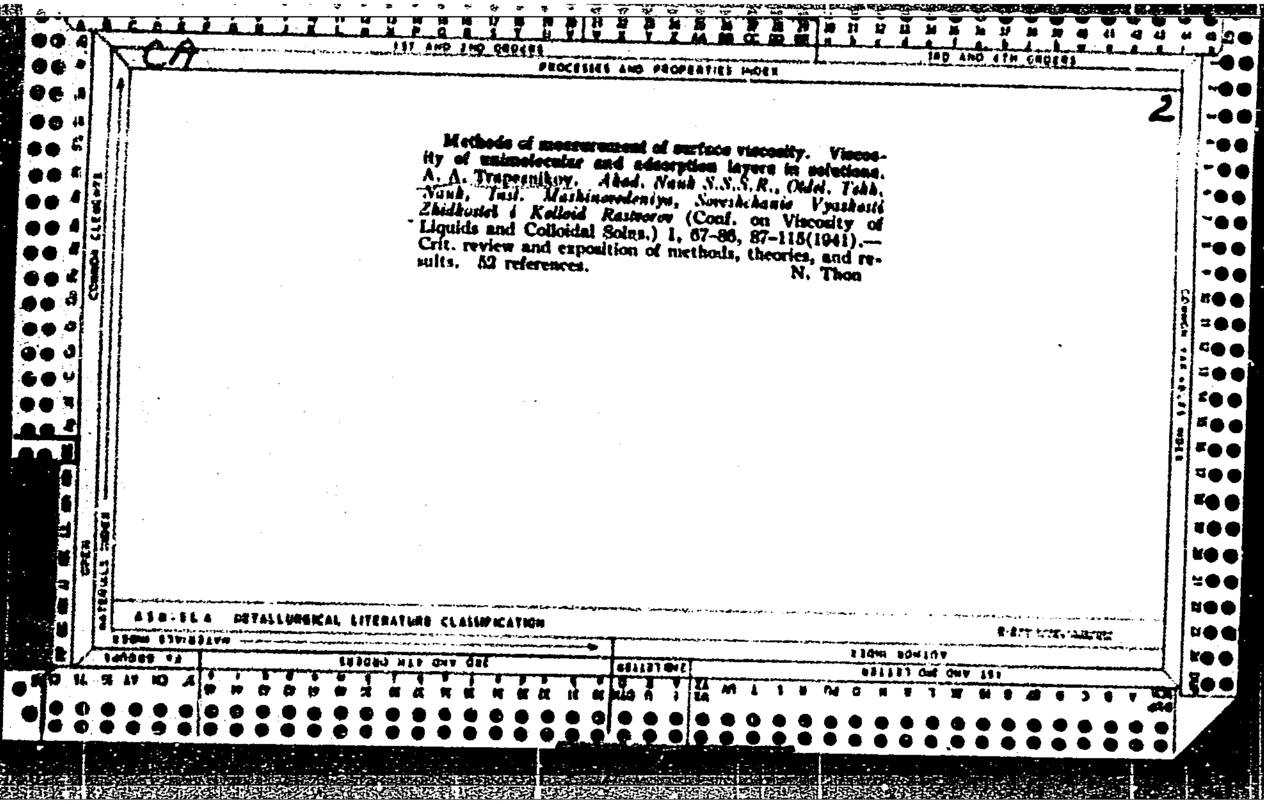
TRAPEZNIKOV, A. A.

Moscow

Laboratory of Physico-Chemical Dispersion Systems, Colloids and Electrochemical Institute, Academy of Sciences USSR, (-1940-).

"The Effect of Monolayer Insoluble Substances on the Stability Persistence of Bubbles (an Element of Foam)."

Zhur. Fiz. Khim., Vol. 14, No. 5-6, 1940.



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2

Methods of measurement of surface viscosity. Viscosity of unimolecular and adsorption layers in solutions. A. A. Trapeznikov. *Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk, Inst. Mashinovedeniya, Soveshchanie Vyazkosti Zhidkostei i Kolloid Rastvorov* (Conf. on Viscosity of Liquids and Colloidal Solns.) 1, 67-86, 87-115(1941).—Crit. review and exposition of methods, theories, and results. 52 references.

N. Thon

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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CA

2

Surface viscosity and structure of monolayers of higher alcohols. A. A. Trapeznikov. *Doklady Akad. Nauk. S. S. S. R.* 30, 319-24(1941).—The viscosity of monolayers of octadecyl alc. was detd. in a temp. range of 17.3° to 22.2° by the method of the oscillating disk. The curves of viscosity *vs.* pressure gave a sharp break at a pressure of 13-14 dynes/cm. Use of 0.01 *N* NaCl and HCl gave essentially the same results, but the latter yielded somewhat lower abs. viscosity than the former. Use of water yielded an addnl. max. of viscosity at 25 dynes/cm. Doubt is expressed that the monolayer of octadecyl alc. can be considered a true liquid below the breakdown pressure and a cryst. solid above that pressure, because of similarity of the viscosity relation with pressure for both regions

G. M. Kosolapoff

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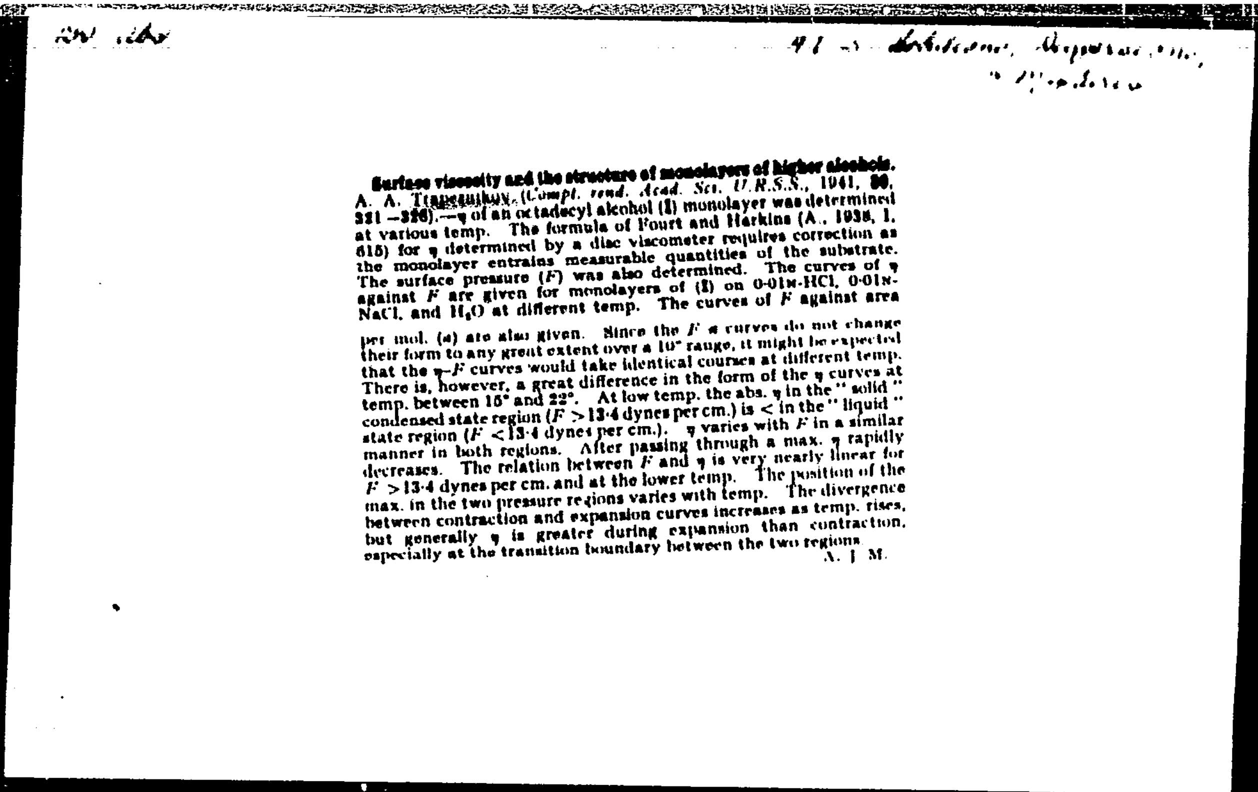

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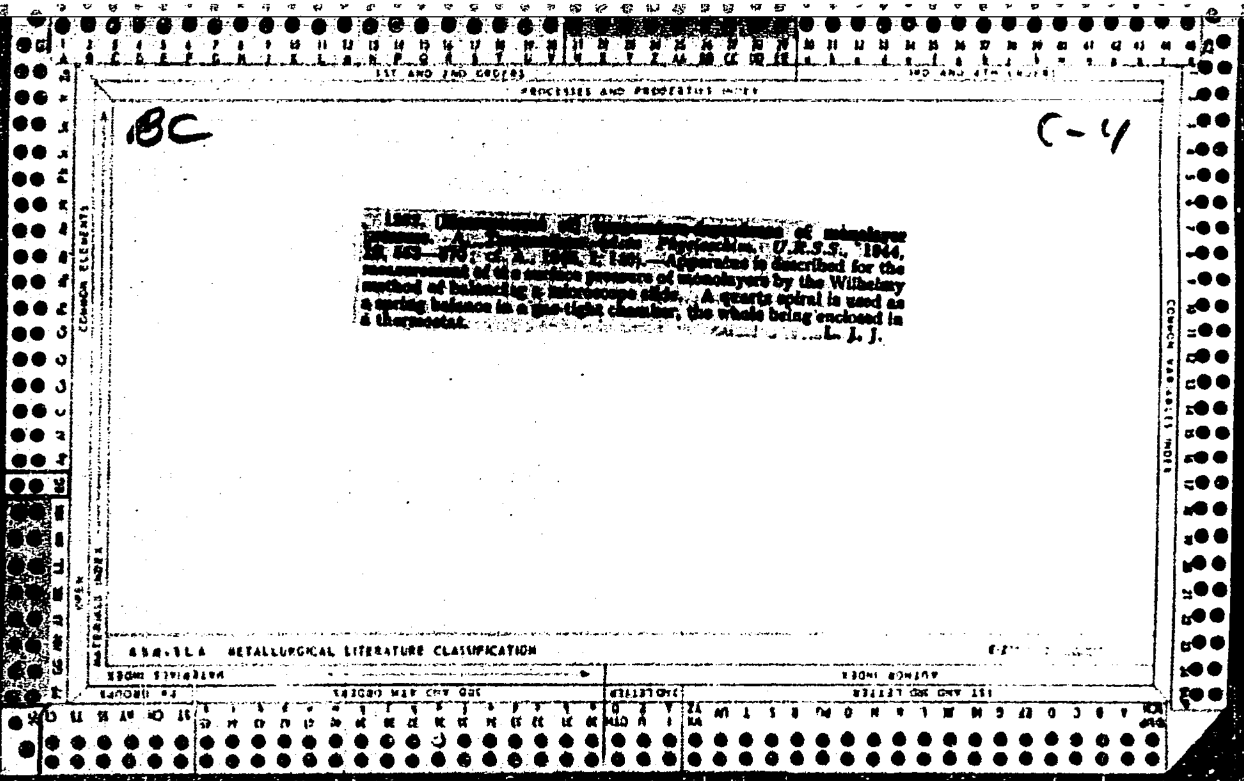
41 [illegible]

Surface viscosity and the structure of monolayers of higher alcohols.
A. A. Trapeznikov. (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **30**,
321 –326).—η of an octadecyl alcohol (**I**) monolayer was determined
at various temp. The formula of Fourt and Harkins (A., 1938, I,
615) for η determined by a disc viscometer requires correction as
the monolayer entrains measurable quantities of the substrate.
The surface pressure (F) was also determined. The curves of η
against F are given for monolayers of (**I**) on 0·01N-HCl, 0·01N-
NaCl, and H_2O at different temp. The curves of F against area

per mol. (a) are also given. Since the F–a curves do not change
their form to any great extent over a 10° range, it might be expected
that the η–F curves would take identical courses at different temp.
There is, however, a great difference in the form of the η curves at
temp. between 15° and 22°. At low temp. the abs. η in the " solid "
condensed state region ($F > 13·4$ dynes per cm.) is < in the " liquid "
state region ($F < 13·4$ dynes per cm.). η varies with F in a similar
manner in both regions. After passing through a max. η rapidly
decreases. The relation between F and η is very nearly linear for
$F > 13·4$ dynes per cm. and at the lower temp. The position of the
max. in the two pressure regions varies with temp. The divergence
between contraction and expansion curves increases as temp. rises,
but generally η is greater during expansion than contraction,
especially at the transition boundary between the two regions.
A. J. M.

