LEVICH   V. G.

USSR/Engineering - Wind waves

Card 1/1   Pub. 22 - 8/52

Authors   : Levich, V. G.

Title   : The effect of turbulence on the generation and damping of wind waves on
             the surface of a liquid

Periodical : Dok. AN SSSR 101/4, 615-618, Apr 1, 1955

Abstract   : Assuming that the wind velocity (U_0) is known, a method is described for the
             theoretical computation of the amplitude of wind waves on the surface of
             a liquid. Conditions under which the turbulent movement of a liquid is
             formed and the effect of this turbulent movement on the generation and
             damping of the waves are discussed. Formulas, which allow the theoretical
             figures to be compared with the experimental data are presented. Eleven
             references: 1 German, 3 English and 7 USSR (1925-1954). Graph.

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

Presented by: Academician M. A. Leontovich, December 22, 1954

LEVICH, V G

The stabilization of suspensions, emulsions, and colloids.
V. O. Levich. Doklady Akad. Nauk S.S.S.R. 103, 453-6

(1965).—The discussion is based on the assumption that the
adsorbed stabilizer substance forms an envelope of structured
liquid around each particle of the dispersed phase, which
affects its diffusion coeff. The reduced viscosity lowers
slightly the rate of coagulation. The effects are discussed
of the envelope on the van der Waals forces, the Brownian
movement, the Au no., the presence of excessively large
amts. of stabilizers, etc.   W. M. S.
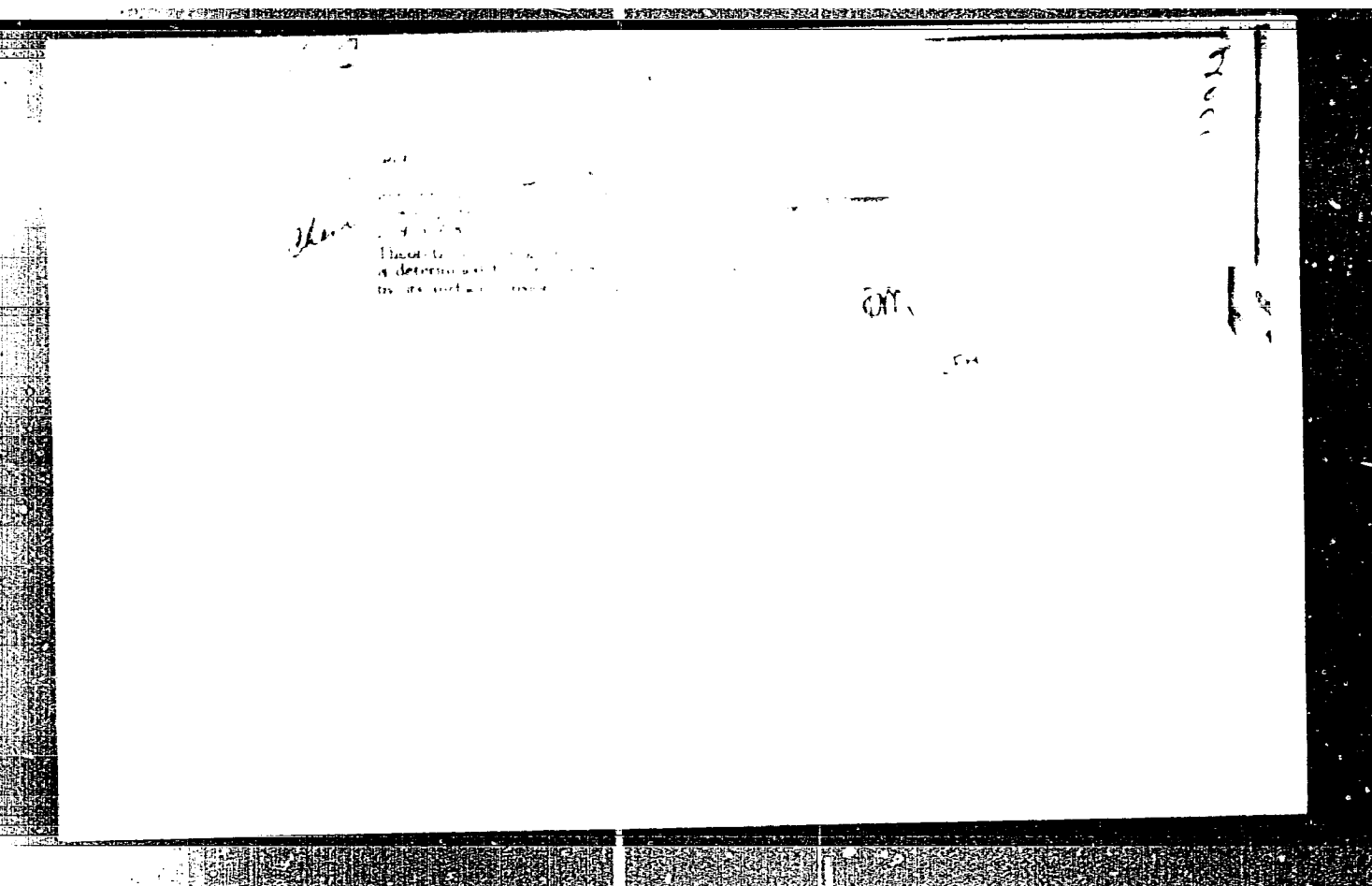
LEVICH, V.G.

76-11-11/35

AUTHORS: Levich, V.G., Myamlin, V.A.

TITLE: The Motion of Mercury Drops in a Field of Gravity and in a Magnetic Field (Dvizheniye rtutnykh kapel' v pole tyazhesti i v magnitnom pole)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 11, pp. 2453-2457 (USSR)

ABSTRACT: Here the motion of mercury drops in the electrolyte is investigated, where the total system is located in the field of gravity and the magnetic field. The computation, which was carried out in a system in which the drop was located, resulted in the following: Besides the vertical fall in the field of gravity an additional motion of the drop is created in a direction which is vertical to the field of gravity as well as to the magnetic field. The value for the velocity of motion is obtained and its order of magnitude is evaluated. There is 1 Slavic reference.

Card 1/2

Levich, V.G.

20-3-23/52

AUTHORS: Koutetskiy, Ya. , Levich, V. C.

TITLE: Use of a Rotating Disk-Electrode in the Study of Kinetic and Catalytic Processes in Electrochemistry (Primenoniye vrashchayushchegosya diskovogo elektroda k izucheniyu kinetiches- kikh i katalitichekikh protsessov v elektrokhimii)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr, 3, pp. 441 - 444 (USSR)

ABSTRACT: The present paper shows that the rotating disk as a device for the investigation of kinetic and catalytic currents offers considerable advantages as against the droplet electrode. Unlike what is the case with the simple electrode, processes on the rotating disk take place during steady operation. It is just this that facilitates the easy derivation of the formulae for the computation of complicated cases of reactions. This is an essential condition for the study of the velocities of kinetic reactions. Besides, the study of stea- dy processes is also experimentally more simple. Finally, it is possible, in the case of the disk, also to vary experimental con- ditions considerably by modifying not only the pH-value of the so- lution, but also the rotation velocity of the disk. The authors do not intend here to deal with the entire manifold of the various kinetic and catalytic processes, but the present paper explains

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Use of a Rotating Disk-Electrode in the Study of Kinetic and
Catalytic Processes in Electrochemistry

the characteristic method for the solution of problems occurring
during the study of kinetic and catalytic processes on the basis
of individual examples. As a first example a kinetic quasi-steady
process is investigated, which develops in accordance with the
scheme $A \underset{k_2}{\overset{k_1}{\rightleftharpoons}} B$ (volume), $A \rightarrow C$ (electrode). The computation
is followed step by step. In the second characteristic example the
volume reaction for the scheme $2A \underset{k_2}{\overset{k_1}{\rightleftharpoons}} B$ is defined and is thus

of bimolecular character. There are 7 references, 4 of which are
Slavic.

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20-3-23/52

Use of a Rotating Disk-Electrode in the Study of Kinetic and Catalytic
Processes in Electrochemistry

ASSOCIATION: Institute for Physical Chemistry AN USSR (Institut fizicheskoy khi-
mii Akademii nauk SSSR)
Institute for Physical Chemistry of the Czechoslovakian AN
(Institut fizicheskoy khimii Chekhoslovatskoy Akademii nauk)

PRESENTED: March 13, 1957, by A. N. Frumkin, Academician

SUBMITTED: January 18, 1957

AVAILABLE: Library of Congress

Card 3/3

KIR'YANOV, V.A.; LEVICH, V.G.

