U S S R .

NIKOL'SKIY, B.P.; PARAMONOVA, V.I.

Theory of anion exchange. Part 1. Possible generalisation of the cation exchange theory to include anion exchange. Uch.zap.Len.un. 163:112-120 '53. (MLRA 9:6)

(Ion exchange)

NIKOL'SKIY, B.P.; PARAMONOVA, V.I., BOGATOVA, N.F.

Theory of anion exchange. Part 2. Nature of anion exchange on m-
-phenylenediamine resin. Uch.zap.Len.un. 163:121-145 '53.

(Anions) (Phenylenediamine) (Ion exchange)   (MLRA 9:6)

Nikol'skiy, B. P.

USSR/Chemistry - Physical chemistry

Card 1/1   Pub. 147 - 13/26

Authors   :   Materova, Ye. A.; Kozhakina, F. A.; and Nikol'skiy, B. P.

Title   :   Research of electrode characteristics of ionite membranes

Periodical   :   Zhur. fiz. khim. 29/1, 105-110, Jan 1955

Abstract   :   Efforts were made to obtain electrodes from technical ion-exchange
                    resins reversible with respect to anions and cations. A method was
                    developed for the preparation of the most perfect membranes and for
                    the study of their electrode characteristics. The results obtained
                    by studying the cationite and anionite membranes are described. In
                    order to make the best possible practical application of membrane
                    electrodes it is necessary to know their behavior in mixed solutions.
                    Three references: 2 USA and 1 USSR (1942-1954). Tables; diagram.

Institution   :   The A. A. Zhdanov State University, Institute of Chemistry, Leningrad

Submitted   :   May 3, 1954

NIKOL'SKIY, B.P., otvetstvennyy redaktor; SHEMYAKINA, Ye.V., redaktor;
IVANOVA, A.V., tekhnicheskiy redaktor

[Chromatography; a collection of articles] Khromatografiia; sbornik
statei. [Leningrad] 1956. 176 p.   (MLRA 10:2)

1. Leningrad, Universitet.   2. Chlen-korrespondent Akademii nauk
SSSR (for Nikol'skiy)
        (Chromatographic analysis)

NIKELICKIY, B. P.

The state of oxidation-reduction transistors in solution.
B. P. Nikol'skii and V. V. Pal'chevskii /A. A. Zdanov
Gosd. Univ., Leningrad/ Zhur. Fiz. Khim. 3.1.5.R.
Obsd. Khim. Nauk 1957, (32-40.—A method is described
for detg. the prototytic classes of reversible oxidation-
reduction systems by using a cell made up of a Pt and the
oxidation-reduction electrode. This method has the advan-
tage of a high degree of thermodynamic accuracy and precision.
The method was applied to the detn. of the classes oxide
of leucomethylene blue, toluidine blue, and leuco-thidine
blue. The values thus obtained are in good agreement with
spectrophotometric data.   Boward Leach—

"Investigation of the Interaction of Uranyl Salt Solutions With
Sodium Hydroxide; Part 1 - Potentiometric Titration of Uranyl
Salt Solutions With Sodium Hydroxide," by B. P. Nikol'skiy V. I.
Paramonova, and M. D. Morachevskaya, Zhurnal Neorganicheskoy
Khimii, Vol 2, No 5, May 57, pp 1194-1200

By investigating potentiometrically individual samples, the interac-
tion of aqueous solutions of uranyl nitrate and uranyl sulfate with sodium
hydroxide at different concentrations of sodium nitrate and sodium sulfate
was studied. It was established that when solutions of uranyl salts inter-
act with alkali at room temperature, an equilibrium is established after
a prolonged period of time ranging from several days up to a year, time
depending on the concentration of the salt and the amount of alkali which
has been added.

It follows from the results of the potentiometric titrations that
upon interaction of uranyl salts with sodium hydroxide at least two dif-
ferent sodium uranate precipitates with different contents of sodium are
formed, depending on the p_H. The results of a detailed investigation of
the composition of these precipitates will be published in a subsequent
paper. (U)

Sum 'N 451

NIKOL'SKIY, B. P.

62-11-29/29

AUTHOR: None Given.

TITLE: General Meeting of the Department for Chemical
            Sciences of the AN USSR Held in May 30-31, and
            June 28, 1957 (Obshchiye sobraniya Otdeleniya
            khimicheskikh nauk Akademii nauk SSSR 30-31 maya i 28
            iyunya 1957 g).

PERIODICAL: Izvestiya AN SSSR, Otdel. Khim. Nauk, 1957, Nr 11,
            pp. 1416-1419 (USSR)

ABSTRACT: Chairman: Member of the Academy A. P. Vinogradov.
            Lectures: A. N. Terenin, Member of the Academy.
            "Spectroscopy of the Molecular Compounds with Metal Halides."
            V. N. Filimonov, the student D. Borsovyy and Sh. Sh. Raskin
            helped the author in his work.
            S. Z. Roginskiy, corresponding Member of the Academy,
            B. V. Nekrasov, corresponding Member of the Academy,
            N. D. Sokolov, Doctor of chemical sciences, M. M. Shemvakin,
            corresponding Member of the Academy, A. I. Kitaygorodskiy,
            Doctor of physico-mathematical sciences, A. P. Vinogradov,
            Member of the Academy, took part in the discussion.
            B. P. Nikol'skiy, corresponding Member of the Academy of

Card 1/3

General Meeting of the Department for Chemical Sciences of the   62-11-29/29
AN USSR Held in May 30-31 and June, 28,1957

the AN SSSR (partaking authors M. M. Shul'ts and
N. P. Isakova) spoke on "Influence of the Composition of
Bero-Aluminum-Silicate Glasses on their Electrode - and
Acid-Properties." V. A. Kargin, Member of the Academy and
N. I. Nikitin, corresponding Member of the Academy, took
part in the discussion. Ya. I. Ryskin (from the institute
for silicate-chemistry of the AN SSSR) spoke on
"Hydrogen-Bond in Silican Compounds According to Data of
the Infrared Spectrometry." M. A. Peray-Koshits, and
A. D. Petrov, corresponding member of the Academy took part
in the discussion. A. I. Kitaygorodskiy, Doctor of physico-
mathematical sciences spoke on "Conditions for the
Formation of Solid Solutions of Organic Compounds."
B. V. Nekrasev, corresponding Member of the Academy,
Ye. S. Makarev, Doctor of chemical sciences, V. G. Kuznetsev,
and S. Z. Roginskiy, corresponding Member of the Academy
of the AN USSR took part in the discussion. M. M. Koton,
Doctor of chemical sciences (partaking author Yu. V. Mitin)
spoke on "The Synthesis of Polymers with Cycles in the
Chain."

Card 2/3

General Meeting of the Department for Chemical Sciences   62-11-29/29
of the AN USSR Held in May 30-31 and June, 28, 1957

June 28, 1957: Chairman: N. N. Semenov, Member of the
Academy, Kargin, Valentin Alekseyevich, Member of the
Academy spoke on "The Structure and Phase-Condition of
Polymers."

G. L. Slonimskiy (partaking authors T. I. Sogolova and
V. A. Kargin) spoke on "The Particularities of Flow in
Polymers."

N. V. Mikhaylov, Doctor of chemical sciences (partaking
authors V. I. Mayboroda and V. A. Kargin) spoke on "The New
Production Methods for Viscous Fibers". V. I. Sharkov,
Professor, S. Z. Roginsky, corresponding Member of the
Academy, V. I. Ivanov, Doctor of chemical sciences took part
in the discussion. Welcome speeches were held by N. N. Semenov,
Member of the Academy, D. P. Novikov, Minister-Representative
for chemical industry, V. I. Veselovskiy, Professor, Ya. I.
Gerasimov, corresponding Member of the Academy, P. A.
Rebinder, Member of the Academy and Ye. O. Kuvshinskiy,
Professor.

AVAILABLE: Library of Congress

Card 3/3

NIKOL'SKIY, A.P.

KOISEYEV, V.V.; NIKOL'SKIY, B.P.

Investigating the ion exchange properties of glass electrodes by
means of radioactive indicators [with summary in English]. Vest.
LGU 12 no.16:69-84 '57.   (MIRA 10:11)
                    (Electrodes, Glass)   (Ion exchange)
                            (Radioactive tracers)

"Discussion of the Problems of Radiochemistry," by B. P. Nikoll-
skiy, Corresponding Member, Academy of Sciences USSR, Vestnik
Akademii Nauk SSSR, Vol 27, No 5, May 57, pp 103-105

"The All-Union Conference on Radiochemistry held at Leningrad from
5 to 9 March 1957 was a significant event not only for specialists in this
field of knowledge, but also for all Soviet chemists, because radiochemis-
try has penetrated into chemical science in all its aspects and has be-
come a commonly used method in many branches of industry. The popularity
of radiochemistry and the great interest shown in it by wide circles of
chemists are indicated by the large number of reports registered with the
organizational committee of the conference and by the participation of
600 scientists from all parts of the USSR in this conference. More than
half the participants were from localities other than Leningrad.