2

Temperature dependence of the surface viscosity of unimolecular layers of higher alcohols. A. A. Trapeznikov (Colloid-Electrochem. Inst., Acad. Sci. U.S.S.R.). *Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk, Inst. Mashinovedeniya, Soveshchanie po Vyazkosti Zhidkostei i Kolloid. Rastvorov (Conf. on Viscosity of Liquids and Colloidal Solns.)* 2, 54-61(1944).--The two-dimensional viscosity η is measured by the damping of the vibrations of a disk suspended on an elastic wire. For octadecanol on aq. 0.01 *N* NaCl, plots of η against the surface area per mol., show curves strikingly different at two temps. as close as 19.2° and 21.3°. In terms of the surface pressure *F*, curves of η taken at 17.2, 19.2, 19.8, 21.3, 21.8, and 22.2° are very strongly shifted relative to one another in the direction of increasing η with higher temp. All curves show a min. followed immediately by a max. at about $F = 13$ dynes/cm.; at the six temps. given, the corresponding max. values of η are resp. about 10, 17, 26, 44, 47, and 64 × 10^{-4} surface poises. Beyond the max., at not too high a temp., η not only is not higher but is actually lower than in the region of lower surface pressures; this disproves Harkins' assumption of a transition from a true liquid to a solid-condensed state at $F = 13$ dynes/cm.; more likely, in both regions the layer is in a liquid-cryst. state; the two distinct portions of the η curve correspond to two different modifications, not to two different two-dimensional states of aggregation. Comparative plots of log η against the temp. for tetradecanol and octadecanol show that at temps. lower than about 48°, tetradecanol has the higher η; the two curves intersect at about 48°; at 55.5°, log η for tetradecanol drops sharply, whereas for octadecanol it continues to rise well above the max. const. value attained by tetradecanol. These marked temp. effects invalidate Harkins' statement of an alleged decrease of the surface viscosity with increasing chain length; it is only correct within a limited temp. interval and does not hold if the members of a homologous series are compared at temps. equally distant from their resp. m. ps. It is around the m.p. that log η becomes practically const. over an extended temp. interval; the sharp fall observed for tetradecanol at 55.5°, occurring within a very narrow temp. interval of less than 0.2°, from about 1 surface poise to 1 × 10^{-4}, appears to indicate a *two-dimensional fusion*, or a transition from a liquid-cryst. to a two-dimensional liquid-expanded state. One is entitled to consider the state of monolayers of higher alcs. (and ethers) under high surface pressures (F = about 40 dynes/cm.), usually referred to as solid-condensed, as being actually liquid-cryst. The difference between the latter state and the three-dimensional solid cryst. state may be due to hydration in the film and to the absence of forces between two layers of mols. Since the actual existence of a surface viscosity has been questioned, particularly by V. G. Levich (*Zhurnal eksper. teoret. fiziki* 10, 1206(1940)), the usual oscillating-disk method was so modified as to permit a direct decision as to whether the observed damping is actually due to the viscosity of the unimol. film or to that of the underlying liquid. In this novel exptl. arrangement, the oscillating system consists, instead of the usual glass disk, of a horizontal platinum-wire ring of 2.7 cm. diam., surrounded in the same plane by a concentric fixed outer ring of 3.06 cm. diam.; a thin rod of 0.05 cm. diam. is placed vertically in a fixed position in the center of the cylindrical vessel. The unimol. film is spread either in the space between the central rod and the oscillating 2.7-cm. ring or in the narrow annular space between the oscillating and the outer fixed 3.06-cm. ring. If it were true that the damping effect is mainly due to the viscosity of the bulk of the liquid, the effect of a film should be much more marked in the first case than in the 2nd. Actual expt. with tetradecanol (at $F = 40$ dynes/cm.)



18C

C-4

1582. [illegible] of [illegible] of monolayer pressure. A. [illegible] Physicochim., U.R.S.S., 1944, 19, 463—470; C. A., [illegible] 1401.—Apparatus is described for the measurement of the surface pressure of monolayers by the Wilhelmy method of balancing a microscope slide. A quartz spiral is used as a spring balance in a gas-tight chamber, the whole being enclosed in a thermostat.

L. J. J.

TRAPEZNIKOV, A A

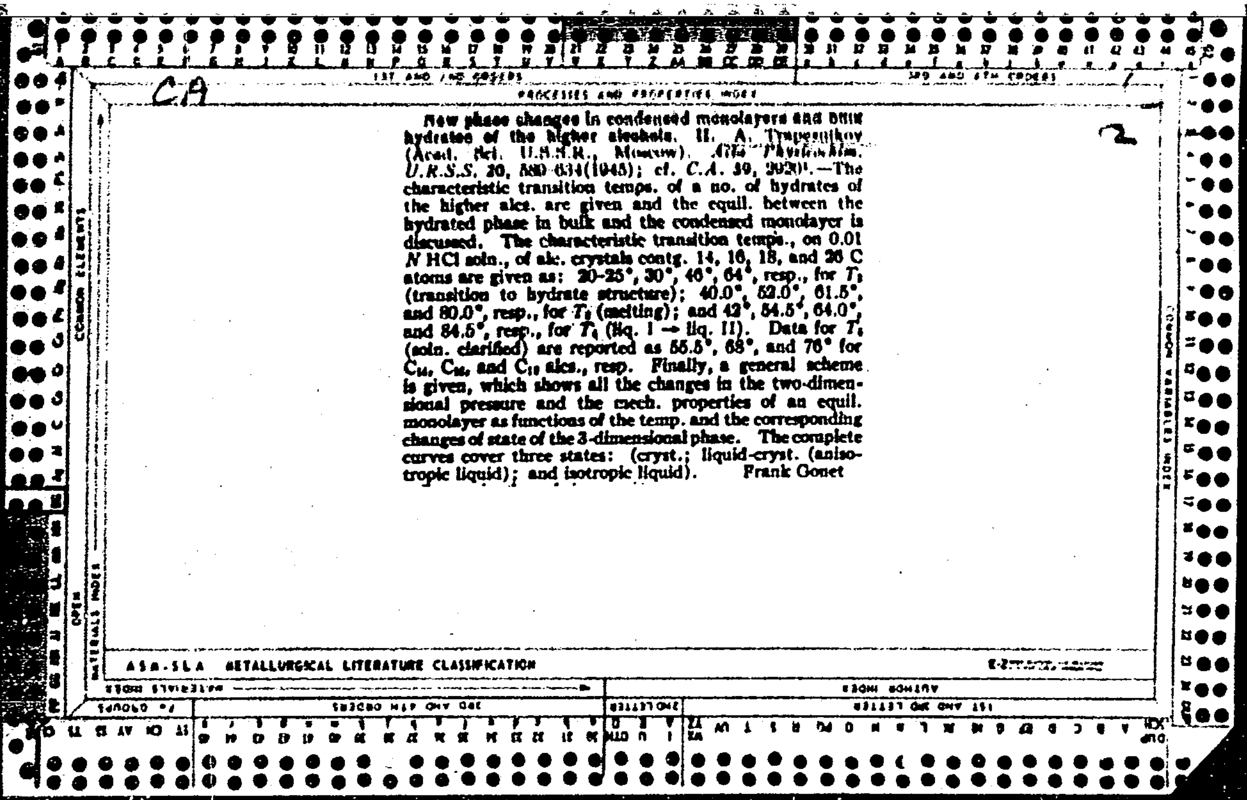
USSR

2

The temperature dependence of the pressure of monolayers as a new method for studying the crystalline hydrates of the highest aliphatic compounds. A. A. Trapeznikov. *Zhur. Fiz. Khim.* 19, 228-38(1945).—An app. is described that can be used to measure the temp. dependence of the 2-dimensional pressure of monolayers that are in equil. with the cryst. phase. From these data all of the higher aliphatic compds. (alcs., acids, and compd. ethers) react with water in the cryst. state to form cryst. hydrates characterized by certain phys.-chem. properties, e.g., transition temp., m.p., and d. The cryst. hydrates are polymorphic in their nature. The results lead to certain conclusions about the structure of unimol. layers.

J. Rovtar Leach

62



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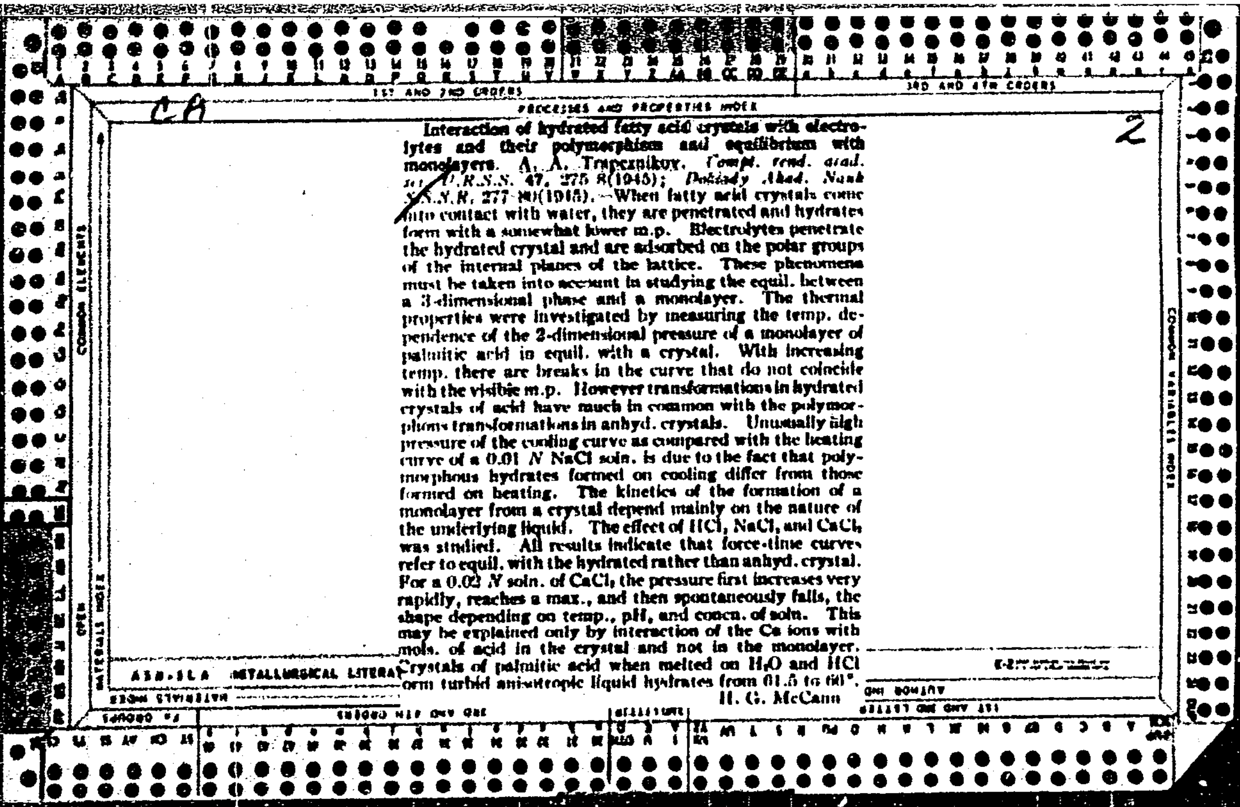
New phase changes in condensed monolayers and bulk hydrates of the higher alcohols. II. A. Trapeznikov (Acad. Sci. U.S.S.R., Moscow). *Acta Physicochim. U.R.S.S.* 20, 589-634(1945); cf. *C.A.* 39, 2020^{1}.—The characteristic transition temps. of a no. of hydrates of the higher alcs. are given and the equil. between the hydrated phase in bulk and the condensed monolayer is discussed. The characteristic transition temps., on 0.01 *N* HCl soln., of alc. crystals contg. 14, 16, 18, and 20 C atoms are given as: 20-25°, 30°, 46°, 64°, resp., for T_1 (transition to hydrate structure); 40.0°, 52.0°, 61.5°, and 80.0°, resp., for T_2 (melting); and 42°, 54.5°, 64.0°, and 84.5°, resp., for T_3 (liq. I → liq. II). Data for T_4 (soln. clarified) are reported as 55.5°, 68°, and 76° for C_{14}, C_{16}, and C_{18} alcs., resp. Finally, a general scheme is given, which shows all the changes in the two-dimensional pressure and the mech. properties of an equil. monolayer as functions of the temp. and the corresponding changes of state of the 3-dimensional phase. The complete curves cover three states: (cryst.; liquid-cryst. (anisotropic liquid); and isotropic liquid). Frank Gonet



CA

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Interaction of hydrated fatty acid crystals with electrolytes and their polymorphism and equilibrium with monolayers. A. A. Trapeznikov. *Compt. rend. acad. sci. U.R.S.S.* 47, 275-8(1945); *Doklady Akad. Nauk S.S.S.R.* 277-80(1945).—When fatty acid crystals come into contact with water, they are penetrated and hydrates form with a somewhat lower m.p. Electrolytes penetrate the hydrated crystal and are adsorbed on the polar groups of the internal planes of the lattice. These phenomena must be taken into account in studying the equil. between a 3-dimensional phase and a monolayer. The thermal properties were investigated by measuring the temp. dependence of the 2-dimensional pressure of a monolayer of palmitic acid in equil. with a crystal. With increasing temp. there are breaks in the curve that do not coincide with the visible m.p. However transformations in hydrated crystals of acid have much in common with the polymorphous transformations in anhyd. crystals. Unusually high pressure of the cooling curve as compared with the heating curve of a 0.01 *N* NaCl soln. is due to the fact that polymorphous hydrates formed on cooling differ from those formed on heating. The kinetics of the formation of a monolayer from a crystal depend mainly on the nature of the underlying liquid. The effect of HCl, NaCl, and $CaCl_2$ was studied. All results indicate that force-time curves refer to equil. with the hydrated rather than anhyd. crystal. For a 0.02 *N* soln. of $CaCl_2$ the pressure first increases very rapidly, reaches a max., and then spontaneously falls, the shape depending on temp., pH, and concn. of soln. This may be explained only by interaction of the Ca ions with mols. of acid in the crystal and not in the monolayer. Crystals of palmitic acid when melted on H_2O and HCl orm turbid anisotropic liquid hydrates from 61.5 to 66°.