Theory of an electric double layer at the boundary of a
metal – electrolyte interface. Nek.vop.inzh.fiz.   no.3:5-
27 '58.   (MIRA 12:5)
        (Surface chemistry)   (Electrolytes)

LEVICH, V. G.; KREMENEV, L. Ya.; TAUBMAN, A. B.; NATANSON, E. M.;

"The resistance of emulsions and suspensions in connection with the stabilizing action of structure-mechanical properties of protective surface layers,"

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:·   Ivanov, Yu. B., Levich, V. G.   76-32-3-14/43

TITLE: The Convective Diffusion in a Binary Liquid System in
              the Critical Region
              (Konvektivnaya diffusiya v dvoynoy zhidkoy sisteme v
              kriticheskoy oblasti)

PERIODICAL: Zhurnal Fisicheskoy Khimii, 1958, Vol. 32, Nr 3,
              pp. 592-597 (USSR)

ABSTRACT: Gibbs (ref 1) had already observed that the motive
              force of the diffusion process represents the gradient
              of the partial (chemical) potential. The vanishing of the
              diffusion coefficient at the critical point in liquid
              binary systems was for the first time observed by I. R.
              Krichevskiy et al (ref 2), and (in the same laboratory) more
              exactly   by Yu. V. Tsekhanskaya (ref 3). In her
              determinations, the latter used a rotating disk of compressed
              terephthalic acid,   for which the process of
              solution was investigated .   using   triethylamine.
              The results of the solution-velocity values of the rotating
              disk at 290° K, measured and calculated according to the
Card 1/3   formula for the diffusion current obtained by Levich, are

The Convective Diffusion in a Binary Liquid System in the   76-32-3-14/43
Critical Region

graphically represented. It is found that the applied
formula and the theory of convective diffusion
respectively, are not to be applied to the critical region.
There, the dependence n of the diffusion coefficient and of the
solution on the concentration of the diffusing substance must be
taken into account.
                         . From the mathematical derivations
which were performed, it follows among others that the
calculations can be performed near the disk with the
application of the derivation according to Karman. From a dia-
gram giving the theoretical and experimental values of the dependence
the flow (j) at the surface of the disk on the solution
concentration c, where both values coincide well, it follows
that the obtained expression of the density of flow possesses
a general character for all solutions and for the critical
domain of concentration, where the flow of substance
possesses a low dependence on the concentration c_0 and is
proportional to $\sqrt{\omega}$. The numerical value of the coefficient
and its dependence on c_0 are connected with some values of
constants and can possess different values in different

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The Convective Diffusion in a Binary Liquid System in the   76-32-3-14/43
Critical Region

> solutions.   There are 4 figures and 4 references, 4 of
> which are Soviet.

SUBMITTED: November 3, 1956

Card 3/3

AUTHORS: Koutetskiy, Ya., Levich, V. G.   SOV/76-32-7-17/45

TITLE: The Application of the Rotating Disk Electrode for the Investigation of Kinetic and Catalytic Processes in Electrochemistry (Primeneniye vrashchayushchegosya dirkovogo elektroda k izucheniyu kineticheskikh i kataliticheskikh protsessov v elektrokhimii)

ABSTRACT: The electrode reactions, the course of which is closely connected with chemical side reactions in the volume of the solution, have recently been investigated systematically. The reactions may be divided into two groups: the so-called kinetic reactions in which one of the products of the chemical reaction in the inner volume of the solution diffuses to the electrode, and enters into the electrode reaction; this can be represented by the scheme

exchange   electrode

$$nA \underset{k_2}{\overset{k_1}{\rightleftarrows}} mB \qquad B \longrightarrow C$$

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SOV/76-32-7-17/45
· The Application of the Rotating Disk Electrode for the Investigation of Kinetic and Catalytic Processes in Electrochemisty

The second group are the catalytic reactions in which the substance participating in the electrode reaction is partly regenerated in the exchange reaction into which products of the electron reaction enter; this takes place according to the scheme:

exchange

electrode

$$nA + mB \rightarrow C$$

$$C \longrightarrow 1 \; A$$

The investigations of these two types of reactions have hither-to been carried out by means of the dropping mercury electrode, it is, however, assumed that the method mentioned in the title offers some advantages, as the processes take place within the steady regime; thus, calculation formulae for complicated reactions may be obtained. On the other hand in the case of disk electrodes besides the properties of the solutions also the angular velocities of the rotation may be modified within a wide interval, by which fact the experimental technique is simplified. By means of some examples of kinetic and catalytic processes the limit-diffusion currents at the surface of the disk electrode are calculated. A kinetic process of quasimo-

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The Application of the Rotating Disk Electrode for the Investigation of
Kinetic and Catalytic Processes in Electrochemistry

lecular character is investigated as first example as the
constants of the reaction velocity $A \rightleftharpoons B$ depend on the con-
centration of any of the substances D being in the solution.
The calculations were carried out for the case $D_1 \neq D_2$ in
the convective diffusion according to R. R. Dogonadze; they
are printed in the DAN USSR. A value δ_k of the thickness of
the layer of the solution at the electrode surface is de-
termined in which the reaction takes place kinetically (not
in equilibrium). The authors mention the paper written by
Budovskiy (Ref 6) in which reactions of bimolecular character
as well as catalytic reactions of a quasimolecular character
are described. There are 8 references, 3 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva;
Chekhoslovatskaya Akademiya nauk, Institut fizicheskoy khimii,
Praga
(Moscow, Institute of Physical Chemistry, AS USSR; Prague,
Institute of Physical Chemistry of the Czechoslovakian Aca-
Card 3/4   demy of Sciences)

Submitted Jan '57

10(4); 24(8)   PHASE I BOOK EXPLOITATION   SOV/3288

Levich, Veniamin Grigor'yevich

Fiziko-khimicheskaya gidrodinamika (Physicochemical Hydrodynamics)
    2d ed., rev. and enl. Moscow, Fizmatgiz, 1959. 699 p. Errata
    slip inserted. 5,000 copies printed.

Ed.: Yu. A. Chizmadzhev; Tech. Ed.: S. N. Akhlamov.

PURPOSE: This book is intended for scientific workers, physicists,
    chemists, and advanced students of theoretical physics and phys-
    ical chemistry.

COVERAGE: This book provides systematic treatment of problems in
    physicochemical hydrodynamics, i.e., studies on the influence of
    the movement of liquids on chemical or physicochemical changes
    as well as the influence of physicochemical factors on the move-
    ment of liquids. Studies are based on the work carried out in
    the electrochemistry section of the Institute of Physical Chem-
    istry of the Academy of Sciences. This second edition differs
    from the first by including new findings on the theory of heat

Card 1/6

LEVICH (V. G.)

"On the Theory of Convective Diffusion"

    report to be submitted for the Session of the Theoretical Division of the
Electrochemical Society - Spring Meeting, Philadelphia, 4-7 May 1959.
Abst. available E,3,128,664

Institute of Electrochemistry, Leninsky Prospekt 31, Moscow

LEVICH V. G.

PHASE I BOOK EXPLOITATION SOV/2216

Sereshchaniye po electrokhimii. 4th, Moscow, 1956.

Trudy... laborial (Transactions of the Fourth Conference on Electrochemistry; Collection of Articles) Moscow, Izd-vo AN SSSR, 1959. 668 p. Errata slip inserted. 2,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk.

Editorial Board: A.N. Frumkin (Resp. Ed.) Academician, O.A. Yesin, Professor; S.I. Zhdanov (Resp. Secretary), B.N. Kabanov, Professor, Ya. M. Kolotyrkin, Doctor of Chemical Sciences; V.V. Losev, P.D. Lukovtsev, Professor; Z.A. Solov'yeva; V.V. Stender, Professor; and O.K. Florianovich; Ed. of Publishing House; N.G. Yegorov; Tech. Ed.; T.A. Prusakova.

PURPOSE: This book is intended for chemical and electrical engineers, physicists, metallurgists and researchers interested in various aspects of electrochemistry.

COVERAGE: The book contains 127 of the 138 reports presented at the Fourth Conference on Electrochemistry sponsored by the Department of Chemical Sciences and the Institute of Physical Chemistry, Academy of Sciences, USSR. The collection pertains to different branches of electrochemical kinetics, double layer theories and galvanic processes, electrodeposition and induced electrolysis. Abridged discussions are included here at the end of each division. The majority of reports not given have been mentioned. References are given at the end of most of the articles; published in periodical literature.