The conference was planned to accomplish important tasks. It was nec-
essary to exchange experience accumulated by individual scientific research teams
active in various fields of radiochemistry. It was also necessary to dis-
cuss the fundamental problems of radiochemistry, to settle differences
with regard to many theoretical problems, to solve problems pertaining
to practical applications, and to outline the ways to be followed in future
work. Furthermore, it was necessary to establish personal contacts be-
tween Soviet radiochemists, all the more since this was the first confer-
ence on the subject.

"Only a few fundamental problems of present-day radiochemistry were to be discussed at the conference, according to the program, because it was physically impossible to deal with a greater number of problems in 5 days. The problems discussed were the state of microquantities of radio-active elements in solid precipitates, the significance of complex compounds for radiochemistry, adsorption and ion-exchange adsorption of radioelements, the distribution of radioactive substances between two liquid phases, and the chemistry of individual radioelements.

"For almost 50 years, the problem in regard to the state in which microquantities of radioelements occur in solid and liquid phases was disputed by different schools of radiochemists, because determination of the colloidal state in which radioelements occur is extraordinarily difficult. As a rule, one cannot establish with certainty by using the available methods of investigation whether any particular radiocolloid is in a true colloidal state (i.e., represents a radioactive substance in a state of very fine dispersion) or is a so-called pseudoradiocolloid, i.e., a radioactive element adsorbed on the surface of extraneous colloidal particles. Only the application of many methods combined made it possible to demonstrate that in a number of cases true radiocolloids are formed, while in other cases the radioelements may occur exclusively in the pseudocolloidal state, i.e., be adsorbed on a substrate which in many cases is colloidal silicon dioxide. Particularly convincing data on the subject were obtained by I. Ye. Starik's school in investigations which demonstrated, among other things, that whenever true radiocolloids are formed an essential condition for their formation must be fulfilled, namely, the solubility product must be exceeded.

"The problem of the state in which radioelements occur in crystals and specifically in minerals was discussed in connection with differences in the behavior of parent elements, which cannot be leached out, and daughter radioelements derived from these parent elements, which can be completely leached out.

"The problem of the coprecipitation of radioelements with crystalline precipitates, which was discussed in detail at the conference, is one of the most important ones in radiochemistry.

"Classical investigations by V. G. Khlopin and his collaborators not only established the laws of coprecipitation of this type, but also led to carefully developed methods for the investigation of the phenomena involved and of the condition under which the laws that have been established retain their validity. New data obtained in research in the coprecipitation of a number of radioelements with various crystalline precipitates were reported at the conference (V. I. Grebenshchikova, E. M. Ioffe, E. R. Klokman, K. S. Merkulova, and others). The data which have been reported indicate that anomalous mixed crystals in some cases are subject to the same laws as true mixed crystals and do not have a lower limit of heterogeneity. This circumstance must be taken into consideration when conclusions are drawn concerning the valency of elements present in microconcentrations on the basis of data pertaining to iso- morphous precipitation.

"G. I. Gorshteyn reported results obtained in investigations dealing with the coprecipitation not only of microquantities but also of macro-quantities of substances with crystalline and amorphous precipitates. These data can be used to improve the technology of the production of pure reagents.

"The complex compounds of radioelements are of special importance in the solution of many theoretical and practical problems of radiochemistry. This is due to the fact that radioelements in complex compounds often exhibit greater individual differences than in ordinary compounds, so that the analysis, separation, and purification of the elements in question are facilitated. A paper by A. A. Grinberg and a number of communications made by other participants at the conference were devoted to this subject. Of particular interest from this standpoint is the application of processes leading to the formation of complexes in the chromatographic separation of radioelements, a type of separation which is of exceptional importance in present-day radiochemistry.

"Great attention was paid at the conference to those processes of the
adsorption and ion exchange of radioelements which form the basis of chroma-
tography. In addition to a report dealing with the theory of ion exchange
(B. P. Nikol'skiy), the participants in the conference heard a report by
N. N. Tunitskiy in which the effect of various kinetic factors (including
internal and external diffusion) on the precision of the chromatographic
separation of rare earth elements from each other was discussed. In a
number of communications the participants considered many different types
of application of ion exchange for the solution of various chemical and
radiochemical problems of both a theoretical and practical nature. Of
particular significance is the application of ion exchange procedures in
the investigation of equilibriums established in processes leading to
complex-formation in solutions. A very important problem pertaining to
the theory of adsorption, i. e., that concerning the relative roles
played by electrochemical and specific adsorption of radioelements on
porous adsorbents (e. g., carbon), was discussed in a report by D. N.
Strazhesko.

"Another problem to which particular attention was paid is that concerning the distribution of radioelements between two liquid phases. This problem is of very great practical and theoretical significance. In the principal report on this subject (given by V. M. Vdovenko) and in many other reports, the possiblilites of the application of distribution phenomena for the purification and separation of different elements, for the isolation of radioactive tracers without carriers (N. I. Rudenko), for the analytical determination of radioelements, and for the investigation of chemical equilibriums in solutions where processes leading to complex-formation take place were discussed.

"The distribution of a great number of radioactive substances between aqueous solutions and various organic solvents was investigated in work done by Soviet radiochemists. The results obtained in this work made it possible to establish the conditions under which radioelements can be separated and purified by the extraction method. Furthermore, the role of processes of complex-formation in the distribution of radioelements between phases was clarified in many cases. Specifically, it was established that many radioelements are extracted from acidic solutions in the form of acidocomplexes. Work in the field of the chemistry of distribution processes is being conducted at present by a large number of specialists and comprises a significant proportion of all work done in radiochemistry. The conference demonstrated the necessity of expansion of work in this field, including extension of the range of solvents used and application of new complex-forming substances.

"A number of reports dealing with the chemistry of individual radio-elements which have not been investigated to a great extent were also presented and discussed. This includes reports on americium (G. N. Yakovalev), curium, technetium (V. I. Spitsyn, F. Kuzina), protoactinium, promethium, and many rare-earth elements.

"The conference showed that during the period after World War II, the number of radiochemists in the USSR greatly increased and that the scope of radiochemical research increased correspondingly.

"The conference decided to organize a permanent all-union seminar on radiochemistry and to hold all-union conferences once every 3 years."
(U)

NIKOLSKIY, O. P.

Oxidation-reduction potentials of solutions of methylene blue. P. P. Nikitina, M. S. Zakharyevskii and V. V. Pal... ...aya Rabota; Trudy ... ...aya, V. V. ...na, A. A. Zhionova ... ... Khim. Nauk No. ... 26-30. ...

...deter... ...ture of dissoc... ... ...indicators by means of galvanic elements without trans-ference. Methylene blue (I) was purified by quintuple recrystn. from dil. aq. HCl, then twice from H_2O, and dried over H_2SO_4. Leuco-I was prepd. from I by reduction with H_2 and Pt. The cell Pt | [(2.000 × 10^{-4}M/leuco I:1.050 × 10^{-4}M)] | H electrode was used in place of the calomel electrode with uncertain diffusion potential as used by Clark (C.A. 17, 2087; 22, 699). The pH of the system was detd. by means of the H electrode and a third, satd. calomel half-cell, with a satd. KCl bridge. The oxidation-reduction potential of the I system, φ, at 30°, was detd. relative to both the H and the calomel electrodes as a function of the pH. Simultaneously the ratio I:leuco I was detd. spectrophotometrically from the intensity of absorption at 615.0 mμ rather than at the absorption max. 667.5 mμ. The function φ vs. pH shows breaks at pH 5 and 6, corresponding to K_1 and K_2, resp.; φ is practically independent of ionic strength μ over the range 0.03-0.45. The I:I oxidation-reduction electrode shows a min. for $K = \varphi$ ... at about pH 5.2 ...

... ...

/Distr. ...Ku...

NIKOLSKIY, B. P.   et. al.

"Ion-Exchange Investigation on the State of Elements in Solutions."

paper to be presented at 2nd UN Intl. Conf. on the peaceful uses of Atomic Energy, Geneva, 1 - 13 Sep 58.

NIKOL'SKIY, B.P.

Ion exchanging adsorption of radioelements. Zhur. neorg. khim. 3
no.1:59-65 Ja '58.   (MIRA 11:3)
                        (Ions--Migration and velocity)
                        (Adsorption) (Radiochemistry)

NIKOL'SKIY, B.P.; SINITSYNA, G.S.; ZIV, D.K.

Determination of the valency of polonium in solutions. Trudy
Radiev.inst.AN SSSR. 8:141-152 '58.   (MIRA 12:2)
        (Polonium)   (Valence (Theoretical chemistry))

NIKOL'SKIY, B.P.; ZIV, D.M.; SHESTAKOV, B.I.; SINITSINA, G.S.

Effect of the nature and concentration of acid on the value
of the electrode potential of polonium. Trudy Radiev.inst.
AN SSSR. 8:153-157 '58.   (MIRA 12:2)
          (Polonium)   (Acids)   (Electromotive force)

NIKOL'SKIY, B.P.; PARAMONOVA, V.I.; V'YUGINA, A.F.