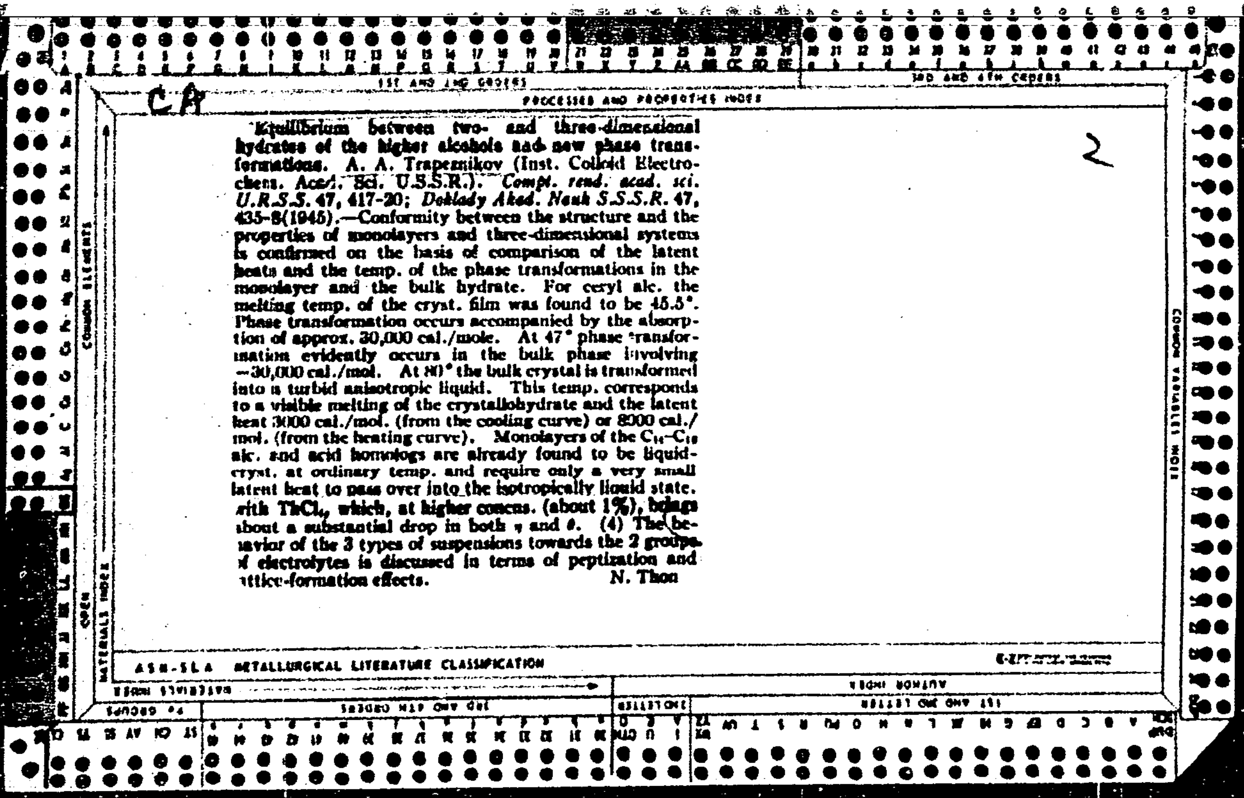
H. G. McCann

CA

2

Permutoid transformation of fatty acid crystals into metallic soap crystals and the temperature dependence of the two-dimensional pressure of monolayers. A. A. Trapeznikov (Colloid-Elektrochem. Inst., Acad. Sci., U.S.S.R.). *Compt. rend. acad. sci. U.R.S.S.* 47, 344-7; *Doklady Akad. Nauk S.S.S.R.* 47, 349-53(1945); cf. *C.A.* 39, 2930¹.—The penetration of crystals by electrolytes and the different stages of the interaction of multivalent cations with fatty acid mols. within the crystal become apparent in a study of the temp. dependence of the two-dimensional equil. pressure of the monolayers that form upon spreading. The effect of electrolytes contg. multivalent cations manifests itself in the marked lowering of the two-dimensional pressure as compared with the equil. pressure on pure H_2O. Following is the equil. pressure (dynes/cm.) of a palmitic acid monolayer in contact with different underlying solns. Temp. is 75° above the m.p. of the crystals. H_2O 31.7; 0.02 *N* $CaCl_2$ 33.0; 0.02 *N* $Th(NO_3)_4$ 19.5; 0.02 *N* $CuSO_4$ 8.7; satd. $Ca(OH)_2$ 13.7. This also furnishes a new method of obtaining pure metallic soaps, free from univalent cations. The interaction of fatty acid crystals with electrolytes reaffirms that crystals in the hydrated state are three-dimensional analogs of monolayers. Lewis J. Ross

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



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Equilibrium between two- and three-dimensional hydrates of the higher alcohols and new phase transformations. A. A. Trapeznikov (Inst. Colloid Electrochem. Acad. Sci. U.S.S.R.). *Compt. rend. acad. sci. U.R.S.S.* 47, 417-20; *Doklady Akad. Nauk S.S.S.R.* 47, 435-8(1945).—Conformity between the structure and the properties of monolayers and three-dimensional systems is confirmed on the basis of comparison of the latent heats and the temp. of the phase transformations in the monolayer and the bulk hydrate. For ceryl alc. the melting temp. of the cryst. film was found to be 45.5°. Phase transformation occurs accompanied by the absorption of approx. 30,000 cal./mole. At 47° phase transformation evidently occurs in the bulk phase involving ~30,000 cal./mol. At 80° the bulk crystal is transformed into a turbid anisotropic liquid. This temp. corresponds to a visible melting of the crystallohydrate and the latent heat 3000 cal./mol. (from the cooling curve) or 8000 cal./mol. (from the heating curve). Monolayers of the C_{14}-C_{18} alc. and acid homologs are already found to be liquid-cryst. at ordinary temp. and require only a very small latent heat to pass over into the isotropically liquid state.

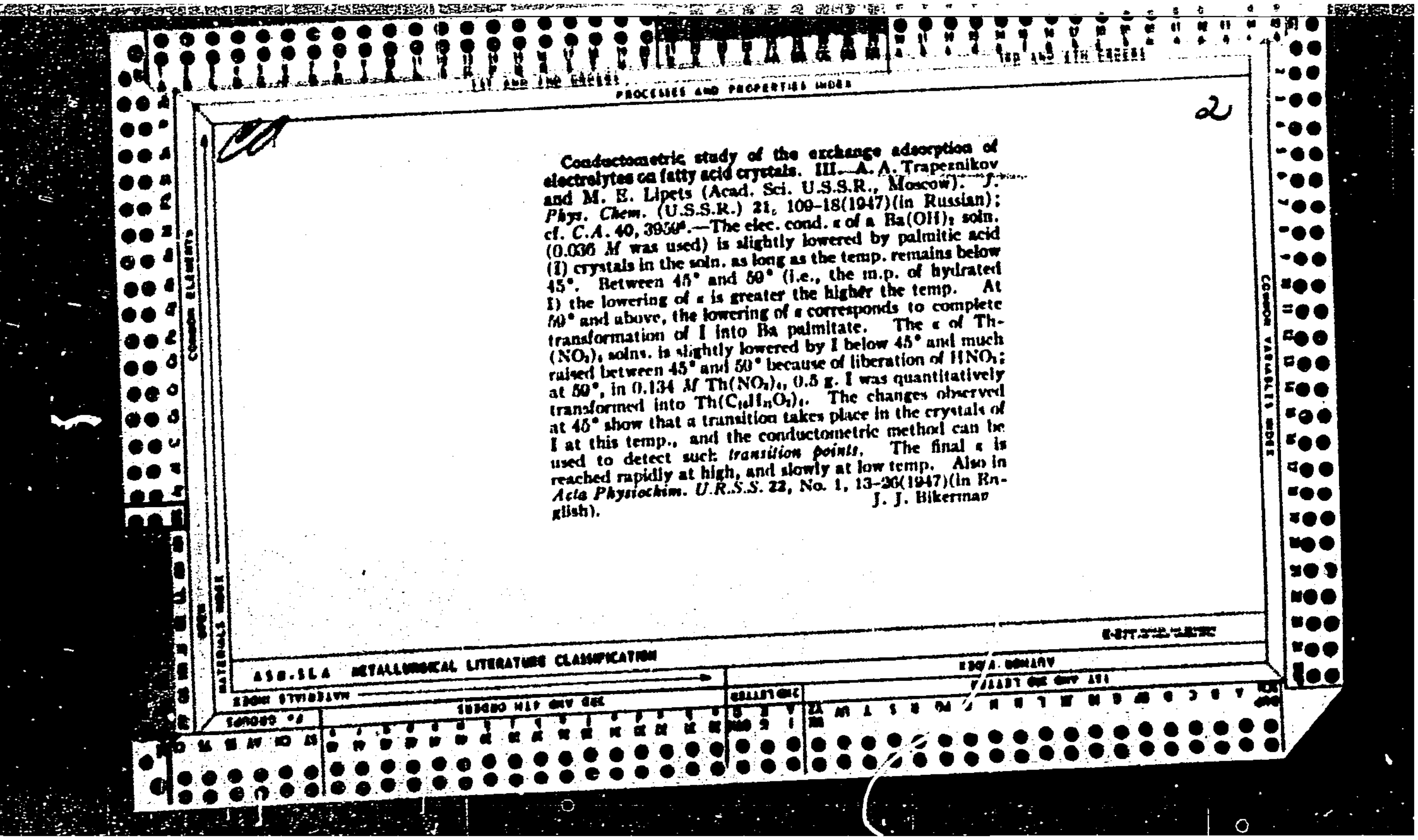
with $ThCl_4$, which, at higher concns. (about 1%), brings about a substantial drop in both η and ζ. (4) The behavior of the 3 types of suspensions towards the 2 groups of electrolytes is discussed in terms of peptization and lattice-formation effects. N. Thon

TRAPEZNIKOV, A. A.

Colloidal Electro-Chem. Inst., Acad. Sci., (-1946-)

"New Phase Transformations in Condensed Monolayers and in Three-Dimensional Hydrates of Higher Alcohols, II,"

Zhur. Fiz. Khim., No. 1, 1946.



Conductometric study of the exchange adsorption of electrolytes on fatty acid crystals. III.—A. A. Trapeznikov and M. E. Lipets (Acad. Sci. U.S.S.R., Moscow). *J. Phys. Chem.* (U.S.S.R.) 21, 109-18(1947)(in Russian); cf. *C.A.* 40, 3950^a.—The elec. cond. κ of a $Ba(OH)_2$ soln. (0.036 *M* was used) is slightly lowered by palmitic acid (I) crystals in the soln. as long as the temp. remains below 45°. Between 45° and 50° (i.e., the m.p. of hydrated I) the lowering of κ is greater the higher the temp. At 50° and above, the lowering of κ corresponds to complete transformation of I into Ba palmitate. The κ of $Th(NO_3)_4$ solns. is slightly lowered by I below 45° and much raised between 45° and 50° because of liberation of HNO_3; at 50°, in 0.134 *M* $Th(NO_3)_4$, 0.5 g. I was quantitatively transformed into $Th(C_{16}H_{31}O_2)_4$. The changes observed at 45° show that a transition takes place in the crystals of I at this temp., and the conductometric method can be used to detect such *transition points*. The final κ is reached rapidly at high, and slowly at low temp. Also in *Acta Physicochim. U.R.S.S.* 22, No. 1, 13-26(1947)(in English).

J. J. Bikerman

USSR/Physics Jan 1947
Adsorption
Fatty Acids

PA 26T57

"An Investigation of the Exchange Adsorption of Electrolytes on Fatty Acid Crystals by the Conduction Method, Part III," A. Trapeznikov, M. Lipetz, Academy of Sciences of the USSR, 14 pp

"Acta Physicochimica URSS" Vol XXII, No 1

The exchange adsorption of $Ba(OH)_2$ and $Th (NO_3)^4$ on palmitic acid crystals is investigated. The curve for the temperature relation of electrolytic conductivity reveals three ranges characterizing different rates and adsorption. The discontinuities correspond

BS 26T57

USSR/Physics (Contd) Jan 1947

with those of two-dimensional pressure curves of monolayers in equilibrium with crystals.

26T57

TRAPEZNIKOV, A.
BS

TRAPEZNIKOV, A. A.

42353: TRAPEZNIKOV, A. A. - Bezalmaznaya pravka shlifoval'nykh Krugov. (Zavod im. frunze). V sb: Opyt novatorov mashinostroyeniya. Kuybyshev, 1948, s. 197-204.