Levich, V.G. (Institute of Electrochemistry, Academy of Sciences). Diffusion Kinetics of Electrochemical Reactions   659

Gorbachev, S.V. (Moscow Institute of Chemical Technology iment D.I. Mendeleyev). Statement of the Problem in Computing Concentration Polarization Under Nonstationary Conditions   661
of Electrolysis

Fedotova, A.I., O.L. Vidovich, L.I. Krishtalik, and L.I. Rubinson, (Moscow State University). Some Experiments in the Study of Convective Diffusion   665

Ershova, Ye. I. (Moscow Institute of Chemical Technology iment D.I. Mendeleyev). Study of Concentration Polarization of During Electrochemical Dissolution and the Separation of Metals by the Refractometric Method   669

Devlet'yan, O.P., and S.I. Berezina (Kazan' Branch, Academy of Sciences, USSR). Determining the Concentration of Ions Which Determine the Potential in the Electrode Zones of an Electrolyte   672

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SOV/76-33-5-23/33

5(4)

AUTHORS: Dogonadze, R. R., Levich, V. G., Chizmadzhev, Yu. A. (Moscow)

TITLE: Calculation of the Electrochemical Protection (Raschet elektro-khimicheskoy zashchity). 1. A Process Determined by the Rate of the Electrochemical Reaction (1. Protsess, opredelyayushchi-yeya skorost'yu elektrokhimicheskoy reaktsii)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 5, pp 1111 - 1118 (USSR)

ABSTRACT: The system protector - metal is an electrolytical cell. Since the calculation of this system is complicated because of great potential shifts and the effect of concentration pola-rization, a simplified model is investigated as a first approximation. The concentration polarization is neglected, the metal considered as being weakly polarized, the protector as strongly polarized. The calculation by means of successive approximation shows that in slight intervals the presupposi-tion of the weakly polarized metal becomes unrealizable. A second model (Fig 1) is investigated; a current with a con-stant density j_0 flows on its projector, a current with con-stant density j_1 at both sides, whereas the current density

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Calculation of the Electrochemical Protection.   SOV/76-33-5-23/33
1. A Process Determined by the Rate of the Electrochemical Reaction

becomes zero at a great distance. The potential calculated
(Fig 3) is a reasonable approximation for distances from the
protector which are great as compared to its dimension. The
calculation can be used if the protector has high polariza-
bility whereas the metal has insignificant polarizability.
The authors express their gratitude to Academician A. N.
Frumkin for setting up the problem and to I. L. Rozenfel'd
for judging the investigation. There are 4 figures and 6
references, 5 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR institut fizicheskoy khimii Moskva
(Academy of Sciences of the USSR Institute of Physical Chemi-
stry, Moscow)

SUBMITTED: November 1, 1957

Card 2/2

5(4)
AUTHORS: Levich, V. G., Corresponding Member,   SOV/20-124-1-34/69
AS USSR, Dogonadze, R. R.

TITLE: The Theory of the Radiationless Electron Transitions Between
Ions in Solutions (Teoriya bezyzluchatel'nykh elektronnykh
perekhodov mezhdu ionami v rastvorakh)

ABSTRACT: According to the authors' opinion, all theoretical papers
dealing with this subject neglected to take proper account of
the influence exercised by the solvent. In the present paper
the solvent is considered to be a set of atoms which perform
small oscillations round fixed positions of equilibrium. In
the case of an electron transition that is considered to be a
radiationless transition of the complete electron-solvent
system, a certain number of oscillation quanta (phonons) is
absorbed (or emitted). Calculations were carried out in
adiabatic approximation and the atoms of the solvent were
selected in form of a slow subsystem and the electron as a
fast subsystem. The Hamiltonian of the complete system
Card 1/3 $H(x, q) = H(x) + H(q) + V(x, q)$ consists of the electron part

The Theory of the Radiationless Electron Transitions   SOV/20-124-1-34/69
Between Ions in Solutions

$$H(x) = -(\hbar^2/2m)\nabla^2 + U(x, R),$$ of the Hamiltonian of the

oscillating atoms $H(q) = (1/2)\sum_{\varkappa} \hbar \omega_{\varkappa} (q_{\varkappa}^2 - \frac{\partial^2}{\partial q_{\varkappa}^2})$ and of the

energy of the interaction between electron and phonon. The
coordinates x and q refer to the electron and phonon
respectively. The potential $U(x, R)$ describes the interaction
between the electron and the ions between which there is a
distance R, and between the electron and the static part of the
solvent polarized by them. $V(x, q)$ can be expanded in a series
according to the powers of the small deviations of the atoms
of the solvent from the positions of equilibrium. An expression
is then derived for the total energy of the system. If the
optical branch plays the principal part in electron-phonon
interaction, the dispersion of frequencies and the anharmonic
condition can be neglected. The rather long formula for the
corresponding transition probabilities is explicitly written
down. Finally, the acoustic branch is investigated. For the
liquids under investigation it is of importance to take the

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The Theory of the Radiationless Electron Transitions   SOV/20-124-1-34/69
Between Ions in Solutions

anharmonic condition into account. Also for this case a
formula for the transition probability is written down. If
the acoustic branch plays the essential part, deviation from
linearity begins at~240° K. There are 10 references, 2 of
which are Soviet.

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of
Electrochemistry of the Academy of Sciences, USSR)

SUBMITTED: August 29, 1958

Card 3/3

5(4)

AUTHORS: Vdovin, Yu. A.,
Levich, V. G., Corresponding Member, AS USSR,   SOV/20-124-2-31/71
Myamlin, V. A.

TITLE: The Volt-ampere Characteristic of the Contact Electrolyte-
electron-semiconductor (Vol't-ampernaya kharakteristika
kontakta elektrolit-elektronnyy poluprovodnik)

ABSTRACT: An oxidation-reduction reaction of the type $A^+ + e \rightleftharpoons A$ is
assumed to occur during passage of the current. For reasons of
greater simplicity it is assumed that the ion concentration
on the surface of the reaction is sufficiently great and that
its supply from the interior of the solution is not a limiting
stage of the above-mentioned reaction. The potential drop
in the electrolyte is neglected, which is justified if the
solution contains an addition of an indifferent electrolyte of
sufficiently high concentration. First, the basic equations
are written down, which connect the amperage, the charge
density, and the electric field strength in the semiconductor
with one another: $j = eu[En + (kT/e)(dn/dx)]$ $(e > 0)$,

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The Volt-ampere Characteristic of the Contact
Electrolyte-electron-semiconductor   SOV/20-124-2-31/71

$div \vec{E} = -(4\pi e/\epsilon)(n - (n_\infty^2/n))$. Here u denotes electron mobility, n - their concentration, n_∞ - the concentration of the electrons within a domain that is sufficiently far from the contact. Such a selection of the charge density ρ corresponds to the weakly ionized donor-levels. The above-mentioned system of equations can also be written down in dimensionless form: $(dz/dt) - zy - \lambda = 0$, $(dy/dt) = z - (1/z)$. Contrary to what is the case in metal, concentration in a semi-conductor may vary considerably. A generalized formula for the slowed-down discharge is written down. An auxiliary function is introduced for the solution of the dimensionless equation. First, the equation for this auxiliary function for low amperages is solved ($\lambda \ll 1$). An expression is written down for the entire voltage drop in a Helmholtz layer and in the semiconductor (after deduction of the ohmic voltage drop). After some further steps an expression is obtained for the volt-ampere characteristic. Next, the currents flowing in the locked direction are investigated. In this case the width of the united layer increases, and an expression for the

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The Volt-ampere Characteristic of the Contact
Electrolyte-electron-semiconductor

SOV/20-124-2-31/71

volt-ampere characteristic corresponding to this case is
written down. In this case the dependence of the potential on
amperage is essentially determined by Tafel's law. The
authors then deal with the non-locked direction. The
rectifier effect depends both on the electrochemical reaction
taking place in the semiconductor and on the properties of the
semiconductors. The discussed system has marked rectifier-
properties under the conditions investigated. The results
of this paper apply also if different reactions predominate
at different directions of the current. There are 4 references,
3 of which are Soviet.