Separation of uranium and thorium on anionites of the weak
base type. Trudy Radiev.inst.AN SSSR. 8:177-188 '58.

(MIRA 12:2)

(Uranium)   (Thorium)   (Anions)

NIKOL'SKIY, B.P.; TROFIMOV, A.M.

Chromatographic separation of uranium and thorium by means of
ion-exchanging resins.   Trudy Radiev.inst.AN SSSR. 8:189-197
'58.
(MIRA 12:2)
(Uranium)   (Thorium)   (Base-exchanging compounds)

IL'YENKO, Ye.I.; NIKOL'SKIY, B.P.; TROFIMOV, A.M.

Adsorption of ruthenium from aqueous solutions by ion-exchanging resins. Trudy kom.anal.khim. 9:148-160 '58.   (MIRA 11:11)
(Ion exchange)   (Ruthenium)   (Adsorption)

NIKOL'SKI, B.P.

AUTHOR: Nikol'skiy, B. P.   70-1-12/43

TITLE: The Ion Exchange and Sorption of Radio-Elements
               (Ionoobmennaya sorbtsiya radioelementov).

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 1,
               pp. 59-65 (USSR)

ABSTRACT: The importance of this exchange in radiochemistry is very
               great at present. As is known, radioactive elements are sorbed
               at the vessel walls and at other surfaces with which they come
               into contact. Therefore their sorption will be one of the most
               important phenomena determining the reaction of these elements
               in solutions, if, as a rule, they are in solutions in very
               small concentrations. As radio-elements appear in solutions
               mostly in the form of ions, the assumption would be natural,
               that their adsorption in most cases represents an ion exchange
               plus sorption. This is proved by the part played by the pH-
               value and the concentration of radio-elements during sorption
               at many surfaces. Such a part played by hydrogen ions was
               proved by many researchers (ref. 1) very clearly. The author
               gives a survey of the works on ion exchange (ref. s 1-11)
               together with the regula:ities explored thereby. These
               regularities proved to be completely analogous to those of

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formally. The increase of the pH-value increases the
absorption. With still higher pH-values a deposit of hydro-
xyde is precipitated and Fe is no longer absorbed by the
resin. Apparently the resin absorbs, however, the hydrolysis
complexes of iron. The additions of substances which form
complex compounds with iron (trilon B, oxylic acid, citric
acid) to the solution decrease the iron absorption by
carboxyl-resin. Only acetic acid increases the absorption.
The use of the ion exchange in radiochemistry. From the above
we can form an idea of the possibilities of the use of ionites
in radiochemistry. The simplification of the basic equation
(2) of the ion-exchange equilibrium results in

$$\frac{\Gamma_1}{c_1} = K^{z_1} \left(\frac{\Gamma_2}{c_2}\right)^{z_1/z_2} f(\gamma) = \alpha_1 = const. \quad (3)$$

where C= the concentration of the ion, $f(\gamma)$= a multiplier
containing the activity coefficients in resin and in the
solution; α_1 = the distribution coefficient of ion No. 1
(microcomponent) between the ionite and the solution. It is

Card 3/4

The Ion Exchange and Sorption of Radio-Elements   78-1-12/43

constant on the conditions given. It will transform at the
change of the nature of the second ion of its concentration,
as well as with the introduction of new ions, and finally
with changes of pressure and temperature. One of the most
interesting possibilities of use of the ion exchange is the
determination of the state of radio-elements in the solution.
Also the valence of the ions can be determined on certain
conditions (equation (2)). The exchange can become useful
in the investigation of radio-colloides (ref. 20). This way
the activity coefficients of an electrolyte can be determined
from several others. Radio-elements can be isolated and
purified. Finally the importance of this method in analytical
chemistry increases (mixtures of actinides and lanthanides, as
well as new unknown transuranium elements, especially
mendeyeevium). There are 2 figures, and 23 references,
14 of which are Slavic.

SUBMITTED: June 18, 1957

AVAILABLE: Library of Congress

Card 4/4

NIKOL'SKIY, B.P.; PAL'CHEVSKIY V.V. (Leningrad)

Spectrophotometric determination of dissociation constants of
leucomethylene blue and leucotoluidine blue (with summary in English).
Zhur. fiz. khim. 32 no.9:1506-1516 Jl '58.   (MIRA 11:9)
           (Methylene blue--Spectra)
           (Toluidine blue--Spectra)

SCV/78-3-9-11/18

AUTHORS: Paramonova, V. I., Morachevskaya, M. D., Nikol'skiy B. P.

TITLE: II. Determination of the Composition of the Precipitation Formed in
               the Interaction of the Solutions of Uranyl Salts With Sodium
               Hydroxide (II. Opredeleniye sostava osadkov, obrazuyushchikhsya
               pri vzaimodeystvii rastvorov soley uranila s gidrookis'yu
               natriya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 9, pp 2067-2074
               (USSR)

ABSTRACT: In the interaction of the solutions of uranyl salts with sodium
               hydroxide the equilibrium in the system is only very slowly
               obtained at temperatures of 17-20°C. The composition of the
               deposits formed in the system $UO_2(NO_3)_2$-$NaOH$-$NaNO_3$-H_2O depends

               on the hydrogen concentrations and on the concentration of
               sodium in the solution. The molar relation between sodium and
               uranium in the deposits formed at pH ~ 3,5 - 4,8 is 0,12 - 0,15.
               If the pH-value of the solution increases from 4,8 to 4,9, the
               relation between sodium and uranium increases from 0,15 to

Card 1/3   0,30. In the pH-range of 4,9 - 7,7 the sodium content in the

scv/7e-3-9-11/3e

II. Determination of the Composition of the Deposits Formed in the Interaction
of the Solutions of Uranyl Salts With Sodium Hydroxide

deposits varies only insignificantly. If the pH-value of the
solution increases to 11, the relation between sodium and
uranium increases to 1 and stays constant up to pH = 13,5. The
potentiometric titration of the solutions of uranyl salts with
soda lye shows a slow formation of deposits, and the results of
the analysis of the deposits indicate that the uronic acid
formed in the solution polymerizes in molecules with 6 atoms of
uranium. Between the solid phase and the solution an equilibrium
is reached which is expressed by the following reactions:

$$2UO_2(NO_3)_2 + 4NaOH \rightleftharpoons H_2U_2O_7 + 4NaNO_3 + H_2O$$

$$3H_2U_2O_7 \rightleftharpoons H_2U_6O_{19} + 2H_2O$$

$$H_2U_6O_{19} + Na^+ \rightleftharpoons NaHU_6O_{19} + H^+, \; pH \; 3,5-4,8$$

$$NaHU_6O_{19} + Na^+ \rightleftharpoons Na_2U_6O_{19} + H^+, \; pH \; 4,8-7,7$$

$$Na_2U_6O_{19} + 4Na^+ + 2H_2O \rightleftharpoons 3Na_2U_2O_7 + 4H^+, \; pH \; 7,7-13,5$$
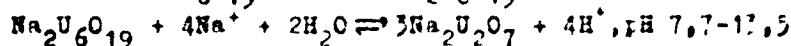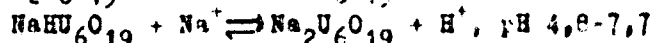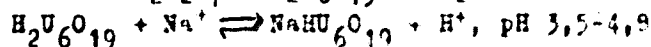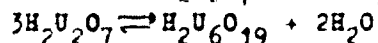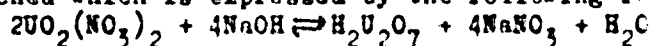
There are 3 figures, 2 tables, and 10 references, 3 of which
are Soviet.

Card 2/3

Nikol'skiy, B.P.

AUTHORS: Nikol'skiy, B. P., Shul'ts, M. M.,   76-1-3/32
              Peshekhonova, N. V.

TITLE: The Theory of the Glass Electrode (Teoriya steklyannogo
              elektroda) VII. The Effect of Foreign Ions on the Sodium and
              Potassium Functions of Glass Electrodes (VII. Vliyaniye
              postoronnikh ionov na natriyevuyu i kaliyevuyu funktsiyu
              steklyannykh elektrodov)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 1, pp. 19-26
              (USSR)

ABSTRACT: The following problems were investigated here: 1) The
              influence of foreign ions on the sodium function of glass
              electrodes at various temperatures. 2) The presence of a
              potassium function with glass electrodes of potash glass and
              the influence of various cations of various temperatures on
              the potash function. In order to carry out exactly the
              investigations of the thermodynamic properties of the sodium
              glass electrode a galvanic without transfer was used.