SO: Letopis' Zhurnal'nykh Statey, Vol. 47, 1948.

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

Ca

2

Investigation of viscoelastic properties of colloidal systems by the pendulum method. A. A. Trapeznikov and B. M. Shloberg. *Doklady Akad. Nauk S.S.S.R.* 62, 791-4(1948).—With a vertically oscillating pendulum, in the form of a sphere of 1 cm. diam. suspended on a spiral spring through a thin rod of 0.1 cm. diam., and immersed in a 5% soln. of Al naphthenate in a petroleum fraction b. 160-250°, the elasticity E of the colloidal soln., expressed by the increase ΔC of the elasticity of the pendulum spring, over its value C_0 in air, detd. by $\Delta C = 4\pi^2 M[(1/T^2) - (1/T_0^2)]$ (T = period, T_0 = period in air) was ~10 g./cm., independent of T between 0.3 and 0.8 sec. (at amplitudes 0.2-1.0 cm.), C_0 varying from 11 to 55.5 g./cm. and the moment of inertia M from 119.6 to 694.0 g. cm. Consequently, the relaxation time θ of that soln. is well over 0.8 sec. For a coaxial-cylinder pendulum, $E = K\Delta C$, where $K = (1/4\pi L)[(1/R_1^2) - (1/R_2^2)]$, L = length of the cylinder, R_1 and R_2 = radii of the inner and outer cylinder; the viscosity $\eta = Kp$, where p = moment of the friction forces, detd. from $\varphi = \varphi_0 e^{-C_0\tau/p}$, with φ = angle of deflection at the time τ, φ_0 = angle at the beginning of the aperiodic motion; the relaxation time $\theta = \eta/E$. With a coaxial pendulum of C_0 = 437.5 dyne cm./radian, M = 3856.1 g. cm., T_0 = 18.87 sec., K = 0.05778, one finds, for a 5% Al naphthenate soln., T = 5.28, E = 100.5 dyne/sq. cm., η = 2280.0 poises, θ = 22.7 sec., for a 10% soln., 2.8, 1096.6, 4985.0, 4.5, for a 5% Al stearate soln., 4.8, 356.85, 6187.0, 17.3. Values of E detd. by this method decrease somewhat with increasing M and T_0 at const. K, show no systematic variation with K varying from 0.2 to 0.002. N. Thon

Inst. Phys. Chem.
AS USSR

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

CA

2

Elastic properties of monolayers of proteins (myosin and myogen) and their temperature dependence, in connection with thermal denaturation. A. A. Trapeznikov. *Doklady Akad. Nauk S.S.S.R.* 63, 57-60(1948).—Measurements of the period T of a torsional pendulum of moment of inertia $M = 122$ g. cm.^{2} (in H_2O), radius of the disk $a = 1.0$ cm., radius of the vessel $b = 4.4$ cm., give the modulus of shear E_s of the monolayer (myosin on a 0.6 N KCl soln., myogen on H_2O or 0.6 N KCl) by $E_s = \pi M[(1/T^2) - (1/T_0^2)][(1/a^2) - (1/b^2)]$, and the dynamic viscosity of the elastic monolayer $\eta = (1/4\pi)[(1/a^2) - (1/b^2)](2\lambda M/T)$, from the damping decrement λ. The change of F (surface pressure in dynes/cm.), E_s (in dynes/cm.), and η (in surface poises), with the time of spreading τ (in min.) is illustrated by the data: τ = 0.75, 2, 5, 6.5, 25, 140, 190, F = 3.04, 5.03, 6.35, 6.59, 8.62, 9.98, 10.00, E_s = 0.113, 0.316, 0.58, 0.794, 2.03, 5.62, 6.91, η = 0.709, 1.845, 2.091, 2.341, 2.851 (max.), 2.401, 2.261. Curves of E_s against the temp. t show inflections at a denaturation temp. t_s which is equal to the denaturation temp. t_D (38–45°) in the bulk for myosine, but below t_D (55°) for myogen. Along the 1st branch, between room temp. and t_s, E_s decreases hyperbolically; the curve for myosin has a level portion at 40–45°. For myogen, the E_s curve is reflected, on 1st heating, at 40°; then E_s increases up to 55° from where on it remains very nearly const.; on 2nd heating, the hyperbolic decrease holds up to 55°, then E_s falls linearly with further rising t. Thermal denaturation in the monolayer is thus shown to occur in the temp. interval $t_s - t_D$; consequently, mere spreading to a monolayer is in no way analogous to denaturation in the bulk. Taking the thickness of a myosin monolayer to be 20 A., that of myogen 10 A. (from pressure-area detns.), E_s at 20°, calcd. for 1 cm. thickness of the layer, is, resp., 200 and 100 100 kg./sq. cm.

N. Thon

CHEMICAL ELEMENTS

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

2

Study of exchange adsorption of barium hydroxide by fatty acid crystals. M. K. Lipets and A. A. Trapeznikov. *Zhur. Fiz. Khim.* 23, 981-92(1949); cf. *C.A.* 41, 6107*c*.—The rate of decrease of elec. cond. of 6.3 g./l. $Ba(OH)_2$ on adding palmitic acid (I) increases with temp., and this increase is particularly marked at 47° and 50°. The apparent activation energy is 4300 cal./mole below 47°, 16,000 between 47° and 50°, and 227,000 between 50 and 60°. The temps. of the "transition points" are independent of pre-treatment of I (aging at 50.7°, solidification on glass or on H_2O, etc.) but seem to depend on the concn. of $Ba(OH)_2$ (1.3-18 g./l.). Two samples of stearic acids showed sudden changes of the rate of reaction with $Ba(OH)_2$ at 35, 48, and 60-65°. J. J. Bikerman

Inst. Phys. Chem, AS USSR

Elastic plastic properties of saponin adsorption layers and their comparison with [illegible] elastic plastic [illegible] of volume systems. A. A. Tr[illegible]znikov (Acad. [illegible] U.S.S.R., Moscow). *Kolloid. Zhur.* 12, 8[illegible]; cf. C.A. 43, 2487*d*. —The surface of [illegible] sapo[illegible] (surface tension 48 dynes/cm.), [illegible] 1 day old, [illegible] formed by a const. shearing stress *P* acting for the time τ. The strain *S* increased with τ in 4 stages: (*a*) Rapid increase; assuming it to be completed in 15 sec., the shearing modulus of the surface film becomes 55 dynes/cm. (*b*) Decelerating increase (i.e. $d^2S/d\tau$ was neg.). (*c*) Increase at a const. rate (i.e. $dS/d\tau$ was const.). At $P < 0.8$ dyne/cm. $dS/d\tau$ was kP, k = const., and at $P > 0.8$ $dS/d\tau$ (say, ω) increased with *P* more rapidly. The difference $\omega - kP$ at $P > 0.8$ was approx. a linear function of $(P - 0.8)$. Below $P = 0.8$ the surface viscosity was const. (about $2 \times 10^{[illegible]}$ g./sec.); it decreased on further increase of *P*. If in one expt. *P* was rapidly increased instead of being const., the great increase of $dS/d\tau$ with *P* was observed at, e.g., $P = 1.5$ instead of 0.8. (*d*) Accelerating increase observed at great *P* (e.g., 1.6) only. This behavior is similar to that of metals. A spr[illegible] dashpot system simulating it was devised. J. J. [illegible]

O. A.

2 2

Shearing stress and strength limit of consistent greases in the evaluation of their mechanical properties. A. A. Trapeznikov and S. Kh. Zakieva. *Doklady Akad. Nauk S.S.S.R.* **73**, 519-22(1950).—Strain (S)-time (τ) and strain (S)-stress (P) curves were detd., at 25° and −40°, for a grease (I) with 30% Ca stearate in nonpolar paraffin oil, and solidol (II) with 20% cottonseed-oil soap, under conditions of stepwise application of small load portions ΔP; such S-τ curves permit the detn. of the limiting stress P_k (yield point) of beginning marked plastic flow, and of the corresponding elastic S. The S-P curves constructed from such S-τ plots, correspond to infinitely slow loading, i.e. to the equil. S as a function of P. At $P > P_k$, the S-τ curves become linear, and the S-P curves vertical. At such infinitely slow loading, the P_k point coincides with the strength limit P_r. On rapid application of equal load portions ΔP, e.g. with time intervals $\Delta\tau$ = 5 and 1 min. between consecutive applications, the S-P curves of II at 25° are shifted somewhat, relative to the equil. curve, in the direction of higher P, whereas for I they coincide with the equil. curve. This indicates that, for I, P_r is identical with P_k, whereas for II there is a slight difference. At −40°, the 3 curves of S ($\Delta\tau$ = 1 and 5 min., and the equil. curve) diverge very markedly for both I and II, i.e. P_r is markedly higher than P_k. This result contradicts the expected increase of brittleness at lower temps., according to which P_k and P_r should draw closer to each other at lower temp. The contrary behavior of the consistent greases is attributed to a more rapid growth of the P-dependent structural viscosity η_r of plastic deformation (characteristic in the range $P > P_k$) with decreasing temp., as compared with its less rapid decrease with decreasing P, and as compared with the growth of P_k with falling temp. The magnitude of the spread between P_k and P_r characterizes the plasticity of the grease as against its brittleness; in this sense, I is more brittle than II at 25°, whereas at −40° both I and II are plastic. That this spread is detd. by solvation, and not only by an increase of the viscosity of the oil with decreasing temp., follows from the fact that paraffin in paraffin oil at −40° shows only brittle rupture. The rapid growth of η_r with decreasing temp. is due to increased strength of the linkage of the mols. in their solvate envelopes. For that reason, greater plasticity, in the above sense, also goes hand in hand with greater stability of the grease with regard to sepn. of the oil. From the point of view of practical requirements, a grease, in order to attain a large strain in a short time, should have a not-too-high η_r at P slightly above P_k, and falling rapidly with further increasing P, i.e. P_r should not be too far above P_k. N. Thon

L-A

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Dynamic and static methods of investigating the elastoviscous properties of protein monolayers. A. A. Trapeznikov. *Doklady Akad. Nauk S.S.S.R.* 74, 525-8(1950); cf. *C.A.* 44, 3767c.—Oscillating compression curves showing deformation (*S*) as a function of time (τ) for myosin monolayers that had been heated once to 85° but were held at 20° during the expts. were obtained at different shearing stresses. The exptl. data could be expressed by equations of the form $S/S_0 = (\tau/\tau_0)^a$, where S_0 is a const. depending on the shearing stress, τ_0 is a const. = to one-fourth the oscillation period, and *a* is a const. generally having a value near 0.1.

H. K. Livingston

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Fluidity and strength of oleogels. A. A. Trapeznikov and V. A. Fedotova (Inst. Phys. Chem., Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* **81**, 1101-4(1951).—Curves of the shearing stress P as a function of the deformation time τ, detd. with a 4% oleogel of Al naphthenate in decahydronaphthalene in the rate-of-shear (ω) range from 3.2×10^{-5} to 95.5 radians/sec., are of 2 types: at lowest ω, P increases monotonously with τ to an equil. P_s, corresponding to stationary flow; at somewhat greater ω, P passes through a max., after which it falls to the equil. P_s. Closer investigation showed the apparently smooth curves corresponding to ω from 2×10^{-4} to 5×10^{-4} also to possess a max., and only the curves for ω from 3.2×10^{-5} to 1.5×10^{-4} to have none. There is, consequently, a crit. ω_r below which a max. is rigorously absent and above which it appears. The magnitude P_s characterizes the purely viscous properties of the system, whereas the max. can be explained only in terms of elastic properties. The max., followed by a fall of P, indicates disruption of the structure; the value of P corresponding to the max. can therefore be considered as the strength of the system, P_r. The max. appears when P_s is greater than the yield point P_k. In the range of small $P < P_k$ and small $\omega < \omega_r$ the variation of P_s with ω is linear, i.e. the viscosity η_s is const.; in the range $P > P_k$ and $\omega > \omega_r$ the system is non-Newtonian, i.e. η is variable. This point corresponds to appearance of P_r. The following conclusions flow from these facts: P_k is the max. P at which the flow can still be stationary, without there being any disruption of the structure either on a macro or on a micro scale; correspondingly, ω_r is the max. rate of shear at which elastic stresses can still relax in a purely Maxwellian manner. In consistent greases, the relaxation period is so long, i.e. the rate of relaxation so small, that ω_r is beyond the exptl. sensitivity. In contrast to P_k, which is a true const., P_r depends strongly on ω; it is incorrect, as is sometimes done, to identify P_r with P_k; with increasing ω, more and more bonds become unable to relax, and P_r can exceed P_k by a factor greater than 100. The range $\omega > \omega_r$ is thus a range of incomplete relaxation. This range is subdivided into 2 subintervals: the curve has a distinct break at which very rapid growth of P_r sets in, i.e. relaxation becomes unusually difficult. The maxima on the P, τ curves are analogous to the maxima found in hydrophilic gels of bentonite clays and in solidols. Consequently, the same system, depending on ω in relation to the relaxation time of irreversible flow, can behave both as a brittle, i.e. perfectly solid, and as a viscous non-Newtonian liquid.