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut (Moscow Engineering
Physics Institute)

SUBMITTED: September 27, 1958

Card 3/3

5(4)   SOV/20-124-4-39/67

AUTHOR: Levich, V. G., Corresponding Member, AS USSR

TITLE: On the Theory of the Non-equilibrium Double Layer (K teorii
               neravnovesnogo dvoynogo sloya)

ABSTRACT: The author endeavors to synthetize two previous hypotheses
               concerning this phenomenon; in this connection he takes the
               deviation of the concentration of the discharging ions in
               the double layer (during passage of the current) from the
               equilibrium concentration and also the finite rate of the
               discharge reaction into account. In this connection it is
               assumed that the current density is low compared to the dif-
               fusion limiting current, so that variations of the concentra-
               tion of the reacting particles inside the solution beyond
               the boundaries of the double layer can be neglected. It is
               further assumed that the solution contains an addition of an
               indifferent electrolyte, in which case the concentration c_1
               of the reacting ions is very low compared to the concentrations
               c_2 and c_3 of the non-reacting ions. The carrying-over equa-
Card 1/3   tions of ions are written down and the denotations occurring

On the Theory of the Non-equilibrium Double Layer   SOV/20-124-4-39/67

therein are explained. The potential of the field satisfies
a Poisson equation. Also the boundary conditions are given.
Near the electrode the distribution of the potential and of
the concentration is investigated only in the diffuse part
of the double layer. Expressions are derived for the charge
coefficients and for the current density j. The complete
course of the function $j(\varphi_0)$ is expressed by a curve with

a minimum and a maximum. At certain values of the constants
approximation of the minimum and maximum may lead to the
formation of a region on the curve in which amperage depends
relatively little on φ_0. The structural details of the

double layer were not considered by this paper. Particular
interest is also caused by the formation of ion-pairs or ion-
complexes of the type KS_2O_8 in the case of the reduction of
$S_2O_8^{2-}$. The following two limiting cases are possible: 1) Ion-
pairs take part in the reaction, in which case the equilibrium
between the ion-pairs and their components is conserved in
the interior of the solution. 2) In the other limiting case
the concentration of the ion pairs in the interior of the
solution is very low and the rate of reaction is determined
Card 2/3   by the rate at which these ion-pairs are formed within the

On the Theory of the Non-equilibrium Double Layer   SOV/20-124-4-39/67

double layer. The author thanks Academician A. N. Frumkin for a useful discussion of the problems dealt with by the present paper. There are 10 references, 9 of which are Soviet.

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

SUBMITTED: October 1, 1958

Card 3/3

5(4)

AUTHORS: Ivanov, Yu. B., Levich, V. G., Corresponding Member, AS USSR

SOV/20-126-5-32/69

TITLE: The Investigation of Unstable Intermediate Products of Electrode
                  Reactions by Means of the Rotating Disk Electrode (Izucheniye
                  nestoykikh promezhutochnykh produktov elektrodnykh reaktsiy s
                  pomoshoh'yu vrashchayushchegosya diskovogo elektroda)

ABSTRACT: A. N. Frumkin (Ref 1) suggested to investigate the intermediates
                  of electrode reactions by means of convective diffusion, i.e.
                  the intermediate products forming on one electrode are collect-
                  ed by a second electrode spatially separated from the first.
                  The ring disk electrode described in reference 1 proved to be
                  hydrodynamically an optimum. The first electrode (Zone 1) forms
                  the inner circular surface of the disk; here, the electrode
                  reaction $A \longrightarrow B'$ takes place. The particles of the intermedi-
                  ates are moved onto the outer annular electrode (Zone 3) which
                  is separated from the inner circle by an annular insolating
                  layer (Zone 2). The equation of the convective diffusion is
Card 1/2   written down, and the boundary conditions are fixed for the

The Investigation of Unstable Intermediate Products of Electrode Reactions by
Means of the Rotating Disk Electrode   SOV/20-126-5-32/69

3 zones. The method of transforming this equation to an equa-
tion of heat conduction is applied to the solution of the equa-
tion of convective diffusion as shown in reference 2. After the
transformation has been carried out it may be seen that the solu-
tion of each equation for an inner zone influences the solution
of the outer zone as a boundary condition. The solutions found
for the experimental conditions of reference 1 for current
density and total current are given which, as reference 1
shows, are in sufficient qualitative agreement with the experi-
ment so that they may be applied to the determination of the
transformation constant k. The more general case is of interest
in which the particles of the intermediate undergo transforma-
tions in the solution, e.g. by reaction with water. This problem
is soon to be dealt with. There are 5 references, 4 of which
are Soviet.

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of Electro-
chemistry of the Academy of Sciences, USSR)

SUBMITTED: April 11, 1959
Card 2/2

5(4)

AUTHORS: Vdovin, Yu. A.; Levich, V. G.,   SOV/20-126-6-42/67
            Corresponding Member, AS USSR; Myamlin, V. A.

TITLE: The Anodic   Solution of Germanium (Anodnoye rastvoreniye
            germaniya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 6, pp 1296-1299
            (USSR)

ABSTRACT: The results of germanium investigations hitherto obtained
            (Refs 1-4) permit already the drawing of conclusions as to the
            reaction mentioned in the title, although there are still
            contradictions. It is certain that a saturation current occurs
            in the dissolution of electronic germanium, whereas it lacks
            in holes germanium. In currents that are considerably smaller
            than the saturation current of n-germanium in both cases a
            linear dependence of the potential upon the logarithm of the
            density of the anode current is observed. Holes in the elec-
            trode are necessary for the primary electrochemical reaction.
            A quantitative investigation of the dissolution process is
            attempted. The voltage drop in the electrolyte is neglected
            with the exception of the voltage drop in the Helmholtz double
Card 1/3   layer. The ratio between holes current and electronic current

The Anodic   Solution of Germanium   SOV/20-126-6-42/67

is r/m. After several simplifications tne voltampere char-
acteristic (21) is found by means of a system of equations
(1) - (4) for dz/dt, dλ/dt, dy/dt, dp/dt and below the satura-
tion current the logarithmic dependence of the potential upon
the current is confirmed. The following is derived for the

saturation current: $j_{sat} = -n_i^2 D_+ e^2 u_- \frac{\rho}{L}(1 + \frac{m}{r})$ (23)

(n_i = concentration of the electrons in the semiconductor,

D_+ = diffusion coefficient of the holes, ϵ = electron charge,
u_- = mobility of the electrons, ρ = specific resistance,
L = diffusion length of the non-basic charge carriers). Under
consideration of the data given by J. B. Flynn (Ref 4) it holds
that m/r = 3. Thus, the reaction on the surface requires 1
hole, and 3 electrons are liberated. The values deviating
herefrom, found in other papers (Refs 2,10), are likely to be
due to surface effects. There are 10 references, 4 of which
are Soviet.

Card 2/3

The Anodic Dissolution of Germanium   SOV/20-126-6-42/67

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of
                Electrochemistry of the Academy of Sciences, USSR)

SUBMITTED: April 9, 1959   .

Card 3/3

84634

S/076/60/034/010/016/022
B015/B064

I88300   1530,1138, 1454

AUTHORS: Dogonadze, R. R., Levich, V. G., Chizmadzhev, Yu. A.

TITLE: Theory of the Electrochemical Protection. II. Reactions With
           Diffusion Control   18

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 10,
            pp. 2320 - 2327

TEXT: In a previous paper (Ref. 1), the authors determined the distribu-
tion of the potential in a system consisting of a metal (cathode) and a
protector (anode), however, without taking account of the concentration
polarization. In practice, however, metal corrosion frequently takes place
in the presence of dissolved oxygen. The oxygen concentration may, how-
ever, be so low that the total rate of the corrosion process in the system
metal - protector depends on the access velocity of oxygen. The present
paper investigates this case. Since the access of oxygen in mixing through
the solution (which is mainly the case in practice) depends on the con-
vective diffusion, the most simple case, i.e. the convective diffusion to
the surface of a rotating metal disc which is in the center of the

Card 1/2

84634

Theory of the Electrochemical Protection.   S/076/60/034/010/016/022
II. Reactions With Diffusion Control   B015/B064

protector, was chosen. In contrast to the experiments by Wagner
(J.Electrochem.Soc. 24, 380,1957), in the present case the diffusion
current has the same value in all points of the system. The conditions
are discussed under which it is possible to separate the surface of the
protected metal into diffusion- and kinetic regions, and the corresponding
equations are derived. By means of the Legendre polynomials equations are
derived for the case in which the metal can be regarded as non-polarizable
in the kinetic region. There are 2 figures and 6 references: 5 Soviet and
1 US.

ASSOCIATION: Akademiya nauk SSSR Institut Elektrokhimii (Academy of
            Sciences of the USSR Institute of Electrochemistry)

SUBMITTED: February 5, 1959

Card 2/2

AUTHORS: Levich, V. G.; Corresponding Member AS USSR, Dogonadze, R. R.