              -Ag AgCl, inner solution   glass membrane   outer solution

Card 1/5   AgCl Ag⁺   (1)

The Theory of the Glass Electrode. VII. The Effect of   76-1-3/32
Foreign Ions on the Sodium and Potassium Functions of Glass Electrodes

with the corresponding index means the magnitude of the
potential jump at the limit of two touching phases. A
sodiumchloride solution was used as inner and outer
solution. Alumoborium-silicate glass, the composition of
which varied only within certain limits, was used. This
glass differs from that serving for the production of glass
electrodes with a hydrogen function only insofar as the
hydrogen function is much less pronounced here. Every
experiment consisted of two parts: a measurement of the de-
crease of e.m.f. - E in pure sodium chloride solution and
the measurement of E in compound solution.. Results:
1) Investigation of the influence of various cations on the
sodium function of glass electrodes. The reaction of sodium
glass electrodes in compound solutions of sodium chloride
as well as in the chlorides of hydrogen, potassium, lithium,
rubidium, ammonium, magnesium and calcium at 2o, 35, 6o and
65°C were investigated. The authors show that the hydrogen
ion exercises the greatest influence on the sodium function
of the glass electrode. This is followed with decreasing
influence by the ions of potassium, rubidium, magnesium and
calcium. The position of the lithium ion among alkaline

Card 2/5

The Theory of the Glass Electrode. VII. The Effect of Forei n   76-1-3,/32
Ions on the Sodium an Potassium Function of Glass Electrodes

cations is anomalous from the point of view of its influence
on the sodium function of the glass electrode. The exact
analysis of this anomalously small influence will be given
in the following work. In order to characterize the
influence of the temperature on the sodium functi n in a
semiquantitative manner of the glass elec'rode in pure
sodium salt solutions the theoretical coefficient   - 2,3
RT/F of the equati n for the glass electrode is compared
with the experimental magnitude $_e$, i. e. the angular
coefficient of the inclinati o. of the straight line
E - f(1 ; a_{NaCl}). The authors show that the influence of the
temperature on the difference between   and $_e$ is small
and that with a rise of temperature both values approac.
each other. The authors also show th t (based on the
experiment l curves) a rise of temperature mostly exten's
a little the domain of the basic electrode functi . 2) The
investigation of the potassium function of glass electrodes.
Here a galvanic cell was used which was built according to
the following scheme:

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The Theory of the Glass Electrode. "II" The Effect of Foreign   76-1-3/32
Ions on the Sodium and Potassium Functions of Glass Electrodes

Ag $AgCl$, KCl 1,0 M   Soft glass KCl + HCl, $AgCl$ Ag
            within the   on the outside of
            electrode   the electrode

The authors show that (with the experiments with potassium
electrodes in pure KCl solution) for the given glass
composition the potassium function of the electrodes
would possess about 94% of the value of the theoretical
function appertaining to an ideal potassium electrode.
They further show that the hydrogen ion has the greatest
effect on the electrode function of potassium glass. This
is followed by sodium-, lithium-, barium-, magnesium- and
calcium-ions. The lithium ion, as is the case with sodium
glass, influences the potassium function of the glass
electrode anomalously little. There are 5 figures, 5 tables,
and 16 references, 7 of which are Slavic.

ASSOCIATION: Leningrad State University imeni A. A. Zhdanov
                (Leningradskiy gosudarstvennyy universitet imeni A. A.
                Zhdanova)

Card 4/5

The Theory of the Glass Electrode. VII. The Effect of Foreign   76-1-3/32
Ions on the Sodium and Potassium Functions of Glass Electrodes

SUBMITTED: July 6, 1956

AVAILABLE: Library of Congress

Card 5/5

76-38-2-6/38

AUTHORS: Nikol'skiy, B. P. , Shul'ts, M. M. , Peshekhonova, N. V.

TITLE: The Theory of Glass Electrodes (Teoriya steklyannogo elektroda)
              VIII. The Transition of Glass Electrodes From a Metal Func-
              tion to Other Functions (VIII. Perekhod steklyannykh elek-
              trodov ot odnoy metallicheskoy funktsii k drugin)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 2, pp. 262-269
              (USSR)

ABSTRACT: The problem was investigated to what extent the one or other
              electrode with certain electrode function is capable of sa-
              tisfying another electrode function, i.e. being capable of
              showing a reverse effect with regard to the ion originally
              not contained in the glass. In consequence of the experiments
              carried out it can be maintained that in the action of a
              foreign alkaline kation on a glass electrode with metal func-
              tion the electrode obtains another metal function correspond-
              ing to this kation. This new metal function occurs with an
Card 1/4   accuracy of up to 5 %. The calculation of the ion exchange

76-32-2-6/38

The Theory of Glass Electrodes . VIII. The Transition of Glass Electrodes
From a Metal Function to Other Functions

constants for sodium glass electrodes is carried out. This is
also valid, however, for electrodes of potassium glass, It is
shown that the ion exchange between glass- and water phase
mainly depends on the magnitude of the energy of binding of
the exchange ions with the glass phase as well as on their
energy with regard to the binding with the water phase. It
can be assumed that the ion binding which depends on the ion
size plays the main part in the glass phase. To this is added
the action of the polarizability of the anions contained in
the glass. As regards the binding of the ions with the water
medium its stability essentially depends on the interaction
of the ions with the water dipoles. Here the binding energy
in this case to a much greater degree depends on the distance
of the particles than does the energy of the ion binding in
the glass phase. The correlation between these two kinds of
energies also mainly determines the direction of the ion-
-exchange reaction. In the concentration of this energetic
correlation that energy, occurring when the ion in entering
the glass meets with a resistance of steric character, was
not taken into account. As conclusion t was stated: in sodium

Card 2/4   glasses a transition from the basic sodium function to the

76-32-2-6/38

The Theory of Glass Electrodes. VIII. The Transition of Glass Electrodes
From a Metal Function to Other Functions

function of potassium is possible. With potassium glasses a
transition from the potassium function to the sodium function
is possible. The transition from one metal function to the
other is explained by means of the ion-exchange theory. Based
on the hypothesis of the ion-exchange theory of the glass elec-
trode the exchange constant for 4 aluminum-borosilicate glas-
ses was calculated. It was found that in the exchange reaction

$$Na^+_{(glass)} + H^+_{(solution)} \rightleftarrows Na^+_{(solution)} + H^+_{(glass)}$$
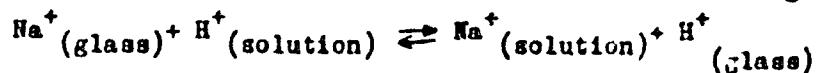
the equilibrium constant for the investigated sodium-aluminum-
borosilicate glasses is greater by 12 orders of magnitude than
in the case of 3C-1 glass. The values of constants computed
here prove the order arranged in Reference 1 for kations of
alkaline metals after their action on the sodium- or potassium
function of glass electrodes. The anomalous position of li-
thium in this order was discussed here from the viewpoint of
the energetic correlations in the ion-exchange process. There

Card 3/4   are 2 figures, 4 tables, and 15 references, 7 of which are

76-32-2-6/38

The Theory of Glass Electrodes. VIII. The Transition of Glass Electrodes
From a Metal Function to Other Functions

Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova
(Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: July 6, 1956

1. Glass electrodes--Properties   2. Ion exchange--Theory
3. Glass electrodes--Exchange reactions

Card 4/4

AUTHORS: Nikol'skiy, B. P., Pal'chevskiy, V. V.   76-32-6-15/46

TITLE: A Potentiometric Method of Investigating Reversible Organic
                Redox Systems (Potentsiometricheskiy metod issledovaniya or-
                ganicheskikh obratimykh okislitel'no-vosstanovitel'nykh sistem)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 6,
                pp. 1280 - 1291 (USSR)

ABSTRACT: A theory for the explanation of the influence of hydrogen ions
                on the oxidation potential of such systems was proposed already
                by Conant, Kohn, Fieser and Kurz (Ref 4). Clark gave the theory
                its final shape, his method, however, still shows serious short-
                comings as it was further developed with a primary interest in
                detail issues, for example in papers by Michaelis et al.(Refs
                7-9). In the present investigation galvanic elements without
                transfer and a glass electrode instead of a hydrogen electrode
                are used. Proceeding from the protolytic theory of acids and
                bases by Brönsted an equation is derived which permits to repre-
                sent all theoretically possible protolytic equilibria. In certain
                cases a simplification is possible. The function of the oxidation
Card 1/3   potential versus the pH of the system toluidine blue-leucoto -

A Potentiometric Method of Investigating Reversible   :0C'76-32-6-15/46
Organic Redox Systems

luidine blue is investigated. From the evidence of the graphical
representations it may be seen, that this method furnishes more
accurate data of the dissociation constant than that by Clark,
the errors being smaller. This method was verified experimentally
with the systems methylene blue-leucomethylene blue and toluidine
blue-leucotoluidine blue. The experimental technique and a
schematic figure of the experimental equipment are described.
The results showed a good agreement with the mentioned equatic:.
The value of the dissociation constant as obtained by Woislawski
(Ref 12) also coincides with that obtained by the authors. Taking
the system thionine-leucothionine as an example it is proved
that a more precise determination of the constant of protolytic
dissociation is possible by the method described. The difference
between theory and experiment in the alkaline range is explained
by experimental errors, which in this case are exceptionally high.
There are 5 figures, 3 tables, and 12 references, 3 of which
are Soviet.