N. Thon

TRAPEZNIKOV, A. A.

Rheology

Methods for investigation of elastic-viscous properties of monolayers and of space colloids, and their rheological characteristics. Trudy Inst. fiz. khimii AN SSSR no. 1, 1952.

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

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Dependence of the elastic deformation of an oleogel on the rate of shear and its relation to viscometric properties. A. A. Trapeznikov and V. A. Fedotova (Inst. Phys. Chem., Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* **82**, 97-100(1952); cf. *C.A.* 46, 4326b.—Curves of the shearing stress P as a function of the relative deformation θ, detd. in a coaxial-cyclinder app., are given for different rates of shear ω; θ (in %) is defined by $\theta = [2R_2^2/(R_2^2 - R_1^2)](\omega\tau - \varphi)100$, where the deformation $S = \omega\tau - \varphi$ is the difference of the angles of rotation, $\omega\tau$ for the outer cyclinder (radius R_2) and φ for the inner cylinder (R_1), at the time τ. The curves are of 2 types, with P either increasing monotonously to a stationary value P_s, or passing through a max. P_r at θ_r, followed by a drop to P_s. With increasing P_r, θ_r first decreases somewhat and, after passing through a min. at $P_{r1} \approx 1100$ dynes/sq. cm., rises rapidly and levels off to $\theta_r(_{max}) \approx 9000\%$ at $P_{r2} \approx 3500$ dynes/sq. cm. The initial fall of θ_r is due to a decrease of the effect of relaxation flow superposed on the elastic deformation; the increase of P_r beyond P_{r2}, not accompanied by an increase of θ_r, is attributed to viscosity of elastic afteraction. These results confirm the viewpoint that in every structured system there exists a max. elastic deformation attainable under quick stresses which prevent the development of relaxation flow, and which can exceed very considerably the elastic strain corresponding to the flow limit. The growth of θ_r from $P_r > P_{r1}$ upwards shows that under quick stress the particles suffer strong elongation before they are broken up; this elongation can be visualized as disentanglement of entangled chains; thermal motion of the thread-shaped particle tends to restore the clew shape, which is the natural shape without stress. The plot of the velocity gradient $G = 2\omega/[1 - (R_1/R_2)^2]$ sec.$^{-1}$ as a function of P_s has the form typical of Bingham bodies, with G increasing approx. linearly from a certain $P_s = P_s'$ on; this P_s' is the strength limit for disruption of the structure under stationary flow conditions. The magnified initial portion of the curve shows presence of flow even at smallest P, i.e. the system can also be viewed as a non-Newtonian liquid, in addn. to being a plastic body. The beginning growth of θ_r at $P_r \approx 1100$ dynes/sq.cm. corresponds to $P_s \approx P_s' \approx 650$, where the dependence of G on P_s becomes linear; this point thus coincides with beginning disentanglement of the balls. Below P_s', the flow involves particles not yet disentangled. The plot of the viscosity $\eta = P_s/G$ as a function of P_s shows η_1 = const. at $P_s < P_s$ and η_1 falling at $P_s > P_s$; the fall is linear over an extended range. Extrapolation to $\eta_{ext.}$ gives $P_s' \approx 575$, close enough to 650 dynes/sq.cm., i.e. η_1 decreases mainly in the range $P_s < P_s'$. Somewhat below and above P_s', the fall of η becomes slower than linear, which can again be taken to indicate a change of the flowing particles from ball-shaped to partially disentangled. N. Thon

TRAPESNIKOV, A.A.

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

1. A. A. Abbasov, A. F. Kasimov, Ia. A. Shvarts (Baku): Supersonic motions of visco-plastic solids and the basis for improving well cementation.
2. A. A. Abbasov, V. M. Makhtiyev, A. A. Mirsufan (Baku): Heat transfer in moving viscous and visco-plastic solids.
3. B. L. Abramian (Erevan): Torsion of cylindrical shafts.
4. B. L. Abramian, A. A. Babloian (Erevan): Torsion of circular hollow shafts with longitudinal notches.
5. V. L. Agamirov, A. S. Volmir, V. E. Mineev (Moscow): Buckling and post-buckling behavior of shells under dynamic loading.
6. A. Ia. Aleksandrov (Novosibirsk): Some relations between the solutions of plane and axisymmetrical problems in the theory of elasticity.
7. A. Ia. Aleksandrov (Novosibirsk): Experimental investigation of plane elastic-plastic problems by means of photoelastic films.
8. V. M. Aleksandrov, Iu. A. Ustinov (Rostov-na-Donu): Some contact problems in elasticity.
9. B. A. Aleksandrian, N. Kh. Arutiunian, M. M. Manukian (Erevan): Torsion of prismatic bars under transient creep.
10. S. A. Alekseev (Moscow): Two-dimensional bodies of equal strength.
11. N. A. Alumiae (Tallin): Axisymmetrical vibration of an elastic conical shell.
12. S. A. Ambartsumian (Erevan): On the theory of anisotropic shells and plates.
13. S. A. Ambartsumian, L. A. Movsisian (Erevan): Some problems in the theory of anisotropic (non-orthotropic) shells.
14. L. Ia. Amiro (Kiev): Stability analysis of a stiffened cylindrical shell under axial compression.
15. V. V. Andreev, A. M. Kosevich, L. V. Tanatarov (Kharkov): The inelastic deformation and residual strains in a plane layer of a solid under allotropic transformations.
16. L. S. Aramanovich (Moscow): The stress distribution in a heavy half-space with a circular hole, the edge of which is subject to non-equilibrated forces.
17. M. Arcan, M. Tannenbaum (Bucharest): Photoelastic model studies of cracked reinforced concrete beams.
18. N. Kh. Arutiunian (Erevan): The plane contact problem of the theory of creep.
19. T. V. Assonova, T. I. Zatsepina, A. A. Trapeznikov (Moscow): Shear strengths and limits of reversible strains of solutions and gels of some rubbers.
20. E. N. Baida (Leningrad): The general solution of the problem of elastic strains in a cylinder of finite length.
21. G. I. Barenblatt (Moscow): The theory of equilibrium cracks under brittle rupture.
22. G. M. Bartenev (Moscow): Rheological properties of rubber-like polymers.
23. M. F. Barshtein (Moscow): Dynamic design of structures subjected to random effects.
24. S. F. Bashlubenko (Moscow): Temperature distribution in container and metal during extrusion.
25. Bao en Pin (Pekanian), Hsun Tszhu-Hua (Tsansha), G. S. Shapiro (Moscow): On the dynamics of rigid-plastic structures.
26. V. G. Berezantsev (Leningrad): The theory of the limit state of stress in soil mechanics and its applications.
27. A. Iu. Birkgan, A. S. Volmir (Moscow): The use of electronic digital computers for solving non-linear problems in the theory of plates and shells.
28. V. I. Blokh (Kharkov): Stress displacement functions.
29. V. A. Bobin (Dnepropetrovsk): Difference-variational methods of the theory of structures.
30. V. I. Boiko (Kiev): On solving Hertz's contact problem with interior fields of plasticity.
31. V. V. Bolotin (Moscow): Method of space transformations in the non-linear theory of plates and shells.
32. V. V. Bolotin (Moscow): The non-linear problems of aeroelasticity at supersonic speeds.
33. V. V. Bolotin (Moscow): Strength and damage under action of random forces.
34. V. V. Bolotin (Moscow): The statistical theory of seismic design of structures.

TRAPEZNIKOV, A.A.; BELUGINA, G.V.

Effect of the pH in the precipitation of aluminum soaps on the
viscosities of their oleogels. Doklady Akad. Nauk S.S.S.R. 87,
635-7 '52. (MLRA 5:11)
(CA 47 no.13:6220 '53)

1. Institut fizicheskoy khimii, Akademiya nauk S.S.S.R., Moscow.

TRAPEZNIKOV, A.A.

Influence of temperature upon the properties of aluminium soaps. A. A. Trapeznikov and G. V. Belugina (*C. R. Acad. Sci., U.R.S.S.*, 1952, 87, 825—827).—Experiments indicate the possibility of formation of Al soaps as definite chemical compounds in aq. solution during settling and not only during the following dehydration. Measurements of η of Al soaps of naphthenic acids at pH 3·4, 5, 7, and 9 at temp. 20—100° reveals the existence of an optimum temp. range (about 80°) where η reaches its max. Increase of the free alkali content from 36 to 72% makes thickening of the soaps in the optimum temp. range much more pronounced. The appearance of a max. on a η-temp. curve is due to the re-grouping of chemical bonds between the components of Al soaps which results in the formation of structures possessing high thickening properties.

S. K. Lachowicz.

TRAPEZNIKOV, A. A.; Fedotova, V. A.

"On the Connection between Deformation Stabilities and Viscous Properties of Oleophillic Gel Solutions and on the Thixotrophy of Liquid-Plastic Colloid Systems" (O svyazi mezhdu deformatsionno-prochnostnymi i byazkostnymi svoystvami oleofil'nykh gel'-rastvorov i o tiksotropii zhidko-plastichnykh kolloidnykh sistem) from the book Trudy of the Third All-Union Conference on Colloid Chemistry, pp. 65-91, Iz. AN SSSR, Moscow, 1953

(Report given at above Conference, Minsk, 21-4 Dec 53)

AUTHORS: Fedotova, V. A., Trapeznikov, A. A. SOV/20-120-4-42/67

TITLE: The Influence of the Concentration of the Oleogel of Aluminium Naphthenate Upon the Maximum Limit Deformation and Upon the Corresponding Strength of the Structure (Vliyaniye kontsentratsii oleogelya naftenata alyuminiya na maksimal'nuyu predel'nuyu deformatsiyu i sootvetstvuyushchuyu prochnost' struktury)

PERIODICAL: Doklady Akademii nauk SSSR, Vol. 120, Nr 4, pp. 841 - 844 (USSR)

ABSTRACT: The shear deformations corresponding to the ultimate stress limit are particularly marked in the oleogels of aluminium naphthenate; they amount to some thousand per cent and can therefore be regarded as being suitable superelastic highpolymeres. The authors investigated the dependence of the deformation ε_r, which corresponds to the ultimate stress limit, on the shear tension P_r for 2 - 20 - per cent oleogels of aluminium naphthenate in Decalin. The maximum limit deformation ε_{rm} decreases with increasing concentration of the oleogel; this indicates a decrease in elasticity. The authors also give a

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The Influence of the Concentration of the Oleogel of Aluminium Naphthenate Upon the Maximum Limit Deformation and Upon the Corresponding Strength of the Structure SOV/20-120-4-42/67

short explanation of the reasons of this decrease. The strength $P_r = P_{r_2}$ at which the deformation corresponding with the ultimate stress limit, ε_r, reaches its highest value ε_{rm} (by the increase of the velocity of deformation) increases in proportion to the concentration of the system and is a linear function of the number of local bindings between the separate chains. The depenedence of the value of ε_{rm} on the concentration C corresponds to a hyperbola of the first degree. The deformation energy to be applied up to breaking quickly increases at low concentrations of the gel; in the case of higher concentrations $C \sim 6 - 8\%$ it practically tends towards a constant value. This constancy indicates that the increase in bindings in the net of the lattice is compensated by a decrease of the deformation which corresponds with the ultimate stress limit. There are 4 figures, 1 table, and 13 references, 6 of which are Soviet.

Card 2/3

The Influence of the Concentration of the Oleogel of SOV/20-120-4-42/67
Aluminium Naphthenate Upon the Maximum Limit Deformation and Upon the
Corresponding Strength of the Structure

PRESENTED: February 7, 1958, by P. A. Rebinder, Member, Academy of Sciences, USSR

SUBMITTED: February 1, 1958

1. Aluminum naphthenate--Mechanical properties 2. Aluminum naphthenate--Structural analysis 3. Aluminum naphthenate--Elasticity 4. Aluminum naphthenate--Deformation 5. Polymers--Materials

Card 3/3

TRAPEZNIKOV A.A.

for the soap. Simultaneously [illegible] increased considerably
(C.A. 46, 4220b, 8472e) in [illegible] and 80° were treated
[illegible] at pH 6, 7, and 9 and 24 [illegible] and dried

TR[illegible]

3

Thixotropy and methods of estimating it in liquid-plastic colloidal systems. A. A. Trapeznikov and V. A. Fedotova. *Doklady Akad. Nauk S.S.S.R.* 95, 595-8(1954); cf. C.A. 46, 8472c.—A 1% oleogel of Al naphthenate in Decalin (I) was deformed in a concentric-cylinder viscometer at varying rates of shear ω (radians/sec.). The curve of shearing stress P vs. time τ passed through a max. P_r and then fell to an equil. P_e. If ω was decreased to zero and then increased again immediately, P then increased only to P_e; this indicated that thixotropic structure in I had not re-formed. If I "rested" before ω was increased again, the P-τ curve passed through a max., which reached P_r if I rested for a time t_B, dependent on ω. For $\omega = 2.05$ and 4.81, $t_B =$ 600 and 900 sec., resp. The max. value of t_B for re-formation of the structure at the highest velocity gradient G seems to characterize the thixotropy of the system. If ω was increased stepwise to 0.025, the P-τ curve showed a max. for each step; this indicated progressive breaking of bonds in I. Deformation at $\omega = 0.00075$ did not alter the shape of the subsequent P-τ curve; this showed that the structure was not disturbed below the min. ω (0.001455) for exhibition of anomalous viscosity and thixotropy. An increase of ω above 0.14 caused a very small max. in the P-τ curve. since the structure of I had already been destroyed. The amt. of thixotropy is related to the area between the P_r-G and P_e-G curves.