TITLE: An Adiabatic Theory of Electron Processes in Solutions

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol: 133, No: 1,
             pp: 158 - 161

TEXT: The present paper deals with the further development of the theory of electron processes in polar solvents. For the solvent the authors define the conception $\vec{P}(\vec{r})$ of specific polarization and for the system ion - electron - solvent, they write down the Hamiltonian (1):

$$H(\vec{r},q) = H_e(\vec{r}) + H_s(q) + V_{es}(\vec{r},q).$$ H_e relates to the kinetic energy of the electron, the energy of the interaction between electron and ions, as well as to a term taking the influence exerted by the static polarity $\vec{P}_0$ upon the electron into account. H_s relates to the kinetic and potential energy of the solvent as dependent on the polarization $\vec{P}$ produced by the electron. V_{es} is the potential energy of the electron in dependence on $\vec{P}$.

Card 1/2

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S/020/60/134/002/041/041XX
B004/B067

AUTHORS: Levich, V. G., Corresponding Member of the AS USSR and
               Chizmadzhev, Yu. A.

TITLE: Convective Instability in an Electrochemical System

TEXT: The present work was instigated by the undamped oscillations of the
potential of the mercury drop in the range of potential drop and of the
current flowing through the drop in the potentiometric reduction of
persulfate anion on the dropping mercury electrode. This discovery has
been made by A. Ye. Gokhshteyn and A. N. Frumkin (Ref. 1). The authors
attempted to explain the part played in this effect by a tangential
movement on the surface of the Hg drop. They proceed from the similating
scheme shown in Fig. 2: a - radius of the drop; z - axis with respect to
which the distribution of ionic concentrations and potentials is
invariant, and which depends only on the radius r and the angle θ.

Card 1/5

26. 1620

AUTHORS: ~~Levich~~ ~~V. G.~~ Corresponding Member AS USSR, Kir'yanov, V. A.
and Krylov, V. S.

TITLE: Effects of the Discrete Nature of the Charge and Properties
of the Double Layer on the Metal-Charge Interface (Taking
Account of the Discrete Structure of the Charge of
Specifically Adsorbed Layers of Ions)

TEXT: From various papers by other research workers the authors conclude
that the model of an electric double layer with uniformly "smeared out"
charge does not correspond to the experimental results. In the present
paper, they give a report on a quantitative investigation of the effects
of discrete charges of the electric double layer on the metal - solution
interface. The following equations are written: for the potential jump in
the layer of adsorbed anions at the point of the electrocapillary maximum:
$\delta\psi_a = \psi_0 = -4\pi\sigma_f/D$ (5), and in the case of a charged interface as a result

Card 1/3

87410

Effects of the Discrete Nature of the Charge   S/020/60/135/006/026/037
and Properties of the Double Layer on the   B004/B056
Metal-Charge Interface (Taking Account of the Discrete Structure of the
Charge of Specifically Adsorbed Layers of Ions)

of the charge q of the metal: $\delta\psi = \psi_0 - \delta\psi_a + \delta\psi_q; \quad \delta\psi_q = -4\pi q(\beta+\gamma)/D$ (6).
σ denotes the average charge in the adsorbed layer; D is the dielectric
constant of the internal region; β is the minimum distance between metal
and anion, and $\beta+\gamma$ is that between metal and cation. For the micro-
potential of the point charges the following relation is obtained:

$\psi^A = \psi_{1s} + \left[\gamma/(\beta+\gamma)\right](\delta\psi_a + \delta\psi_q)$ (10), where $\psi_{1s} \simeq (e/D\gamma)\ln 2$. Provided the
surface of the electrode is not too largely occupied, equation (10)
agrees well with experimental data. For the dependence of the potential
jump $\delta\psi_a$ on the concentration and activity $a_\pm$ of the anions,

$\delta(\delta\psi_a)/\delta\ln a_\pm = (RT/F\delta\psi_a) - \left[\delta\psi^A/\delta(\delta\psi_a)\right]^{-1}RT/F$ (12) is found. An estimate
of the values of β and γ from the data on ionic radii, and a calculation
from equation (12) gave good agreement with the experimental data on the
mercury - solution interface. The authors thank A. N. Frumkin for a
discussion. There are 13 references: 7 Soviet, 3 US, 3 British, and

Card 2/3

87410

Effects of the Discrete Nature of the Charge   S/020/60/135/006/026/037
and Properties of the Double Layer on the   B004/B056
Metal-Charge Interface (Taking Account of the Discrete Structure of the
Charge of Specifically Adsorbed Layers of Ions)

1 German.

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of
             Electrochemistry of the Academy of Sciences USSR)

SUBMITTED: September 26, 1960

Card 3/3

LEVICH, V. G.; DOGONADZE, R.

Adiabatic theory of electric processes in solutions. Coll Cz chem 26 no.1:193-214 Ja '61. (EEAI 10:9)

1. Institut elektrokhimii, Akademija nauk, SSSR, Moskva.

(Adiabatic changes) (Electrochemistry) (Solutions)

LEVICH, V.G.; KHAYKIN, B.I.; KIR'YANOV, V.A.

Faraday impedance for reversible electrode processes proceeding
according to the pattern of hydrogen catalytic evolution. Dokl.
AN SSSR 139 no.4:925-928 Ag '61.   (MIRA 14:7)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN SSSR
(for Levich).
          (Polarization (Electricity)) (Electromotive force)

LEVICH, V.G.; KRYLOV, V.S.

Theory of the double electric layer in concentrated solutions.
Dokl. AN SSSR 141 no.6:1403-1405 D '61.   (MIRA 14:12)

1. Institut elektrokhimii Akademii nauk SSSR. 2. Chlen-korrespon-
dent AN SSSR (for Levich).
(Electrolyte solutions)

LEVICH, V. G.

"The rotating disk electrode in electrochemistry."

Report submitted to the Intl. Committee for electrochemical thermodynamics and kinetics,   Rome, Italy   24-29 Sep 1962

LEVICH, Veniamin Grigor'yevich; VDOVIN, Yuriy Aleksandrovich;
MYAMLIN, Viktor Alekseyevich; LIVSHITS, B.L., red.;
ALEKSEYEV, A.I., red.; BRUDNO, K.F., tekhn. red.

[Course in theoretical physics]Kurs teoreticheskoi fiziki.
Moskva, Fizmatgiz. Vol.2.[Electromagnetic processes in mat-
ter]Elektromagnitnye protsessy v veshchestve. Kvantovaia
mekhanika. Pod red. V.G.Levicha. 1962. 819 p. (MIRA 16:3)

1. Chlen-korrespondent Akademii nauk SSSR (for Levich).
   (Electromagnetism) (Quantum theory)

LEVICH, Veniamin Grigor'yevich; ALEKSEYEV, A.I., red.; LIVSHITS, B.L.,
red.; BRUDNO, K.F., tekhn. red.

[Course in theoretical physics]Kurs teoreticheskoi fiziki. Mo-
skva, Fizmatgiz. Vol.1. [Electromagnetic field theory. Relativity
theory. Statistical physics]Teoriia elektromagnitnogo polia. Teo-
riia otnositel'nosti. Statisticheskaia fizika. 1962. 695 p.
(MIRA 15:12)

(Physics)

LEVICH, V.G.; YALAMOV, Yu.I.

Theory of polyelectrolyte solutions. Part 1: Low degrees of
ionization. Zhur.fiz.khim. 36 no.5:1096-1102 My '62.
(MIRA 15:8)

1. Institut elektrokhimii, AN SSSR.
   (Electrolyte solutions) (Polymers) (Electromotive force)

LEVICH, V.G.; KIR'YANOV, V.A.

Contribution to the theory of strong electrolyte solutions.
Zhur.fiz.khim. 36 no.8:1646-1654 Ag '62.   (MIRA 15:8)

1. Institut elektrokhimii AN SSSR.
              (Electrolyte solutions)

LEVICH, V.G.; KRYLOV, V.S.

       Adsorption isotherm in a discrete double electric layer model.
       Dokl. AN SSSR 142 no.1:123-126 Ja '62.   (MIRA 14:12)

       1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent
       AN SSSR (for Levich).
                          (Adsorption)

LEVICH, V.G.; YALAMOV, Yu.I.

Potential distribution at the surface of a strongly ionized
polymer macromolecule in an electrolyte solution. Dokl. AN
SSSR 142 no.2:399-402 Ja '62.   (MIRA 15:2)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Levich).
                      (Polymers)
                      (Electromotive force)
                      (Electrolyte solutions)

34480
S/020/62/142/004/017/022
B101/B110

5.4700 (also 1208)

AUTHORS: Levich, V. G., Corresponding Member AS USSR, and
Yalamov, Yu. I.