Card 2/3

A Potentiometric Method of Investigating Reversible   CCV76-32-6-15/46
Organic Redox Systems

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A.A.Zhdanova
               (Leningrad State University imeni A.A.Zhdanov)

SUBMITTED: January 25, 1957

               1. Oxidation-reduction reactions--Analysis   2. Organic compounds
               --Properties

Card 3/3

AUTHORS: Nikol'skiy, B. P., Pal'chevskiy, V. V.   SOV/76-32-7-10/45

TITLE: The Spectrophotometric Determination of the Dissociation
             Constant of Leucomethylene Blue and Leucotoluidine Blue
             (Spektrofotometricheskoye opredeleniye konstant dissotsiatsii
             leykometilenovogo sinego i leykotoluidinovogo sinego)

ABSTRACT: The two above-mentioned compounds had already been investi-
             gated potentiometrically in an earlier paper. In the present
             paper the electron absorption spectra are investigated;
             since the dissociation takes place in two stages, with RH^{+2},
             and RH_2^+ being formed besides H^+ ions, and the proteolytic
             dissociation constants of the two reactions are very close
             to each other the authors employed the method by Thamer
             and Voigt (Ref 4). The measurements were carried out by means
             of a spectrophotometer SF-4 taking into account a number
             of conditions; thus, for instance, the measurements were car-
             ried out within the maximum of the absorption through 1 mμ.
             In order to take into account the high sensitivity to oxida-
Card 1/4   tion a special apparatus was constructed, a diagram and de-

SOV/76-32-7-10/45

The Spectrophotometric Determination of the Dissociation Constant of Leuco-methylene Blue and Leucotoluidine Blue

scription of which are given. The determinatios were carried out in three stages; in the mentioned apparatus the oxidized form was reduced at a certain pH value by hydrogen besides platinum and then was put into the bulb; afterwards it was spectrophotometered and finally the real concentration of the leuco-form was determined by an oxidation with hydrogen peroxide. The measurements were carried out at $20 \pm 2^{\circ}$ C. Some data are already existing on the absorption spectrum of leuco-methylene blue, viz., from the papers by Holst (Ref 5), Vles (Refs 6, 7), and A. T. Vartanyan (Refs 8, 9), whereas no data are known on that of leucotoluidine blue. The determina-tions carried out showed that at different pH values in the case of leucomethylene blue three products of the equilibrium of the leucoform are present, in the acid part the RH_2^+ products and in the alkali part the RH form. Three absorption spectra are given with the third diagram corresponding to pH = 5,20, at which the concentration of the RH_2 product is close to the maximum value. Within the shortwave range an increase of the absorption can be found which is especially

Card 2/4

SOV/76-32-7-10/45

The Spectrophotometric Determination of the Dissociation Constant of Leuco-methylene Blue and Leucotoluidine Blue

strong in the case of the RH form. The absorption spectrum of leucotoluidine does in qualitative respects not differ from that of leucomethylene blue and the maximum of the basic absorption band also regularly decreases with the increase of the pH, and is dislocated towards greater wave lengths. It finally increases again and returns to the previous position at 256 mμ. The similarity in the reaction of the two leuco compounds is explained by a mutual compensation of the influence of the protons on the electron shell of the leuco compound. The experimental data of the determination of the optical density at various pH point to the assumption that in the case of low pH values there exists only the leuco product RH_2^+ and thus the optical density does not depend on the pH. With the increase of the pH value the RH_2 product with a smaller absorption coefficient is formed by the dissociation, whereby the optical density decreases with the increase of the pH, and then increases again in the further dissociation and formation of the RH product which has a greater absorption coefficient. The proteolytic dissociation

Card 3/4

SOV/76-32-7-10/45

The Spectrophotometric Determination of the Dissociation Constant of Leuco-
methylene Blue and Leucotoluidine Blue

constants as well as the molecular absorption coefficients
were calculated from the values of the optical densities and
the activities of the hydrogen ions. The general optical
densities of the two dyes were produced by the additivity
principle. Finally there is an annex which shows the calcula-
tion of the dissociation constant from the optical densities
for bi-basic acids proceeding from the suggestion made by
Thamer and Voigt (Ref 4). There are 8 figures, 2 tables, and
9 references, 4 of which are Soviet.

SUBMITTED: February 22, 1957

1. Toluidines—Spectra   2. Cyclohexanones—Spectra   3. Toluidines
—Properties   4. Cyclohexanones—Properties   5. Spectrophotometers
—Performance

Card 4/4

AUTHORS: Nikol'skiy, B. P., Pal'chevskiy, V. V.   SOV/76-32-9-27/46

TITLE: Absorption Spectra of Methylene and Toluidine Blues (Spektry pogloshcheniya metilenovogo sinego i toluidinovogo sinego)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 9, pp 2123 - 2128 (USSR)

ABSTRACT: The absorption spectra of the dyes in aqueous solution of 20 $\pm$ 2° C were measured with the spectrophotometer C Φ-4. The measurings were done with special accuracy in the neighbourhood of the maxima (accuracy $\pm$ 0,3 - 0,4%). The spectra are plotted and are described in the text (methylene blue, pH -1,93; c- 1,0.10^{-5} M in figure 1; toluidine blue, pH- 2,94; c- 8,26.10^{-6} M in figure 2). The maximum within visible range is displaced to longer wave-lengths with growing ion-strength and at constant pH (Figure 2). The molar absorption coefficients of the two main maxima are reproduced in table 3. The optical density is in linear proportion to the ion-strength of the solution (Fig 3). As characteristic quantity the authors propose the molar coefficient at ion-strength zero

Card 1/2

Absorption Spectra of Methylene and Toluidine Blues   SOV/76-32-9-27/46

(infinite dilution). It amounts to 71 000 for methylene blue, as proved by extrapolation in figure 3. There are 3 figures, 3 tables, and 24 references, 6 of which are Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: April 12, 1957

Card 2/2

1959 –

ZAKHAR'YEVSKIY, Ketislav Sergeyevich;_NIKOL'SKIY, B.P., prof., otv.red.;
        DOBYCHIN, D.P., kand.khim.nauk, otv.red.; VACHINKINA, Ye.V., red.;
        ZHUKOVA, Ye.G., tekhn.red.

        [Kinetics of chemical reactions] Kinetika khimicheskikh reaktsii.
        Leningrad, Izd-vo Leningr.univ., 1959. 165 p.   (MIRA 12:12)

        1. Chlen-korrespondent AN SSSR (for Nikol'skiy).
                  (Chemical reaction, Rate of)

NIKOLSKY, B.P.

NIKOL'SKIY, B.P.; TROFIMOV, A.M.; VYSOKOOSTROVSKAYA, N.B.

Complex formation of barium and radium in trilon B solutions.
Radiokhimiia 1 no.2:147-154 '59.   (MIRA 12:8)
    (Barium compounds) (Radium compounds) (Acetic acid)

NIKOL'SKIY, B.P.; TROFIMOV, A.M.; VYSOKOOSTROVSKAYA, N.B.

Reaction of radium and barium with nitrilotriacetic acid in aqueous solutions. Radiokhimiia 1 no.2:155-161 '59.

(MIRA 12:8)

(Radium) (Barium) (Acetic acid)

NIKOL'SKIY, B.P.; TROFIMOV, A.M.; PANFILOVA, G.G.

Adsorption of zirconium and niobium by silica gel. Radiokhimiia
1 no.3:283-289 '59.   (MIRA 12:10)
        (Zirconium) (Niobium) (Silica)

SOV/78-4-4-24/44

5(4)

AUTHORS: Nikol'skiy, B. P., Trofimov, A. M., Vysokoostrovskaya, N. B.

TITLE: Investigation of the Behavior of Potassium Ions in Solutions of Ethylenediamine Tetraacetic Acid by the Ion Exchange Method and a Potassium Glass Electrode (Issledovaniye pove-deniya ionov kaliya v rastvorakh etilendiamintetrauksusnoy kisloty s pomoshch'yu ionnogo obmena i kaliyevogo steklyannogo elektroda)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 857-86? (USSR)

ABSTRACT: The authors investigated the behavior of potassium ions in solutions of ethylenediamine tetraacetic acid (EDTA) by the method of ion exchange by means of the radioactive indicator K^{42} and by the potentiometric method by means of a potassium glass electrode. The interaction of potassium with EDTA was investigated by means of the cation excharger KU-2 in the Na form and by means of the anion exchanger AV-17 in the Cl form. The results are listed in table 1. It was found that potassium ions within the pH range 6-11 form no complex with

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SOV/78-4-4-24/44

Investigation of the Behavior of Potassium Ions in Solutions of Ethylenedi-
amine Tetraacetic Acid by the Ion Exchange Method   and a Potassium Glass
Electrode

EDTA. In order to check this statement, the authors made ex-
periments concerning the adsorption of potassium on the an-
ion exchangers AV-17 and Dowex-1 from solutions without sodium
ions and with an EDTA concentration of 0.25 m at pH 7.6-11. The
results are given in table 2. The potentiometric investigations
indicated that with increasing EDTA concentration no complex is
formed in the solution since the electromotive force of the
galvanic cell remains constant. The results of the potentio-
metric investigations are given in table 3. There are 3 tables
and 8 references, 6 of which are Soviet.