C. E. Feazel

(1)

TRAPEZNIKOV, A.A.:

TRAPEZNIKOV, A.A.: "The mechanical properties of surface layers at the water-air boundary and their temperature relationship in connection with phase transformations in the surface layers and the spatial crystals of organic substances". Moscow, 1955. Adad Sci USSR. Inst of Physical Chemistry. (Dissertations for the Degree of Doctor of Chemical Sciences)

SO: Knizhnaya letopis' No 44, 29 October 1955. Moscow.

TRAPEZNIKOV, A A

3

CH

(1)

The analogy between the deformation properties of liquid-plastic and solid-plastic systems. Two kinds of plastic deformations and plastic viscosities of colloidal systems. A. A. Trapeznikov and T. G. Shalopalkina. *Kolloid.* ~~*Zhur.* 17, 471-2(1955);~~ cf. *C.A.* 50, 2248*d*.—When a 2% soln. of Al naphthenate in paraffin oil was deformed between two coaxial cylinders at a const. rate of deformation increase (e.g. 0.26/sec.), the shearing stress P was a complicated function of deformation ϵ. When ϵ increased, P first linearly increased (as in elastic deformation of solids), then was almost independent of ϵ (as in plastic deformation of solids), then increased (as in work-hardening), then decreased, and finally again became independent of ϵ; thus, the curve of P against ϵ for a liquid was very similar to those for solids. The 2 parts of the curve, along which P was nearly independent of ϵ, corresponded to 2 types of plastic viscosity. J. J. Bikerman

TRAPEZNIKOV, A.A.

TRAPEZNIKOV, A.A.

Yield points, critical elastic deformation and critical rate of deformation in relaxing colloid systems. Dokl. AN SSSR 102 no.6: 1177-1180 Je'55. (MIRA 8:10)

1. Institut fizicheskoy khimii Akademii nauk SSSR. Predstavleno akademikom P.A.Rebinderom

(Rheology) (Colloids)

SOV/124-57-4-4434

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 4, p 80 (USSR)

AUTHORS: Trapeznikov, A. A., Fedotova, V. A.

TITLE: On the Connection Between the Strength-and-strain and the Viscosity Properties of Lyophilic Gel Solutions and on the Thixotropy of Liquid-plastic Colloidal Solutions (O svyazi mezhdu deformatsionno-prochnostnymi i vyazkostnymi svoystvami oleofil'nykh gel'-rastvorov i o tiksotropii zhidko-plastichnykh kolloidnykh sistem)

PERIODICAL: V sb.: Tr. 3-y Vses. konferentsii po kolloid. khimii. 1953 g. Moscow, AN SSSR, 1956, pp 65-91

ABSTRACT: Bibliographic entry

Card 1/1

TRAPEZNIKOV, Andrey Aleksandrovich

TRAPEZNIKOV, Andrey Aleksandrovich - Academic degree of Doctor of Chemical Sci, based on his defense, 1 Decemember 1955, in the Council of the Inst of Physical Chemistry, Acad Sci USSR, of his dissertation entitled: "Mechanical Properties of Surface Layers on the Dividing Line between Water and Air and Their Temperature Dependence on Phase Transformations in the Surface Layers and in Volumetric Crystals of Organic Substances. for the Academic Degree of Doctor of Sciences

SO: Byulleten' Ministerstva Vysshego Obrazovaniya SSSR, List No. 3, 4 February 1956 Decisions of the Higher Certification Commission Concerning Academic Degrees and Titles.

JPRS/NY 554

TRAPEZNIKOV, A. A.

Category: USSR

B-14

Abs Jour: RZh--Kh, No 3, 1957, 7737

Author : Trapeznikov, A. A.
Inst : Not given
Title : On Some Concepts and Methods Used in the Investigation of the Mechanical Properties of Structured Colloid Systems

Orig Pub: Kolloid. Zh., 1956, Vol 18, No 4, 496-505

Abstract: Reply to the article by N. V. Mikhaylov (RZhKhim, 1956, 576).

Card : 1/1

TRAPEZNIKOV, A. A.

"The Interaction of the Higher Fatty Acids with Electrolytes in Monolayers and Bulk Crystals," Moscow, 1957

Inst. Physical Chemistry, AS USSR

This paper discusses the kinetics of the spreading of monolayers from crystals on electrolytic solutions and some thermal properties of monolayers, the kinetics of the formation of monolayers from crystals of palmitic acid, the influence of temperature on the equilibrium between crystal and monolayer on solutions of electrolytes, the sorption of electrolytes by crystals of the fatty acids in aqueous solutions, the electrical conductivity of solutions of $AgNO_3$ in the presence of crystals of palmitic acid, and potentiometric measurements of the evolution of hydrogen ions in exchange sorption.

A-3,079,288

TRAPEZNIKOV, A. A.

"Application of the Method of Two-Dimensional Viscosity and Shear Strength to the Investigation of the Structure and Composition of Two-Sided Films and Surface Layers in Solutions of Sopas and Saponins," Moscow, 1957

A-3, 079,288

T[illegible]K[illegible] A.A

TRAPEZNIKOV, A.A.

Possible difference in the composition and viscosity correlation of bilateral films and surface layers of soap solutions. Koll.zhur. 19 no.2:252-255 Mr-Ap '57. (MLRA 10:5)

1. Institut fizicheskoy khimii AN SSSR, Moskva.
(Films (Chemistry))

20-114-6-39/54

AUTHOR: Trapeznikov, A. A.

TITLE: The Influence of the Concentration of the Electrolyte Solution (Copper Sulfate) Upon the Exchange Sorption by Fatty Acid Crystals (Vliyaniye kontsentratsii rastvora elektrolita /sul'fata medi/ na obmennuyu sorbtsiyu kristallami zhirnykh kislot).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 114, Nr 6, pp. 1280-1283 (USSR)

ABSTRACT: It was found (reference 1) that the fatty acid crystals are capable of sorbing cations from aqueous salt-solutions and are on this occasion converted to corresponding metal soaps. The velocity of the exchange reaction is highly dependent on temperature. This is especially connected with polymorphous transformations of these crystals and with the hydration acting upon the crystals. The metal cations especially strongly penetrate into the lattice near the melting point of the acid. The present paper studies the separation of hydrogen-ions by crystals of lauric-, myristic-, palmitic- and stearic acid in aqueous solutions of $CuSO_4$ of various concentrations. Figure 1 shows the dependence curves T' of the quantity of separated H^+-ions on the initial values

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The Influence of the Concentration of the Electrolyte Solution (Copper Sulfate) Upon the Exchange Sorption by Fatty Acid Crystals 20-114-6-39/54

of the pH of the solutions (table 1) for the C_{16}-, C_{14}- and C_{12}-acids at various moments, up to 200 days. The curves of the acids pass a maximum at pH = 4,75, which corresponds to C = 0,05 and to a quantity of hydrochloric acid like 10:1. The position of the maximum is for the 3 last-mentioned acids practically independent from the length of chain of the acid homologue and is determined by the nature of the electrolyte

$$[AgNO_3, Th(NO_3)_4, Ce(NO_3)_3]$$

With a shortening of the chain of the acid homologue the height of the curve increases, i.e. the H^+-ions are separated more intensively. The above-mentioned maximum represents an anomaly which may be explained in the following manner: In tests with palmitic acid in $AgNO_3$-solutions according to the conductometric method the author found that the conductivity of this solution at first solution at first decreases, then

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20-114-6-39/54

The Influence of the Concentration of the Electrolyte Solution (Copper Sulfate) Upon the Exchange Sorption by Fatty Acid Crystals

passes a minimum and again increases, in order to surpass the initial value (figure 2). This is to be traced back to the initial decrease in the total concentration of the electrolyte, apparently due to the molecular sorption of $AgNO_3$. This sorption should therefore be taken into account in tests with fatty acid crystals. This sorption must increase with increasing concentration of the electrolyte. The deceleration of the separation of H^+-ions with increasing $CuSO_4$-concentration may therefore be in connection with the influence of the same sorption. The inhibitions of the separation of H^+-ions are less distinct in the shortest acid homologues. Therefore the higher activity of the acid and the mobility of its molecules in the crystals, i.e. the "loosening" of the lattice, reduces the effect of the inhibiting barriers. This assumption was confirmed by additional tests. With an increase in the weighed quantity of acid the anormal curve with a maximum is transformed into a normal, uninterruptedly ascending curve. In this connection the pH drops to much lower values (tabke 2, figure 3). Thereby the specific influence of the passivator decreases. Due to a larger

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The Influence of the Concentration of the Electrolyte Solution (Copper Sulfate) Upon the Exchange Sorption by Fatty Acid Crystals

20-114-6-39/54

surface of the sorbent the reaction within a short period of time only takes place in the surface layers without penetrating into the interior of the crystal. Therefore the "barring" influence of the adsorbed ions hadrly takes any effect. The penetration of the electrolyte into the lattice of the acid apparently begins at the more damaged parts of the crystal, i.e. at the corners and edges where the acid molecules are less completely packed and the polar groups are better accessible for the molecules of the electrolyte. The supposed stages of this process are described. The polymorphous transformation accelerates the exchange reactions. There are 3 figures, 2 tables, and 2 references, all of which are Slavic.

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

PRESENTED: January 26, 1957, by P. A. Rebinder, Academician

SUBMITTED: January 24, 1957

Card 4/4

AUTHORS: Zotova, K. V., and Trapeznikov, A. A. 20-117-5-30/54

TITLE: Shear Strength of Two-sided Films and Surface Layers in Saponin Solutions (Sdvigovaya prochnost' dvustoronnikh plenok i poverkhnostnykh sloyev v rastvorakh saponina).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 5, pp. 833-836 (USSR).

ABSTRACT: The simultaneous investigation of the mechanical properties of mechanical films and of surface layers at differing concentrations represents a new method for the study of the properties and of the composition of two-sided films. The present paper employs the method of shear strength of surface layers and of two-sided films. Two concentric rings consisting of platinum wire with a diameter of 0,1 cm and with the radii $R_1 = 2,738$ cm and $R_2 = 2,995$ cm were mounted in a horizomtal position. The further set-up of the experimental arrangement is described. The authors investigated various saponines, which obviously display widely differing abilities for the formation of films and of foam and different mechanical properties. Here, imported and Sovietic saponines were examined. The present paper investigates the data of one of the imported saponines, that is to say Kahlbaum (Kal'baum), which formed films of a comparative stability and with good

Card 1/3

Shear Strength of Two-sided Films and Surface Layers in Saponin Solutions.

mechanical properties between the rings. A diagram illustrates the curves of the dependence of the deformation Σ on the shear strength for the two-sided films, which were produced from solutions with varying concentrations. If P reaches a certain value $P = P_r$, then Σ increases particularly quickly. This speaks in favour of a flowing, which is connected with a destruction of structure. A further diagram illustrates the curves of the dependence of Σ on P of surface layers in identical saponine solutions. In general, they resemble the curves of the films, they show, however, a less marked transition to the vertical domain, which characterises the destruction of structure and the flowing process. The quantity P_r of the surface layers increases continuously with an increasing concentration, the quantity P_r of the films produced from the same solutions passes through a sharp maximum in the range of comparatively low concentrations of the solution. The strength of the adsorption layer of the film reaches only half the amount of the strength of the surface. Without doubt, even saponines carefully purified contain components with a differing surface activity, even the more the cheaper varieties, which are differing by their molecular structure. The results found here permit the expla-

20-117-5-30/54

Shear Strength of Two-sided Films and Surface Layers in Saponin Solutions.

nation of numerous peculiarities of the stability of foams. There are 4 figures, and 6 Slavic references.

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

PRESENTED: June 11, 1957, by P. A. Rebinder, Academician.

SUBMITTED: June 1, 1957.

Card 3/3

SOV-120-58-3-23/33

AUTHOR: Trapeznikov, A. A.

TITLE: An Elastorelaxometer for the Measurement of High-Elastic Deformations, Rigidity and Relaxation of Colloidal Systems (Elastorelaksometr dlya izmereniy vysokoelasticheskikh deformatsiy, prochnosti i relaksatsii kolloidnykh sistem)

PERIODICAL: Pribory i Tekhnika Eksperimenta, 1958, Nr 3, pp 93-96 (USSR)

ABSTRACT: The author has shown (Ref.1) that a large number of gel-like systems, or the so-called elastic liquids, have large or even gigantic (of the order of a few thousands of per-cent) limiting deformations. A system consisting of two coaxial cylinders is described which can be used to measure such deformations at different rates of deformation and pre-set values of the deformation. The instrument (illustrated in Fig.1) incorporates the following features. The outer cylinder can rotate at constant speed and is automatically brought to rest at a preset angle. The instrument measures the maximum shear stress which develops when deformation up to the preset angle takes place. The inner cylinder may be kept practically in the initial position while the outer cylinder rotates up to the preset angle. The inner cylinder is automatically released a short time after the

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SOV-120-58-3-23/33

An Elastorelaxometer for the Measurement of High-Elastic Deformations, Rigidity and Relaxation of Colloidal Systems

outer cylinder has come to rest. This delay time can be adjusted to a predetermined value. The angle of recoil of the inner cylinder after the outer cylinder has come to rest, may also be measured. The viscosity of the liquid may of course be also measured with the system by the usual coaxial cylinders method (Searle's method). P. G. Glebov collaborated. There are 3 figures, 1 table and 3 Soviet references.