TITLE: Problems of the theory of polyelectrolytes at low degrees of
ionization

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 4, 1962, 851 - 854

TEXT: The discrete distribution of the charge on the surface of a
spherical macro-ion is investigated. The interface macro-ion - electrolyte
is assumed to be plane. The polymer I has the dielectric constant ε_1,
the electrolyte II the dielectric constant ε_2. The charge q is at a depth
h below the surface of I. $\Delta\Psi = -(4\pi/\varepsilon_1)q\delta(x)\delta(y)\delta(z + h)$ (1) is written

down for I; $\Delta\Psi = -(4\pi/\varepsilon_2)\sum_{i=1}^{n} en_i z_i \exp(-z_i e\varphi/T)$ (2) for II. Eq. (2) is

linearized: $\Delta\varphi - \varkappa^2 \varphi = 0$ (3), where $\varkappa^2 = (4\pi e^2/\varepsilon_2 T)\sum_{i=1}^{n} n_i z_i^2$. The solution

of Eqs. (1) and (3) in the range $-\infty < z < 0$ and $0 < z < \infty$ for the boundary
Card 1/3

conditions $\left.\Psi\right|_{z=0} = \left.\varphi\right|_{z=0}$; $\left.\mathcal{E}_1 \partial\Psi/\partial z\right|_{z=0} = \left.\mathcal{E}_2 \partial\varphi/z\right|_{z=0}$; $\left.\varphi\right|_{z=\infty} = \left.\Psi\right|_{z=-\infty} = 0$, and for $z \ll 1/\varkappa$ produces the potential:

$\varphi(\varrho,z) \approx \left[2q/(\mathcal{E}_1 + \mathcal{E}_2)\right]\left[\exp(-\varkappa\sqrt{\varrho^2 + z^2})/\sqrt{\varrho^2 + z^2}\right]$. For the repulsion between two charges q_1, q_2 with the distance d on the surface of I holds:

$\Delta\Psi = -(4\pi/\mathcal{E}_1)\left[q_1\delta(x)\delta(y)\delta(z + h) + q_2\delta(x - d)\delta(y)\delta(z + h)\right]$. For $q_1 = q_2 = q$, and $h = 0$, the following potential is found:

$\varphi(x,y,z) = \left[2q/(\mathcal{E}_1 + \mathcal{E}_2)\right]\left[\exp(-\varkappa\sqrt{\varrho^2 + z^2})/\sqrt{\varrho^2 + z^2} + \exp(-\varkappa\sqrt{\varrho'^2+z^2})/\sqrt{\varrho'^2 - z^2}\right]$. ✗

where $\varrho' = \sqrt{(x - d)^2 + y^2 + z^2}$. The interaction between the ionic clouds surrounding the charges is determined from: $p = -(\partial/\partial d)(\Phi_d - \Phi_\infty)$. Φ_d is the free electric energy of the system of two charges and the respective ionic clouds with the distance d; Φ_∞ corresponds to $d = \infty$ and does not depend on d. Result: $p = \left[2q^2/\mathcal{E}_1 + \mathcal{E}_2\right](1 + \varkappa d)\left[\exp(-\varkappa d)\right]/d$. Already for $\varkappa d \sim 1$, p differs little from the interaction of two punctiform charges in the absence of an electrolyte. With increasing ionization of s

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Problems of the theory of...

S/020/62/142/004/017/022
B101/B110

macromolecule, the electrostatic interaction may thus have a strong effect
on the configuration of macromolecule links. There are 2 figures and
6 references: 1 Soviet and 5 non-Soviet. The four references to
English-language publications read as follows: G. E. Kimball, M Cutler
H. Samelson, J. Phys. Chem., 56, no. 1, 57 (1952); J. Kagawa, M Nagasawa
J. Polym. Sci., 16, 299 (1955); Y. Ykeda, J. Phys. Soc. Japan, 8, 49
(1953); S. Lifson, A. Katchalsky, J. Polym. Sci., 13, 43 (1954).

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of
Electrochemistry of the Academy of Sciences USSR)

SUBMITTED: October 14, 1961

Card 3/3

10.2500
24.2500 (1147, 1147, ...)

AUTHORS: Levich, V. G., Corresponding Member of the AS USSR, and
                Gurevich, Yu. Ya.

TITLE: Effect of a magnetic field on the surface waves of
                conductive liquids

TEXT: The propagation of gravitation-capillary waves in conductive
liquids under the action of an external magnetic field is studied. The
periodical solution of the linearized equations of magnetohydrodynamics

$$\partial v/\partial t = -\frac{1}{\rho}\nabla p + g + \frac{1}{4\pi\rho}[\operatorname{rot} h H_0], \quad \partial h/\partial t = \operatorname{rot}[v H_0], \qquad (1),$$
$$\operatorname{div} v = 0, \quad \operatorname{div} h = 0.$$

are sought. The external magnetic field $\vec{H}_0$ is assumed to be in the direc-
tion of the gravitational field, which leads to the particular solution

$$v_x = \frac{4\pi\rho k l}{4\pi\rho\omega^2 + k^2 H_0^2}Ce^{ikx+kz}, \quad v_y = 0, \quad v_z = \frac{4\pi\rho k}{4\pi\rho\omega^2 + k^2 H_0^2}Ce^{ikx+kz}. \qquad (7).$$

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S/020/62/143/001/010/030
B104/B108

Effect of a magnetic field ...

To this solution must be added the solution

$$v = B e^{-(i p z + \omega t)}, \qquad (9)$$

of the homogeneous equation

$$\omega^2 v + \frac{H_0^2}{4\pi\rho} \frac{\partial^2 v}{\partial z^2} = 0. \qquad (8),$$

which describes the Alfvén waves propagating into the liquid. $p = 4\pi\rho\omega^2/H_0^2$. The electromagnetic field extends above the surface of the liquid to a height equal to about two wavelengths of the surface waves. The liquid particles in the waves move in circles, the radius of which decreases exponentially with the depth. The dispersion of the magnetohydrodynamic gravitational waves is described by

$$\frac{\omega\rho}{k} - g\rho = -\frac{H_0^2}{4\pi} k. \qquad (21).$$

This shows that gravitational waves with a wavelength smaller than $\lambda_{cr} = H_0^2/4\pi\rho g$ cannot propagate along the surface of the liquid. The effect of surface tension is investigated on the assumption that if does not depend on the magnetic field and that the electromagnetic tensions are

Card 2/3

Effect of a magnetic field ...   S/020/62/143/001/010/030
                                                  B104/B108

low. Without attenuation, the propagation of sufficiently short or
sufficiently long waves is possible, the dispersion law not depending on
the orientation of the magnetic field relative to the direction of
gravitation. The propagation of sufficiently short waves (capillary
waves) is always possible. There are 5 references: 4 Soviet and 1 non-
Soviet.

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of
               Electrochemistry of the Academy of Sciences USSR)

SUBMITTED: December 15, 1961

Card 3/3

LEVICH, V.G.; KHAYKIN, B.I.; MAYRANOVSKIY, S.G.

Effect of the double layer on the polarographic catalytic
hydrogen space waves. Dokl.AN SSSR 145 no.3:605-608 Jl '62.
(MIRA 15:7)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Levich).
        (Catalysis)   (Electromotive force)

LEVICH, V.G.; KUZNETSOV, A.M.

Motion of drops in liquids under the effect of surface active
agents. Dokl. AN SSSR 146 no.1:145-147 S '62.   (MIRA 15:9)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Levich).
(Hydrodynamics) (Surface active agents)

LEVICH, V.G.; GRAFOV, B.M.

Alternating current in a binary electrolyte. Dokl. AN SSSR 146
no.2:398-401 S '62.   (MIRA 15:9)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN SSSR
(for Levich).
             (Electrochemistry)

LEVICH, V.G.; GRAFOV, B.M.

Effect of the reaction irreversibility on Faraday's impedance in a binary electrolyte. Dokl. AN SSSR 146 no.3:644-645 S '62. (MIRA 15:10)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Levich).

(Electrochemistry)

LEVICH, V.G.; GRAFOV, B.M.

Rectification effect on an ideally polarizable electrode. Dokl.
AN SSSR 146 no.6:1372-1373 O '62.   (MIRA 15:10)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN SSSR
(for Levich).
          (Electromotive force) (Polarization (Electricity))

LEVICH, V.G.; KHAYKIN, B.I.

Irreversible polarographic catalytic space waves of
hydrogen. Dokl. AN SSSR 147 no.1:146-149 N '62.
(MIRA 15:11)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Levich).
(Polarography)   (Catalysis)   (Hydrogen)

S/020/62/147/004/015/027
B142/B102

AUTHORS: Levich, V. G., Corresponding Member AS USSR, Golovin, A. M.