ASSOCIATION: Radiyevyy Institut AN SSSR im. V. G. Khlopina (Radium Institute
                of the AS USSR imeni V. G. Khlopin)

SUBMITTED: June 21, 1958

Card 2/?

5(4)   SOV/76-33-9-5/37
AUTHORS: Nikol'skiy, B. P., Shul'ts, M. M., Peshekhonova, N. V.

TITLE: The Theory of the Glass Electrode. IX. The Application of the
                 Ion-exchange Theory to Glass Electrodes With Different Metallic
                 Functions

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 9, pp 1922-1927
                 (USSR)

ABSTRACT: The results of the investigations carried out so far (Refs 1-7)
                 and of the paper under review permit the statement that glass
                 electrodes (GE) assume a new electrode function through the
                 exchange of the hydrogen ions of the sodium in the glass with
                 cations from the solution, and this change over from one metal-
                 lic function to another. The experimental results of previous
                 papers (Refs 6,7), obtained with (GE) of aluminum borosilicate
                 glasses, are judged in the paper under review in conformity
                 with the simple theory of the ion-exchange of the (GE). The
                 theoretical change of the electromotive force (EMF) ΔE_n

                 through concentration-changes of NaCl in the galvanic element

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SOV/76-33-9-5/37

The Theory of the Glass Electrode. IX. The Application of the Ion-exchange
Theory to Glass Electrodes With Different Metallic Functions

$$ Ag \left| \begin{array}{c} AgCl, \ NaCl \quad (a) \\ \\ Inner \ Solution \end{array} \right| Glass \ membrane \left| \begin{array}{c} NaCl \ (a') + KCl, AgCl \\ \\ Outer \ Solution \end{array} \right| Ag \ (I) $$
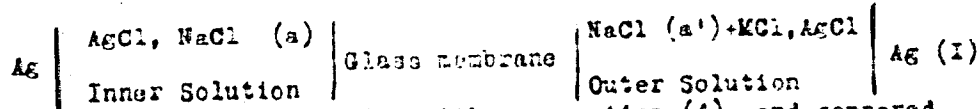
was computed in conformity with an equation (4), and compared
with the experimental values of ΔE of (I) ($\Delta E = E' - E''$; dif-
ference of the experimental values of the (EMF) of (I), with
E' representing the (EMF) at a concentration of the NaCl=1 in
the outer solution) (Table values for ΔE with NaCl+HCl mixtures
at various temperatures). Glasses of the following composition
were used for the tests: Nr 1: 75% SiO_2, 3% Al_2O_3, 11% Ba_2O_3,
11% Na_2O; Nr 2: 71% SiO_2, 3% Al_2O_3, 11% Ba_2O_3, 15% Na_2O. For
the tests with mixed NaCl+HCl solutions, data were taken from
(Ref 9), while the coefficients of activity for experiments
with NaCl+KCl and NaCl+LiCl solutions were calculated in con-
formity with the method by B. P. Nikol'skiy and V. A. Rabino-
vich (Ref 10). It was established that the simple ion-exchange
theory is confirmed within the limits of the accuracy of
measurements for the transition of the (GE) from a sodium-

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SOV/76-33-9-5/37

The Theory of the Glass Electrode. IX. The Application of the Ion-exchange
Theory to Glass Electrodes With Different Metallic Functions

function to the potassium- or lithium-function. Some deviations
of the experimental data from the theoretical values in the
transition zone during the exchange of the Na-ions from
glass with hydrogen ions from the solution, can be explained in
conformity with the generalized ion-exchange theory (Ref 11),
(as for glass of the type SO-1), by the presence of various
types of bonds between the hydrogen ions and the silicate an-
ions of glass. On the basis of previous investigations
(Refs 8,11) it was not possible to establish clearly whether
the last mentioned difference of bonds is valid only for hydro-
gen ions or also for metal ions. The experimental data obtained
indicate however that the transition of the (GE) from a metal-
lic electrode function to the other responds also in the
transition zone of the simple ion-exchange theory, i.e. that
the ions of the sodium, potassium and especially of lithium
(as distinct from hydrogen) show bonds equal in energy with
the silicate lattice of   glass. There are 3 figures,
1 table, and 11 references, 7 of which are Soviet.

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SOV/76-33-9-5/37

The Theory of the Glass Electrode. IX. The Application of the Ion-exchange
Theory to Glass Electrodes With Different Metallic Functions

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova
                (Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: January 18, 1958

Card 4/4

SOV/20-127-5-34/71

AUTHORS: Nikol'skiy, B. P., Corresponding Member, AS USSR,
               Parfenov, A. I., Shul'ts, M. M.

TITLE: Electrode Properties, Electrical Conductivity, and Chemical
               Stability of the Glasses of the System $Li_2O-La_2O_3-SiO_2$

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 3, pp 599-601
               (USSR)

ABSTRACT: In the present paper the results obtained by investigations
               of the above-mentioned properties of the glasses Li_2O-SiO_2
               and $Li_2O-La_2O_3-SiO_2$ (Refs 1-4) are confirmed. First, the com-
               ponent properties of the simple system were determined for
               the purpose of finding out what part each of them plays in
               the glass. In the course of the investigations of the above-
               mentioned system, LiO_2 was varied within the limits of
               25-33 mol% and La_2O_3 of 0-9 mol%. The electrode properties
               were investigated at 25 and 95° in solutions with constant
               Li^+, Na^+ or K^+-ion concentration and a variation of the pH-
               value of from 0-14. The investigation method has already

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SOV/20-127-3-34/71

Electrode Properties, Electrical Conductivity, and Chemical Stability of
the Glasses of the System $Li_2O-La_2O_3-SiO_2$

been described in earlier papers (Refs 1, 7). Electrical con-
ductivity was described in the T-interval of from 140-300°
according to the method described in reference 8. For the
calculation of the molar electrical conductivity λ, density
was determined by weighing in water and benzene. The results
obtained by measuring electrical conductivity, chemical
stability, and density are given in table 1. The measurements
showed the following: With the introduction of La_2O_3 and the

increase of its content, the resistance of the glasses rises
somewhat. On the other hand, the leaching out of the Li of
the glasses, which is due to the action of water, is reduced
by the introduction of lanthanum oxide. Thus, lanthanum in-
creases the chemical stability of the glasses. The results
obtained by investigating the electrode properties at 25°
in the given salt solutions and the ion-exchange constant
between water and glass are given by table 2. It was found
that a variation of the LiO_2-content within the given range

influences the limits of the hydrogen function only little
(± 5 mv). Electrical conductivity varied differently in the

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SOV/20-127-3-34/71

Electrode Properties, Electrical Conductivity, and Chemical Stability of
the Glasses of the System $Li_2O-La_2O_3-SiO_2$

various salt solutions with increasing lanthanum content. In
the Li-salt solutions, the upper limit of the hydrogen func-
tion was shifted towards lower values. With growing La-content
also the numerical value of the constant K grows. Li is
kept back in the glass. In the Na- and K-salt solutions the
limit of the hydrogen function is shifted into the more
basic range. Penetration of Na- or K-ions into the glass is
not possible owing to the filling effect of lanthanum oxide.
For the glasses with La-content, the influence of the alkali
ions upon the hydrogen function is given in the following order
of magnitude: $Li^+ > Na^+ > K$. At 95° a quite similar dependence
of the electrode properties on the composition of the glass
and the solutions could be observed, only it is not so sharp.
By the introduction of lanthanum into the glasses the limits
of the hydrogen function in an acid medium are extended, the
electrode properties are stabilized, and also the chemical
stability of the glasses is increased. For measurements of
the pH-value the glass composed of LiO - 24-28%, LaO - 4-7%,
SiO 65-70% (molar) is recommended besides the electrode
glass KST (TsLA energocherset)(Ref. 12). For the extension of the

Card 3/4

SOV/20-127-5-34/71

Electrode Properties, Electrical Conductivity, and Chemical Stability of the Glasses of the System $Li_2O-La_2O_5-SiO_2$

limits of the hydrogen function in the basic medium, other components must yet be introduced into the glass. There are 2 tables and 12 references, 7 of which are Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: May 13, 1959

Card 4/4

NIKULSKIY, O.I.

26.2510

8632
S/054/60/000/004/002/015
B004/B056

AUTHOR: Nikol'skiy, B. P.