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

SUBMITTED: July 26, 1957.

1. Colloids--Mechanical properties 2. Colloids--Testing equipment 3. Colloids--Test methods

Card 2/2

TRAPEZNIKOV, A.A.

AUTHORS: Belugina, G.V., and Trapeznikov, A.A. 69-20-1-1/20

TITLE: The Effect of the Conditions for the Preparation of the Aluminum Soaps of Naphthenic Acids on the Properties of Their Oleogels (Vliyaniye usloviy prigotovleniya alyuminiyevykh myl naftenovykh kislot na svoystva ikh oleogeley)

PERIODICAL: Kolloidnyy Zhurnal, 1958, Vol. XX, # 1, pp 3-12 (USSR)

ABSTRACT: The authors developed a precipitation method for the preparation of aluminum-soaps in which aqueous solutions of $Al_2(SO_4)_3$ and sodium soaps are poured together, the pH being held constant. The general view of the laboratory equipment used in the precipitation of aluminum soaps of naphthenic acids is shown in fig. 1. It was established by experiment that the thickening properties of the soaps and the structure and stability of their oleogels are strongly affected by the following factors:

1. The ratio of free to bound alkali (fig. 2 and 3). The viscosity of the oleogels of Al-soaps grows with their free alkali content, attaining a maximum at 75-100%. The stability decreases when the alkali content increases. The most stable oleogels are those precipitated with a free alkali content below 50%.

2. The pH during the precipitation (fig. 5). The viscosity of

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69-20-1-1/20

The Effect of the Conditions for the Preparation of the Aluminum Soaps of Naphthenic Acids on the Properties of Their Oleogels

the oleogels precipitated at different pH values (10-3.5) grows with diminishing pH passing through a maximum at pH 5. 3. Temperature. The thickening capacity of the Al-soaps increases with the temperature (20-92°C) passing through a maximum at about 80°C. Thermal treatment of the prepared soaps also raises their thickening capacity (fig. 8). The precipitation and treatment temperatures have no significant effect on the stability of the oleogels.

Diminishing the concentrations of the $Al_2(SO_4)_3$ solutions and particularly of the sodium soaps used for precipitating the Al-soaps raises the thickening capacity. A comparison of the thickening properties of the Al-soaps prepared by the "direct" precipitation method and by precipitation at constant pH of the medium showed that on precipitating under optimal conditions (pH 5, elevated temperatures) soaps with higher thickening capacity are obtained by the latter method. The dependence of the viscosity on the time of keeping the oleogels of soap in various solvents (cryoscopic benzene, aviation gasoline type B-70, gasoline, pyrolysis products of kerosene con-

Card 2/3

69 -20-1-1/20

The Effect of the Conditions for the Preparation of the Aluminum Soaps of Naphthenic Acids on the Properties of Their Oleogels

taining a considerable quantity of unsaturated hydrocarbons) is shown in fig. 11. The correlations found for Al-soap gels in a pure non-polar solvent, like cryoscopic benzine, hold also for the gels in industrial solvents.

The results of this study were used in process development of Al-naphthenate soap production.

There are 10 graphs, 2 tables, 1 photo, and 25 references 8 of which are Soviet, 6 American, 5 British, 3 German, 1 Canadian, 1 Indian, 1 Scandinavian.

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

SUBMITTED: February 20, 1957

AVAILABLE: Library of Congress

Card 3/3

69-58-2 -23/23

AUTHORS: Trapeznikov, A.A.; Belugina, G.V.; Rzhavskaya, F.M.

TITLE: News in Brief. The Effect of the Ratio of Free to Bound Alkali During Precipitation of Aluminum Soaps on Their Thickening Properties (Kratkiye soobshcheniya. Vliyaniye sootnosheniya svobodnoy i svyazannoy shchelochi pri osazhdenii alyuminiyevykh myl na ikh zagushchayushchuyu sposobnost')

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 2, pp 254-255 (USSR)

ABSTRACT: The composition and the thickening properties of aluminum soaps are determined by the molecular weight and the natural organic radical of the acid, and by the ingredients and preparing conditions of the acid. Among these factors, the ratio of free to bound alkali plays an important role. In this article, the preparation of aluminum soaps from naphthenic acids with a molecular weight of 250 is described. The temperature was 80°C. The free alkali content varied from 25 to 200 %. Figure 1 shows that the best results were obtained with an excess of 75 % of free alkali. There are 2 graphs and 5 references, 3 of which are Soviet, and 2 English.

Card 1/2

69-58-2 -23/23

News in Brief. The Effect of the Ratio of Free to Bound Alkali During Precipitation of Aluminum Soaps on Their Thickening Properties

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of Physical Chemistry of the USSR Academy of Sciences, Moscow) Moskovskiy filial VNIIZh, Moskva (Moscow Branch of the VNIIZh, Moscow)

SUBMITTED: July 6, 1957

1. Aluminum--Soaps--Composition 2. Aluminum--Soaps--Thickening properties

Card 2/2

AUTHORS: Trapeznikov, A.A.; Assonova, T.V. 69-20-3-24/24

TITLE: Investigation of the Strength and High Elastic Properties of Rubber Solutions and of Their Vulcanizates at Increased Deformation Rates (Issledovaniye prochnostnykh i vysokoelasticheskikh svoystv rastvorov kauchuka i ikh vulkanizatov pri povyshennykh skorostyakh deformatsii)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 398-399 (USSR)

ABSTRACT: The investigation of the strength and high elastic properties of rubber solutions and their vulcanizates is important for determining the structure and structure formation of these solutions and vulcanizates. An elasto-viscosimeter with oscillographic recording and an elasto-relaxometer were used to measure these properties. In Figure 1, the values for a 6% rubber solution in decalin are presented. The ultimate deformation under shearing conditions attains a value of 5,000%. Figure 2 shows that vulcanization of a 2% rubber solution augments the elastic deformation to 4,000 - 5,000%. There are 2 graphs and 3 Soviet references.

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

SUBMITTED: March 25, 1958

Card 1/1

1. Rubber solutions—Elastic properties 2. Rubber solutions —Deformation

SOV-69-58-4-13/18

AUTHOR: Trapeznikov, A.A.

TITLE: Strain Relaxation and Repeated Deformation of Aluminum Naphthenate Gels (Relaksatsiya deformatsii i povtornoye deformirovaniye geley naftenata alyuminiya)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 4, pp 476-486 (USSR)

ABSTRACT:

Relaxation is one of the most important elements of the rheo-
logical properties of a structural colloidal system. It is
important to differentiate between strain relaxation and de-
formation relaxation. In the article, the elastic recoil and
the relaxation of elastic deformation in aluminum naphthenate
gels under various deformations has been investigated. An
elastorelaxometer (Ref. 11) was used to study the relaxation
of deformation in fast-relaxing high-elastic gels. Figure 1
shows the relaxation curves for θ_e corresponding to various
values of θ. The speed of relaxation deformation depends
considerably on the value of the given and the elastic de-
formation. This is connected with the change of particle con-
figuration and with the destruction of structure. With an in-
crease of θ the values for θ_{e0}, which correspond to the be-
ginning of the linear sections, increase to $\theta = 90^\circ$, but later
they decline markedly. The speed of deformation plays a con-

Card 1/3

SOV-69-58-4-13/18

Strain Relaxation and Repeated Deformation of Aluminum Naphthenate Gels

siderable role in fast-relaxing systems. The method of repeated deformation is used for investigating structural changes in colloidal systems. It is applied in two variants: 1) the gels are deformed with short intervals which do not suffice for complete relaxation; 2) or they are deformed slightly and after a short interval considerably. Figure 6 shows the dependence curves of shear stress and elastic recoil on the time intervals. In 3%- and 4%-gels, there are two fields of deformation: 1) the field of small deformation in which the shear stress depends on the time interval, whereas the deformation does not depend on it; 2) the field of large deformations in which the stress and the elastic recoil depends on the time interval between subsequent deformations. The data show that in the systems there is a set of structural elements which is characterized by different critical deformations and times of relaxation. In low gel concentrations these elements act independently, in stronger concentrations the structure of the short structural elements affects also the longer elements. There are 9 graphs, 2 tables, and 14 references, 10 of which are Soviet, 2 English, 1 German, and 1 French.

Card 2/3

Strain Relaxation and Repeated Deformation of Aluminum Naphthenate Gels SOV-69-58-4-13/18

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

SUBMITTED: July 24, 1957

1. Gels--Physical properties 2. Metallic soaps--Physical properties

Card 3/3

TRAPEZNIKOV, A. A.; VOYUTSKIY, S. S.; YAMPOL'SKIY, B. Ya.; VINOGRADOV, G. V.;

" Problems of rheology and structure formation of the oleophilic systems."

report presented at the Fourth All-Union Conference on Colloidal Chemistry, Tbilisi, Georgian SSR, 12-16 May 1958 (Koll zhur, 20,5, p.677-9, '58, Taubman, A.B)

AUTHORS: Trapeznikov, A.A., Tolmachev, A.M. 76-32-3-40/43

TITLE: On the Influence Exerted by the Conditions of Precipitation of Aluminum Hydroxide Upon the Properties of Thickening
(O vliyanii usloviy osazhdeniya gidrookisi alyuminiya na yeye zagushchayushchiye svoystva)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol 32, Nr 3
pp 725-726 (USSR)

ABSTRACT: The mechanical properties of aluminum oxide pastes in paraffin oil were hitherto investigated, except for those properties mentioned in the title, which are, however, of importance in the production of polarographic colors. The present paper deals with the influence of the pH in precipitations upon the thickening properties of aluminum hydroxide in nonpolar medical paraffin oil. Two varieties of the production of the paste are described, the second one being a modification of the method of precipitation according to A. A. Trapeznikov (reference 2). The aluminum hydroxide precipitations were performed at different pH and the prepared paste was then examined for its bending strength. The test apparatus

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76-32-3-40/43

On the Influence Exerted by the Conditions of Precipitation of Aluminum Hydroxide Upon the Properties of Thickening

developed in the institute mentioned below had already been described and is based on a tangential arrangement of the samples. The obtained results are graphically represented and it is concluded from them that the pH value of the precipitation exerts a very great influence upon the properties of aluminum hydroxide, so that in the case of several equal pH values products with the necessary properties can be obtained. There are 1 figure, and 4 references, 4 of which are Soviet.

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

SUBMITTED: June, 12, 1957

Card 2/2

AUTHORS: Shalopalkina, T. G., Trapeznikov, A. A. 20-118-5-41/59

TITLE: The Influence of the Deformation Rate on the Tixotropic Reduction Rate of Aluminum Naphthenate Gel and the Oscillographic Recording Method of Stress-Deformation Curves (Vliyaniye skorosti deformirovaniya na skorost' tiksotropnogo vosstanovleniya gelya naftenata alyuminiya i metod ostsillograficheskoy zapisi krivykh napryazheniye - deformatsiya)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 5, pp. 994-997 (USSR)

ABSTRACT: The investigation of the tixotropy (tiksotropiya) is to be based on the application of the dissolving effect upon the system at any certain velocity gradient $\dot{\varepsilon}_{\text{dissolution}}$. The last measurements of reduction of structure are also to be carried out at a certain velocity gradient $\varepsilon_{\text{modification}}$. Thereby the following two methods can be used:
1) $\varepsilon_{\text{dissolution}} = \dot{\varepsilon}_{\text{modification}}$ and

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2) $\varepsilon_{\text{dissolution}} \gg \varepsilon_{\text{modification}}$.

By means of applying both methods a sufficiently complete investigation of the tixotropy, and conclusions on the specific peculiarities of structure of the system to be investigated are rendered possible. At small $\dot{\varepsilon}$ the compensation method is completely reliable in determining the curve $P(\varepsilon)$ which characterizes the most important rheological properties of the system. For the purpose of determining those curves $P(\varepsilon)$ at great $\dot{\varepsilon}$ the authors developed a method of automatic recording. The device for this recording operates as follows: On the axis of a cylinder a small mirror is fastened, on which a beam of light with rectangular cross section is incident through a condenser and a focusing lens. This beam of light is reflected by the mirror onto a selen-photoelement, the illuminated surface of which is limited by a special reactangular frame. The photoelectric current being proportional to the illuminated surface is then transmitted

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to the loop of the oscillograph. The simultaneous recording of the angle of rotation φ of the interior cylinder of the measuring device (and therewith of the stress P), and of the angle of rotation θ of the exterior cylinder, i.e. of the deformation ε, and of the deformation rate $\dot{\varepsilon}$ is of special importance. The carrying out of the measurements is shortly described, from which the following results are obtained:

1) The structural strength P_r is determined at different $\dot{\varepsilon}_{dissolution} = \varepsilon_{modification}$ by the different elements of structure, which are differented by their reduction rate.