TITLE: Rain shower theory

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 4, 1962, 829-832

TEXT: The oversaturation of the cloud with humidity, taking account of droplet coagulation, is studied here by means of cloud models as first used by Ya. I. Frenkel' and N. S. Shishkin (Izv. AN SSSR, ser. geogr. i geofiz., 10, 301 (1946)). The oversaturation depends on the altitude, because this lowers the temperature and therefore the vapor pressure necessary for saturation. Oversaturation is slowed down by condensation. Coagulation causes the oversaturation to increase again with altitude. At a height of $z \approx 2$ km, $V(z)$ = volume of the droplets at the height z reaches its boundary value ($\sim 3 \cdot 10^{-6}$). Coagulation affects rising as well as falling drops. The rules of coagulation are discussed for both cases. Some of the coagulation drops, however, are destroyed again by the rising turbulent air current. Thus a cycle can occur. Passage through several such cycles is a necessary condition for the development

Card 1/3

Rain shower theory

S/020/62/147/004/015/027
B142/B102

of a rain shower. Their number can be estimated from the formula

$$N_k \, f \, \frac{1 - f^n}{1 - f} \left(\frac{r_k}{r_n} \right)^3 \varrho \Omega^2 R_m \approx \varrho_0 \omega^2 .$$

N_k - initial number of droplets with radius r_k per unit of volume at the height where the big droplets disintegrate. f - probability of water retention of a droplet within the cycle, n - number of cycles, ϱ - water density, ϱ_0 - density of the rising air current, R_m - radius of the droplet that disintegrates, ω - rate of the rising air current, $\Omega \approx 2 \cdot 10^3$ cm$^{1/2}$/sec. The problem of the cycle stability, e.g. the possibility of humidity loss from the cycle, is also investigated. The English-language reference is: W. Howell, J. Meteorol., 6, No. 2, 134 (1949).

Card 2/3

Rain shower theory

8/020/62/147/004/015/027
B142/B102

ASSOCIATION: Institut elektrokhimii Akademii nauk SSSR (Institute of
Electrochemistry of the Academy of Sciences USSR)

SUBMITTED: June 16, 1962

Card 3/3

LEVICH, V. G.; GRAFOV, B. M.

Faraday's rectification in a binary electrolyte solution.
Dokl. AN SSSR 147 no.6:1402-1405 D '62.

(MIRA 16:1)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Levich).

(Electrolyte solutions)

LEVICH, V. G.; DOGOMADZE, R. R.

"Present State of the Theory of Electron Transfers in Solutions."

Report presented at the 14th meeting CITCE, Intl. Comm. of Electrochemical
Thermodynamics and Kinetics, Moscow, 19-25 Aug 63.

Institute of Electrochemistry, Academy of Sciences of USSR, Moscow

LEVICH, V.G.; FILINOVSKIY, V.Yu.

     Utilization of the hanging drop electrode in research on
     unstable products of electrode reactions. Bul chim PAN 11
     no.12:705-710 '63.

     1. Institute elektrokhimii kademii nauk, Moskva. Predstavleno
     V. Kemuley [Kemula, W.].

LEVICI, V.G. [Levich, V.G.]; KIREANOV, V.A. [Kir'yanov, V.A.]

Statistic theory of the solutions of strong electrolytes. Analele chimie 18 no.2:94-104 Ap-Je '63.

KRYLOV, V.S.; LEVICH, V.G.

Theory of the double electrical layer in concentrated solutions.
Part 1. Zhur.fiz.khim. 37 no.1:106-114 Ja '63.   (MIRA 17:3)

1. Institut elektrokhimii AN SSSR.

S/076/63/037/002/007/018
B101/B186

AUTHORS: Levich, V. G., Yalamov, Yu. I. (Moscow)

TITLE: Determination of the potential at the surface of a
                cylindrical polymer macromolecule in electrolyte solution

PERIODICAL: Zhurnal fizicheskoy khimii, v. 37, no. 2, 1963, 333-339

TEXT: The distribution of the potential is calculated for the surface of
a cylindrical macromolecule in an electrolyte solution, whose length h is
notably greater than its radius a. Based on the Poisson Boltzmann potential
distribution in the neighborhood of a cylinder, $\Delta \Psi = -4\pi\rho/D$, where D is
the dielectric constant of the solution and ρ is the density of charge,
$e_1 \Delta \Psi/kT = \ln\left[(x_1^2/2\beta^2)sh^2\delta\right] - \alpha c_p/(\alpha c_p + 2c_{el})$ is obtained. Here e_1 is
the charge of the ion of a mono-monovalent electrolyte; $x_1^2 = 4\pi n_1 e_1^2/DkT$,
where n_1 is the total of the counter-ions and electrolyte ions having a
charge opposite in sign to that of the macro-ion;

Card 1/4

Determination of the potential ...

$$\beta^2 = x_2^2 \left[n_1/(n_1 + n_2)\right]^2 \cdot f^2(2x_2 a) - x_1^2 \cdot 2.71/2; \quad x_2^2 = 4\pi e^2(n_1 + n_2)/kTD,$$

$e = 4.8 \cdot 10^{-10}$ cgs units; n_2 is the number of electrolyte ions, the sign
of which is consistent with that of the surface charge of the macro-ion at
$\Psi = 0$; $f = K_1(2x_2 a)/K_0(2x_2 a)$. The constant δ is calculated from:

$$cth \ \delta = - \nu e^2/kTDha\beta - \left[n_1/(n_1 + n_2)\right] x_2 f(2x_2 a)/\beta,$$ where ν is the number
of charges on the cylinder with a mean density $|\sigma| = \nu e/2\pi a h$. C_p is the
concentration of the polymer, C_{el} that of the electrolyte, α is the degree
of ionization. The values calculated for $e \Delta \Psi/kT$ were checked on
polymethacrylic acid in NaCl solution and yielded with $\alpha = 0.8$,
$a \approx 5 \cdot 10^{-8}$ cm:

Card 2/4

Determination of the potential ...

S/076/63/037/002/007/018
B101/B186

concentration	$\left| e\,\Delta\Psi/kT \right|_{exp}$	$\left| e\,\Delta\Psi/kT \right|_{theor}$
$C_p = 0.1$ monomole/l $C_{el} = 0.1$ mole/l	≈ 2.7	≈ 3.3
$C_p = 0.05$ monomole/l $C_{el} = 0.04$ mole/l	≈ 4.2	≈ 5.6
$C_p = 0.02$ monomole/l $C_{el} = 0.01$ mole/l	≈ 6	≈ 8.8

The divergence between the experimental and the theoretical value
increases with increasing dilution owing to the higher diffusivity of the
double layer. For a $\geq 10^{-7}$ cm, a better agreement may be expected also

Card 3/4

KRYLOV, V.S.; LEVICH, V.G.

Theory of electrical double layer in concentrated solutions. Part 2.
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LEVICH, V.G.; MARKIN, V.S.; CHIRKOV, Yu.G.

Electric conductivity and electron paramagnetic resonance signal
in polymeric materials built up of molecules with conjugate double
bonds. Dokl. AN SSSR 149 no.4:894-896 Ap '63.   (MIRA 16:3)

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(for Levich).
(Polymers—Electric properties)
            (Electron paramagnetic resonance and relaxation)

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Kinetic and catalytic currents on a hanging dropping electrode.
Dokl. AN SSSR 151 no.6:1379-1382 Ag '63.   (MIRA 16:10)

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> Faraday's heterodynation.   Dokl. AN SSSR 153 no. 6:1374-
> 1377 D '63.   (MIRA 17:1)
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>   AN SSSR (for Levich).

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Secónd harmonic phase of a variable potential and the transfer
coefficient of rapid electrochemical reactions. Dokl. AN
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Properties of the double layer and the characteristic of the
electrostatic adsorption of ions. Dokl. AN SSSR 155 no. 3:
662-665 Mr '64.   (MIRA 17:5)

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Inst of Electrochemistry, AS USSR.

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Polarization curves for electrodes partly immersed in an
electrolyte solution. Dokl. AN SSSR 157 no. 2:404-407 J' '64.
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KIR'YANOV, V.A.; IVANOV, V.G.

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solution interface. Statistical theory of the nonequilibrium
double layer. Dokl. AN SSSR 159 no.1:170-173 N '64.

(MIRA 17:12)

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KRYLOV, V.S.; LEVICH, V.G.