TITLE: The Importance of the Solution Theory for the Development
               of the Theory of Ion Exchange

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii,
               1960, No. 4, pp. 11-25

TEXT: This is a Kendeleyev lecture which was delivered in Leningrad on
February 17, 1960 during a joint meeting of the VKhO (All-Union Chemical
Society imeni Mendeleyev) and LGU (Leningrad State University). The author
demonstrates the theory of solutions, proceeding from the opinion expressed
by D. I. Mendeleyev that every solution is the product of a chemical in-
teraction of its components. The energy processes accompanying the dissolu-
tion of a crystal are briefly described, and Henry's general thermodynamic
equations for the dissolution of gases are given, and for van't Hoff's
theory of dilute solutions. The application of these thermodynamic condi-
tions to ion exchangers is discussed. The fundamental equation for the
theory of ion exchange is written: $RT\ln(c_2'a_1/c_1'a_2) = RT\ln(\alpha_2'\alpha_1/\alpha_2\alpha_1')$

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The Importance of the Solution Theory for   S/054/60/000/004/002/015
the Development of the Theory of Ion Exchange B004/B056

$$+ \Delta'_{x_1 x_1} + \Delta'_{x_1 x_2} - (\Delta'_{x_2 x_2} + \Delta'_{x_2 x_1}) + \Delta'_{x_1 s_2} - \Delta'_{x_2 s_2} + \Delta'_{x_1 s_1} - \Delta'_{x_2 s_1} \quad (13)$$

Here, a_1 denotes the activity of the cation X_1; c'_1 is its concentration
in the exchanger, a_2, c'_2 denote the activity and concentration, respective-
ly, of the cation X_2; α_1, α_2, α'_1, α'_2 are the ratios between the concentra-
tions of the cations X_1, X_2 in the gaseous and liquid phases which have
been derived according to the Henry law. The primes refer to the exchanger
phase; Δ denotes the interactions among the ions and between ions and the
swelling water of the exchanger. The summands of this equation is discussed,
and the "exchange constant" $K = c'_2 a_1 / c'_1 a_2$, which is constant in first
approximation, is defined as being dependent mainly on $\Delta'_{x_1 s_1} - \Delta'_{x_2 s_1}$.

Under complicated conditions, K does not remain constant. Such a case was
observed at the kafedra fizicheskoy khimii LGU (Chair of Physical Chemistry
of Leningrad State University) in the case of glasses which had two diffe-
rent anions (Al_2O_3, SiO_2) with different energy of the interaction with

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8653L

The Importance of the Solution Theory for   S/054/60/000/004/002/015
the Development of the Theory of Ion Exchange   B004/B056

hydrogen. As further reasons for the inconstancy of K the following
are discussed: 1) The individual Δ' values are variable. Especially
Δ'_{xs_1} may be influenced by the swelling degree of the exchanger. 2) The

interaction between ions and the swelling water of the ion exchanger may
be influenced by high osmotic pressure in the case of slightly swelling
resins. 3) Changes in the summands Δ'_{xx} may occur at a high capacity

of the ion exchanger or in the case of ions of different valences. 4) In-
teractions between ions and solution or exchanger, accompanied by the forma-
tion of complexes. The potential difference between ion exchanger and solu-
tion is discussed. Finally, the author mentions two ways of investigating
ion exchange on the basis of the theory of solutions: 1) With one of the
exchangers, which is in equilibrium with a solution containing two electro-
lytes, the composition of the solution is varied, and the interaction of
the ions with the components of the solution is studied, or 2) the proper-
ties of the exchanger (swelling capacity, exchange capacity) are varied,
and the effect of this variation upon the composition of the ions in the
exchanger is studied. A. N. Kosevich, V. I. Paramonova, D. P. Konovalov,
M. S. Vrevskiy, Ye. A. Materova, N. F. Bogatova, A. M. Trofimov, RIAN

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86311

The Importance of the Solution Theory for   S/054/60/000/004/002/0·5
the Development of the Theory of Ion Exchange   B004/B056

(Radium Institute of the AS USSR), and K. K. Gedroyts. There are
9 figures and 10 Soviet references.

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NIKOL'SKIY, B.P.; KOLYCHEV, V.B.; GRENOVICH, A.L.; PARAMONOVA, V.I.

Existence of a uranyl monoacetate complex in solution. Radiokhimiia
2 no.3:330-338 '60.   (MIRA 13:10)
                    (Uranyl compounds)

KOSEVICH, A.N.; PARAMONOVA, V.I.; NIKOL'SKIY, B.P.

Determination of the exchange constants of some anions on
activated platinized carbon. Vest.LGU 15 no.10:93-97 '60.
(MIRA 13:5)

(Ion exchange) (Carbon, Activated)

NIKOL'SKIY, B.P.

Importance of the study of solutions in the development of ion
exchange theory [with summary in English]. Vest. LGU 15 no.22:
11-25 '60.   (MIRA 13:11)
    (Ion exchange) (Solution (Chemistry))

S/076/60/034/009/023/041XX
B020/B056

AUTHORS: Mosevich, A. N., Nikol'skiy, B. P., Paramonova, V. I., and
              Nordberg, Ye. L.

TITLE: Study of the Adsorption of Ions on Platinized Carbon by
              Exchange of the Gaseous Atmosphere

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 9,
              pp. 1900 - 1906

TEXT: A study has been made of adsorption and desorption of Cs^+ and Br^-
ions by means of ash-free platinized active carbon from one and the same
sample solution by way of an exchange of the gaseous atmosphere above the
solution. The adsorption took place mainly from buffer solutions. The
production of active carbon and its platinization have already been de-
scribed in earlier papers (Refs. 7, 14, 15). The carbon used had a turnup
of about 50 % and a maximum ash content of 0.05 % by weight. The weight of
the platinum layer on the carbon surface amounted to 0.25 % of the weight
of the carbon. Carbon fractions with a particle diameter of 1-2 mm were
taken. Gamma-active Cs^{134} and Br^{82} tracer isotopes were used. The experi-

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Study of the Adsorption of Ions on Platinized S/076/60/034/009/023/041XX
Carbon by Exchange of the Gaseous Atmosphere   B020/B056

ments were carried out in the vessel shown in Fig. 1. Electrolytic hydrogen
and atmospheric air freed from CO_2 were used for the purpose. If several
reaction vessels are used in conjunction, sample solutions may be taken
from one vessel without interrupting the gas flow by the others. The four-
vessel system used made it possible to investigate adsorption-desorption
changes in the same sample by blowing hydrogen and air alternatively
through the system. Table 1 shows the dependence of the cesium quantity
adsorbed from a $CsNO_3$ solution on its concentration, the quantity of cesium
adsorbed from the hydrogen atmosphere rising with a rising cesium concen-
tration in the solution. The cesium adsorption is accompanied by an
acidification of the solution, which increases with an increasing adsorp-
tion of cesium. In the desorption of cesium into the same solution, air
instead of hydrogen was used; this desorption was a quantitative one, which
indicates the electrostatic character of the cesium adsorption. An alkaliza-
tion of the solution was found to take place. Table 2 shows the dependence
of the adsorption of cesium ions on the pH of the solution for initial
cesium concentrations c_{Cs} = 0.01 N and 0.05 N. Tables 3 and 4 show the data
on the adsorption of cesium from buffer solutions in the presence of a
strange ion (sodium). In the case of a constant Na concentration, the

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Study of the Adsorption of Ions on Platinized   S/076/60/034/009/023/041 XX
Carbon by Exchange of the Gaseous Atmosphere   B020/B056

adsorption of Cs increases with its concentration; if, however, the
Cs concentration and the pH of the solution remain constant, and the
Na concentration is varied, the adsorption of the Cs ions decreases with
sodium concentration. The dependence of the adsorption of the Cs ions on
pNa ($= -\log c_{Na}$) is linear under these conditions (Fig. 3). If the
Cs- and Na-ion concentrations are kept on a constant level and the pH of
the solution is varied (Fig. 4), the adsorption of Cs increases linearly
with the pH. The results obtained by the experiments with respect to the
adsorption of the Br$^-$ ions on platinized carbon are given in Table 4, from
which it follows that the adsorption of Br$^-$ increases at a low pH. All
results obtained indicate the electrostatic character of bromine-ion
adsorption on the platinized carbon. N. A. Shilov, A. N. Frumkin,
D. N. Strazhesko, B. Ye. Tartakovskaya, S. Petrov, R. Burshteyn, and
T. Kiseleva are mentioned. There are 4 figures, 4 tables, and 19 references:
13 Soviet and 6 German.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova
                 (Leningrad State University imeni A. A. Zhdanov)

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Study of the Adsorption of Ions on Platinized   S/07ᶠ/60/034/009/023/041 XX
Carbon by Exchange of the Gaseous Atmosphere   B020/B056

SUBMITTED: August 2, 1958

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S/076/60/034/012/003/027
B020/B067

AUTHORS: Nikol'skiy, B. P., Paramonova, V. I., and Mosevich, A. N.