2) Those structure elements, which guarantee P_r at a smaller ε do not determine P_r at a greater ε. 3) At different $\dot{\varepsilon}$ the states of structure corresponding to the time, which is necessary for a complete reduction, are not equal. Besides the here investigated reversible destruction of structure

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in the present system there also exists an irreversible destruction of structure, which possibly may be caused by the aging of the system.
There are 4 figures and 4 references, 4 of which are Soviet.

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

PRESENTED: July 18, 1957, by S. I. Vol'fkovich, Member, Academy of Sciences, USSR

SUBMITTED: July 12, 1957

Card 4/4

FEDOTOVA, V.A.; TRAPEZNIKOV, A.A.

Dependence of the lower structural strength limit and critical velocity gradient of aluminum naphthenate oleogel. Dokl. AN SSSR 120 no. 1:130-133 My-Je '58.
(MIRA 11:7)

1. Predstavleno akademikom M.M.Dubininym.
(Aluminum organic compounds)
(Colloids)

FEDOTOVA, V.A.; TRAPEZNIKOV, A.A.

Effect of aluminum naphthanate oleogel concentration on maximum ultimate deformation and related shear strength of a structure. Dokl. AN SSSR 120 no. 4:841-844 Je '58. (MIRA 11:8)

1. Predstavleno akademikom P.A.Rebinderom.
(Colloids)

10(0) SOV/30-59-2-25/60

AUTHORS: Trapeznikov, A. A., Volarovich, M. P.

TITLE: News in Brief (Kratkiye soobshcheniya). III. International Congress on Rheology (III. Mezhdunarodnyy kongress po reologii)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 2, pp 82-83 (USSR)

ABSTRACT: The Congress was held at Bad-Oeynhausen (German Federal Republic) between September 23 and September 30, 1958. Scientists from 18 countries took part in it. Reports on various fields of rheology were heard and discussed. N. V. Mikhaylov, M. P. Volarovich, G. V. Vinogradov, A. A. Trapeznikov, Yu. F. Deynega (all from the USSR) delivered a number of reports on those problems. For the time of the Congress an exposition of rheological apparatus had been provided for. The shown rotational viscosimeters are regarded by the authors to be especially appropriate.

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5(4) SOV/69-21-1-16/21

AUTHOR: Trapeznikov, A.A.

TITLE: A New Instrument (the Elastorelaxometer) for Research on Large Reversible Deformations, Ultimate Strength and Relaxation of Highly Elastic Colloid Systems and on the Polymer Solutions (Novyy pribor (Elastorelaksometr) dlya issledovaniya bol'shikh obratimykh deformatsiy, prochnosti i relaksatsii vysokoelasticheskikh kolloidnykh sistem i rastvorov polimerov).

PERIODICAL: Kolloidnyy zhurnal, 1959, Vol XXI, Nr 1, PP 108-118 (USSR)

ABSTRACT: An apparatus, the elastorelaxometer, has been devised for the direct measurement of large elastic deformations under shear conditions, and of their relaxation in colloid systems characterized by a relatively rapid course of the latter and requiring accelerated rates of a deformation and of a change in given deformations

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SOV/69-21-1-16/21

A New Instrument (The Elastorelaxometer) for Research on Large Reversible Deformations, Ultimate Strength and Relaxation of Highly Elastic Colloid Systems and on the Polymer Solutions.

within wide limits, covering the transition through the ultimate strength values and steady state flow. Measurements carried out on this apparatus showed that the elastic recoil of diluted aluminum naphthenate gels may reach 6,000 %. The ultimate elastic deformations have been shown to be independent of the thickness of the layer being shifted (0.5-2.0 mm). There are 7 graphs, 2 diagrams, 3 tables and 12 references, 10 of which are Soviet, 1 English and 1 Dutch.

ASSOCIATION: Laboratoriya oleokolloidov i monosloyev, Institut fizicheskoy khimii AN USSR. (Laboratory of Oleocolloids and Monolayers, Institute of Physical Chemistry of the AS USSR).

SUBMITTED: September 17, 1957

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SOV/69-21-3-25/25

5(4)

AUTHORS: Trapeznikov, A.A. and Shchegolev, G.G.

TITLE: The Effect of Some Additives on the Syneretic and Strength Properties of Lithium Grease and on its Submicrostructure

PERIODICAL: Kolloidnyy zhurnal, 1959, Vol XXI, Nr 3, pp 374-375 (USSR)

ABSTRACT: The authors present a study on the effect of lauric an nonylic acid on the structural and syneretic properties of lithium grease. A 10% lithium stereate solution in vaseline was cooled in two stages. The additives were gradually introduced into the system, previous to the dissolution of the soap. Graph 1 shows that the structural strength and oil syneresis of the system are strictly correlated, reaching respectively, maxima and minima shortly after the initiation of the process. Subsequently the curves converge and intersect, indicating decay of the

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SOV/69-21-3-25/25

The Effect of Some Additives on the Syneretic and Strength Properties of Lithium Grease and on its Submicrostructure

structure and increase of syneresis. The process is decisively determined by the quantities of acid added, maximum and minimum effect of lauric acid being on the side of less molecular interaction between additive and soap as compared to the extreme, absolutely higher, values of nonylic acid effect. The authors inserted 4 electron microscopic photographs of lithium soap microfibers with and without nonylic acid additive. The photographs show the change in size and shape in dependence on the quantities of acid. Photo 4 shows the additional effect of aging. There are 4 electron microscopic photographs, 1 graph and 4 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR - Laboratoriya oleokolloidov i monosloyev, Moskva (Institute of Physical Chemistry of the AS USSR - Laboratory of

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SOV/69-21-3-25/25

The Effect of Some Additives on the Syneretic and Strength Properties of Lithium Grease and on its Submicrostructure

Oil Colloids and Monolayers, Moscow)

SUBMITTED: 10 July, 1958

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USCOMM-DC-61,311

SOV/69-21-4-18/22

5(4)

AUTHOR: Trapeznikov, A.A. and Assonova, T.V.

TITLE: Stress-Strain, High Elasticity and Viscosity Properties of Rubber Solutions

PERIODICAL: Kolloidnyy zhurnal, 1959, Vol XXI, Nr 4, pp 485-491 (USSR)

ABSTRACT: This is an investigation of the stress-strain, high-elasticity and viscosity properties of 4, 6 and 10% natural-rubber solutions in decalin which was not subjected to special purification. The authors plottted stress-strain curves with the aid of a complex elastoviscometer permitting oscillograph recording [reference 8]. The investigation was carried out at rates of deformation $\dot{\varepsilon}$ varying from 14 to 5,000 sec^{-1}. The authors considered it necessary to investigate the strength properties of the concerned system at $\dot{\varepsilon}$ values, which exceed the rate of relaxation of the system. It was found that the curves (graph 1) prior to transition to the stage of stationary flowing of the system as a viscous liquid pass through a maxi-

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Stress-Strain, High Elasticity and Viscosity Properties of Rubber Solutions

mum which corresponds to the ultimate strength of the system. Moreover, the ultimate shear deformation breaking (up to 10,000%) was determined. The obtained curves are similar in form to those of solid ruber. It was further found that for rubber solutions of various concentrations ε_r (ultimate shearing strain) increases linearly at a rate of deformation $\dot{\varepsilon}$. This dependence is expressed by a general curve (graph 4). With the aid of an elastorelaxometer (model 2) /reference 9/ the inverse (high-elastic) deformation in a 4% rubber solution was measured at rates of deformation of 143 and 1,142 sec $^{-1}$ (graph 5). It was found that the maximum values of elastic deformation represent 770 and 1.100% respectively. On the whole the found properties give evidence of a structure and its demolition in rubber solutions. The structure is determined by Van der Waals forces and the genesis of weak relaxing nodules of the network. In addition, the above-mentioned linear increase of ε_r points to the eminent role of the relaxation properties of the rubber chains themselves. There are 5 graphs and 14 refer-

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Stress-Strain, High Elasticity and Viscosity Properties of Rubber Solutions

ences, 13 of which are Soviet and 1 German.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry of the AS USSR)
Laboratoriya oleokolloidov i monosloyev Moskva (Laboratory of Oleocolloids and Monolayers) Moscow

SUBMITTED: 15 March 1958

Card 3/3

AUTHORS: Trapeznikov, A. A., Shchegolev, G. G., Astakhov, I. I.

SOV/48-23-6-27/28

TITLE: An Electron-microscopical Investigation of the Influence of the Conditions of the Preparation of the Consistent Lithium Grease on Their Microstructure (Elektronnomikroskopicheskoye issledovaniye vliyaniya usloviy prigotovleniya litiyevoy konsistentnoy smazki na yeye mikrostrukturu)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 6, pp 777-779 (USSR)

ABSTRACT: In the introduction to the present paper the increasing importance of consistent lithium lubricants is pointed out and it is shown that their properties depend on the nature of cooling. In the first part of the paper the material and the methods of the investigation are described and the dependence of the solid state of a 10 % isotropic solution of stearate of lithium in medical vaseline on the nature of the two-stage cooling is shown in a diagram (Fig 1). The curve has marked maxima and minima. As shown by electron-optical investigation, also the shape and size of the fiber-structure of the solution is connected with this phenomenon. Figure 3 gives

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An Electron-microscopical Investigation of the Influence of the Conditions of the Preparation of the Consistent Lithium Grease on Their Microstructure SOV/48-23-6-27/28

nine examples of this kind; cooling methods are discussed. The solution is cooled from 230° C to a certain temperature within the range of between 230 and 0°, where this temperature is maintained for 30 minutes, after which cooling is continued. In the last part of the paper the influence of impurities upon the fiber structure is investigated. As impurity, $1.8 \cdot 10^{-2}$ mol nonylic acid was admixed per mol stearate. Figure 3 shows the effect produced by this admixture upon the fiber structure. There are 3 figures and 7 references, 3 of which are Soviet.

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

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SOV/32-25-5-44/56

28(5)

AUTHORS: Shchegolev, G. G., Tolmachev, A. M., Trapeznikov, A. A.

TITLE: Apparatus for Investigating the Properties of Resistance to Deformation of Pasty Colloid Systems (Pribor dlya issledovaniya deformatsionno-prochnostnykh svoystv pastoobraznykh kolloidnykh sistem)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 5, pp 625-627 (USSR)

ABSTRACT: An apparatus is described which operates on the principle of the tangent shift of a steel lamella, which has already been used in asphalt investigations (Ref 1), etc (Refs 2-4). One of the advantages of the apparatus is that the structure of the system to be investigated is not destroyed when the corresponding substance is filled in. The apparatus (Fig 1, Draft) has a cuvette and a drive. The latter can load the measuring metal lamella either constantly or increasingly in certain intervals. The cuvette consists of two screwed metal lamellas (Fig 2) of stainless steel. The substance to be investigated is filled in a grooved indentation of the cuvette bottom where also the equally grooved measuring metal lamella is inserted. The shift of the measuring metal lamella results from the loading of the

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Apparatus for Investigating the Properties of Resistance to Deformation of Pasty Colloid Systems

drive via a dynamometer spring. The deformation of the dynamometer is read by means of the microscope MIR-1 with the eyepiece micrometer AM-IKh-11 with an accuracy of 2μ. There are two ways of loading, as mentioned above, whereby the results can also be plotted according to several variants. The reproducibility of parallel measurements of a 12% lithium lubricating paste and a 33% aluminum hydroxide vaseline grease paste is indicated as being 3-5% (Fig 3). There are 3 figures and 5 Soviet references.

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

Card 2/2

TRAPEZNIKOV, A.A.; VOLAROVICH, M.P.

Third International Congress on Rheology. Vest.AN SSSR 29 no.2:82-83 F '59. (MIRA 12:4)
(Bad Oeynhausen, Germany--Rheology--Congresses)

SOV/80-32-4-10/47

5(4)

AUTHORS: Trapeznikov, A.A. Tolmachev, A.M.

TITLE: Methods for Preparing Aluminum Hydroxide and the Deformation-Resistant Properties of Its Pastes in Vaseline Oil (Metody polucheniya gidrookisi alyuminiya i deformatsionno-prochnostnyye svoystva yeye past v vazelinovom masle)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol 32, Nr 4, pp 763-770 (USSR)

ABSTRACT: Aluminum hydroxide is widely used in industry, especially for printing dyes. The effect of conditions of its deposition on the stability of structure of its pastes in pure medical vaseline oil and their transparency is studied here. Deposition of aluminum hydroxide was carried out at pH-values varying from 4.0 to 9.0. The hydroxide was prepared from potassium-aluminum alums and soda in 0.5 n-solutions. The filtered deposits were dried at 61°C. The best results were observed at pH-values of 5.0-8.0 with a sharp maximum at 6.5. i.e., in the isoelectric point. Other maxima were at pH=5.3 and 8.0. The course of the curve was determined by the method of washing of the deposit. The size of the particles and the density of their packing determined the value of their active surface and affected also

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