Effect of the discreteness of adsorbed charge of interphase surface tension. Dokl. AN SSSR 159 no.2:409-412 N '64.   (MIRA 17:12)

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VVEDENSKIY, B.A., glav. red.; VUL, B.M., glav. red.; SHTEYMMAN,
R.Ya., zam. glav. red.; BALDIN, A.M., red.; VONSOVSKIY,
S.V., red.; GALANIN, M.D., red.; ZERNOV, D.V., red.;
ISHLINSKIY, A.Yu., red.; KAPITSA, P.L., red.; KAPTSOV,
N.A., red.; KOZODAYEV, M.S., red.; LEVICH, V.G., red.;
LOYTSYANSKIY, L.G., red.; LUK'YANOV, S.Yu., red.;
MALYSHEV, V.I., red.; MIGULIN, V.V., red.; REBINDER,
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Theory of the macroscopic kinetics of heterogeneous and homogeneous-heterogeneous processes. Usp.khim. 34 no.10:1846-1865 O '65.   (MIRA 18:11)

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LEVICH, V.G.; KHAYKIN, B.I.; BELOKOLOS, Ya.D.

Establishment of the adsorption equilibrium on flat and dropping electrodes and the irreversible electrochemical conversion of adsorbed substances. Elektrokhimiia 1 no.10:1273-1279 O '65.

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1. Institut elektrokhimii AN SSSR.

LEVICH, V.G.; MARKIN, V.S.; CHIRKOV, Yu.G.

Thermal diffusion in liquids at the rotating disk surface.
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VOROTILIN, V.P.; KRYLOV, V.S.; LEVICH, V.G. (Moskva)

Theory of the extraction of matter from a falling droplet.
Prikl. mat. i mekh. 29 no.2:343-350 Mr-Ap '65.   (MIRA 18:6)

LEVICH, V.G.; KRYLOV, V.S.; VOROTILIN, V.P.

Theory of extraction from a falling drop. Dokl. AN SSSR 160 no.6: 1358-1360 F '65. (MIRA 18:2)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Levich).

LEVICH, V.G.; KRYLOV, V.S.; VOROTILIN, V.P.

Theory of unsteady diffusion from a moving drop. Dokl. AN SSSR
161 no.3:648-651 Mr '65.   (MIRA 18:4)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN S.SR
(for Levich).

PISTER, I.M.; LEVICH, V.G.

Branching chains-thermal explosion limit. Dokl. AN SSSR 165
no.1:144-146 N '65. (MIRA 18:10)

1. Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN
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LEVICH, V.G.; BRODSKIY, A.M.

General theory of homogeneous-heterogeneous processes in moving media. Dokl. AN SSSR 165 no.3:607-610 N '65.
(MIRA 18:11)

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LEVICH, V.G.; BRODSKIY, A.M.

Theory of homogeneous-heterogeneous radical reactions in a
turbulent flow. Dokl. AN SSSR 165 no.5:1115-1118 D '65.
(MIRA 19:1)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova
i Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN
SSSR (for Levich). Submitted July 16, 1965.

BRODSKIY, A.M.; LEVICH, V.G.

Rate of formation of surface deposits in an extensive chemical
reactor. Dokl. AN SSSR 166 no.1:151-154 Ja '66.
(MIRA 19:1)

1. Moskovskiy gosudarstvennyy universitet i Institut elektrokhimii
AN SSSR. 2. Chlen-korrespondent AN SSSR (for Levich). Submitted
July 16, 1965.

AUTHOR: Pis'men, L. M.; Levich, V. G. (Corresponding member AN SSSR)

ORG: Institute of Electrochemistry, Academy of Sciences SSSR (Institut elektrokhimii Akademii nauk SSSR)

TITLE: Limit of a thermal chain explosion

SOURCE: AN SSSR. Doklady, v. 165, no. 1, 1965, 144-146

TOPIC TAGS: combustion kinetics, thermal explosion, chain reaction, reaction rate, free radical

ABSTRACT: The authors study the effect of slow nonradical reactions on the stability of stationary conditions in a chain process. The process considered involves a single type of radical with reactions of the first, second and zero order with respect to radical concentration. A system of nonlinear equations is given for the dimensionless concentrations of the initial radicals and molecules and for the dimensionless temperature in the reaction zone. It is assumed that the effect of temperature on the reaction rate is given by the Arrhenius equation and that all three reactions take place with double collisions. The dimensionless variables for the molecular concentration and temperature are selected to give homogeneous boundary conditions for the initial system of nonlinear equations. A solution is given for this system in the form of a

UDC: 541.126

Card 1/2

L 06526-67   EWT(1)/EWP(m)   WW

ACC NR: AP7000469   SOURCE CODE: UR/0207/66/000/002/0063/0071

GOLOVIN, A. M., LEVICH, V. G., and TOLMACHEV, V. V.

ORG: none

"Hydrodynamics of a System of Bubbles in a Liquid of Low Viscosity"

Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, Moscow, No. 2, Mar-Apr 1966, pp. 63-71

TOPIC TAGS: Reynolds number, hydrodynamics

Translation: The effect of the gas content and the shape occupied by a system of bubbles on the rate of their rise in an unlimited medium and a vertical cylindrical column is investigated. Deformations of the system which are advantageous from the energy standpoint are considered, with the assumption of a homogeneous and isotropic distribution of the bubbles in the system. A theoretical description of the motion of the system of gas bubbles in the liquid is necessary for study of the bubbling processses. This problem has been repeatedly studied in the case of small Reynolds numbers (Re   1) on the basis of the so-called model of cells. In reference [1]* a similar model was used for description of the motion of a system of bubbles of moderate dimensions (Re 300). It was assumed that at all instants of time each bubble is located at the center of an imaginary spherical cell of liquid, the radius of which is equal to the mean distance between the centers of the bubbles in the system. Also, the normal component of the velocity of the liquid is equal to zero on the surface of the cell. The first assumption is equivalent to the principle

Card 1/2

L 08727-67   EWT(m)/EWP(t)/ETI   IJP(c)   JD
ACC NR: AP7001650   SOURCE CODE: UR/0040/66/030/003/0467/0475

AUTHOR: Lovich, V. G. (Moscow); Myasnikov, V. P. (Moscow)

+3

ORG: none

TITLE: Kinetic model of a fluidized bed

SOURCE: Prikladnaya matematika i mekhanika, v. 30, no. 3, 1966, 467-475

TOPIC TAGS: fluid mechanics, fluid kinetics

ABSTRACT:,   The characteristic feature of almost all processes
occurring in a fluidized bed is their strong dependence on the
nature of the mechanical motion of the solid particles forming
the layer. An attempt is made to construct a theoretical model
which would adequately describe this motion. In existing models
there is no explanation of the nature of the sharp transition
to the psuedofluid state and the velocity distribution of the
particles is neglected, as is the relation of this distribution
to the parameters of gas motion, etc.

A very simple kinetic model of a fluidized bed is proposed. It
is based on the idea that the solid particles in such a layer

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L 08727-67
ACC NR: AP7001650

can be simulated by a set of elastic spheres, while their inter-
action with the fluidizing gas diffuses the points representing
a particle in its velocity space. Results obtained with the
model are qualitatively close to experimental results. An example is given in
which the mean reaction rate is calculated in a unit volume of a fluidezed bed.
Orig. art. has: 3 figures and 3 formulas. [JRPS: 37,751]

SUB CODE: 20 / SUBM DATE: 29Nov65 / ORIG REF: 005 / OTH REF: 001

Card 2/2 nst

L 32202-66 EWT(1) IJP(c)
ACC NR: AP6014165

AUTHOR: Levich, V. G.

SOURCE CODE: UR/0053/66/088/004/0787/0788

ORG: none

TITLE: "New" magnetic effect

40

SOURCE: Uspekhi fizicheskikh nauk, v. 88, no. 4, 1966, 787-788

B

TOPIC TAGS: magnetic effect, magnetic field, boiler, metal scaling

ABSTRACT: A "new" magnetic effect on water has been given more than passing
attention in the Soviet popular science periodicals and newspapers. Recently
the discussion reached the pages of the scientific monthly Uspekhi fiziche-
skikh nauk. V. G. Levich, in a letter to the editor of the publication,
describes the effect on the basis of various popular versions as a change
in certain properties of water when it is passed through a magnetic field
of special geometric configuration. The effect has been used, it is said,
to reduce scale-formation in boilers by augmenting the proportion of vapor
bubbles in the water at the expense of those originating on the heated walls.

Levich, apparently a scientist himself, asks the editor of Uspekhi fi-
zicheskikh nauk to clarify the issue