TITLE: Determination of the Exchange Constants of Some Cations on
              Activated Platinized Carbon in Hydrogen Atmosphere

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 12,
              pp. 2664-2670

TEXT: According to the papers by A. N. Frumkin and his collaborators
(Refs. 1-10) the exchange of two ions between carbon and solution is
expressed by the following equation of exchange isothermal lines:

$$\varepsilon_L^{1/z_L} / \varepsilon_M^{1/z_M} = K_{L/M} \, (f_L^{1/z_L}/f_M^{1/z_M})(c^{1/z_L}/c^{1/z_M}) \tag{1}$$

where ε_L and ε_M are the equilibrium amounts of the ions L and M in
milliequivalents which are absorbed by 1 g of the absorbent; c_L, c_M, f_L,
and f_M are the equilibrium concentrations and activation coefficients of
the ions L and M in the solution, z_L and z_M the valences of the ions L

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Determination of the Exchange Constants   S/076/60/034/012/005/027
of Some Cations on Activated Platinized   B020/B067
Carbon in Hydrogen Atmosphere

and M, and $K_{L/M}$ the exchange constant of the ions L and M. The authors
examine the applicability of equation (1) and the determination of the
exchange constants of some cation pairs on carbon from neutral solutions
of their salts. Under the experimental conditions the "apparent" ("con-
centration") constant $K'_{L/M}$ was obtained from the following equation

$$K'_{L/M} = K_{L/M} \left(f_L^{1/z_L} / f_M^{1/z_M} \right) \qquad (2).$$

The apparent exchange constant $K'_{L/M}$ is bound to remain constant at
constant ionic strength of the solution in first approximation. The
methods of determining the exchange constant are described in Refs. 16
and 17. The device used for this experiment is illustrated in Fig. 1.
The experiments showed that the solution above carbon has to be exchanged
seven to eight times in order to obtain a solution with the same composi-
tion as the initial solution. The exchange constants of the ion pairs
Ba - Cs, Ca - Cs, Mg - Cs, and Ca - Mg were determined, i.e., that of the
chlorides at a constant ionic strength of 0.1. The apparent exchange

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Determination of the Exchange Constants
of Some Cations on Activated Platinized
Carbon in Hydrogen Atmosphere

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constants were calculated from the following equation:

$$K'_{L/M} = (c^{1/z_M} c_L^{1/z_L})/(c_L^{1/z_L} c_M^{1/z_M}) \qquad (3).$$

The maximum error in calculating the constant is 15-20%. The experimental
results are listed in Tables 1-4. It was found that the absorption
capacity of carbon is the same for solutions with equal ionic concentra-
tions and any type of cations. In the experiments made by the authors it
was between 0.078 ± 0.006 mg/eq/g. The reversibility of the adsorption of
these ions on coal can be checked by means of the given exchange constant
for the ion pairs Ca - Cs, Mg - Cs, and Ca - Mg. Also the exchange con-
stants of the ion pairs Ba - Ca and Ba - Mg could be calculated from the
experimentally determined data for the above ion pairs by using the ratios
$K'_{Ba/Ca} = K'_{Ba/Cs} : K'_{Ca/Cs} = 0.86$ and $K'_{Ba/Mg} = K'_{Ba/Cs} : K'_{Mg/Cs} = 1.05$.
The values of the exchange constants of the ion pairs which are close to
unity indicate the low absorption selectivity of these ions on carbon.
This can be explained by the absence of ionogeneous groups on the surface
of platinized carbon as well as by the fact that the hydrate shell of the

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NIKOL'SKIY, B.P.; PAL'CHEVSKIY, V.V.; GORBUNOVA, R.G.

Study of the formation of acetate complexes in a ferric-ferrous
system by means of the oxidation potential. Zhur. neorg.
khim. 6 no.3:606-612 Mr '61.   (MIRA 14:3)
        (Complex compounds) (Electromotive force)
                        (Iron compounds)

NIKOL'SKIY, B.P.; BOGATOVA, N.F.

Certain problems in the theory of ion exchange. Part 2:
Nonexchange absorption of electrolytes by ion exchangers.
Vest LGU 16 no.16:97-107 '61.   (MIRA 14:8)

(Ion exchange resins)
(Electrolytes)

54700

AUTHORS: Nikol'skiy, B. P., Corresponding Member AS USSR, Shul'ts, M. M., Peshekhonova, N. V., and Belyustin, A. A.

TITLE: Particular electrode behavior of glasses containing two acid (glass-forming) oxides

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 3, 1961, 641 - 643

TEXT: Electrodes of alkali glasses with basic oxides (modifiers): Cs_2O CaO, BaO, La_2O_3, etc. have hydrogen function in a large pH interval:

$\varphi = \varphi^0 + \psi \log_{H^+}$ (1); ($\psi = (RT/F) \cdot 2.303$). By ion exchange: H^+(glass) $+ M^+$(solution) $\rightleftharpoons H^+$(solution) $+ M^+$(glass) (2), the hydrogen function changes to the metal function at certain pH's (section a"'б' of the curve 1, Fig. 1). According to the ion exchange theory, curve 1 is described by $\varphi = \varphi^0 + \psi \log(a_{H^+} + Ka_{M^+})$ (3), where K is the equilibrium constant of Eq. (2). The divergence from Eq. (3) observed in the a"'б' section, specifically when B_2O_3 is introduced (curve 2), is explained by the

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Particular electrode...

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presence of hydrogen ions bound differently strong to the glass. When adding B_2O_3 or Al_2O_3, one obtains a glass electrode with metal function (curve 4). B and Al free glasses correspond to weak acids ($K \sim 10^{-12}$, curve 1). Curves 2 and 4 correspond to $Na_2O-CaO-SiO_2$ systems with additions of Al_2O_3, B_2O_3, and ZrO_2. In the section aa' (curve 3), the hydrogen ions are bound to the anions of strong and weak acids in glass phase. In the section a'б'''б", the hydrogen ions are replaced by weakly bound alkali-metal ions. These are bound stronger in section б"б. The metal function is complete in б'б'''. This has been established experimentally in the ternary system $Li_2O-Al_2O_3-SiO_2$ with 0 - 3 mole% of Al_2O_3. Similar to Al_2O_3, B_2O_3 effects a differentiation in the system $Na_2O-B_2O_3-SiO_2$ at 0.1 N and 3 N Na-ion concentrations of the solution. With the curves representing the pH dependence of the potential, the vertical distance between the sections of the Na functions for glasses containing 6.6 and 9.4 mole% of B_2O_3 is: $\Delta E = \frac{1}{2}\log \left(a"_{NaCl}/a'_{NaCl}\right) = 85$ mv. Similar conditions were found for the following systems: $Li_2O - R_nO_m - SiO_2$ (R_nO_m

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B110/B101

$= B_2O_3$, Ga_2O_3, ZnO_2); $Na_2O - R_nO_m - SiO_2$ ($R_nO_m = Al_2O_3$, Cr_2O_3, Fe_2O_3, GeO_2, SnO_2, TiO_2, ZrO_2, P_2O_5, Sb_2O_5, Bi_2O_3). The second hydrogen range due to the weaker acid disappears with a pH of 0 - 14, when relatively large amounts (3 - 9%) of Al_2O_3, Fe_2O_3, B_2O_3, and ZrO_2 are added (curve 4, Fig. 1). Thus, alkali-metals are bound in complex silicate systems by Al_2O_3, B_2O_3, and similar oxides. The established "differentiating effect" of a small quantity of acid oxide in glasses of simple composition is common to all glass-forming oxides and confirms the assumed binding and coordination of atoms of glass-forming elements according to M. K. Shul'ts (Ref. 18: Vestn. LGU, No. 22, 40 (1960)) and (Ref. 19: Stekloobraznoye sostoyaniye (the vitreous state), Izd. AN SSSR, 1960). There are 5 figures and 19 references: 15 Soviet-bloc and 4 non-Soviet-bloc. The most recent reference to the English-language publication reads as follows: Ref. 11: G. Eisen ann, D. O. Rudin, J. U. Casby, Sci., 126, 831 (1957).

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

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Particular electrode...

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SUBMITTED: May 22, 1961

Fig. 1. Diagram of the electrode behavior
of different glasses.

Legend: (1) Binary alkali-silicate glasses
and glasses containing modifying ions;
(2) complex glasses with glass-formers and
modifiers; (3) simple glasses containing
small quantities of a second glass-former;
(4) glasses containing relatively large
quantities of a second glass-former. The
dotted sections of curves 1, 2 correspond
to Eq. (3).
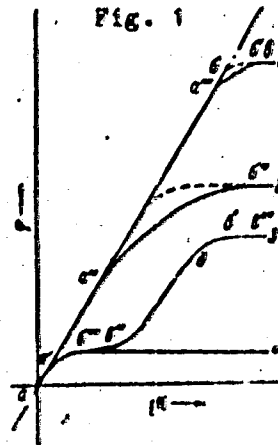
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NIKOL'SKIY, B.P.; BOGATOVA, N.F.

Sorption of water vapors by sulfonic acid and carboxylic cation exchangers. Dokl. AN SSSR 141 no.6:1409-1412 D '61.

(MIRA 14:12)

1. Leningradskiy gosudarstvennyy universitet im. A.A.Zhdanova.
2. Chlen-korrespondent AN SSSR (for Nikol'skiy).
   (Water vapor)　(Sorption)　(Ion exchange)

NIKOL'SKIY, B.P.; VYSOKOOSTROVSKAYA, N.B.; TROFIMOV, A.M.

Exchange of ions of some alkaline earth metals
on carboxylic phosphate, and sulfonic resins.
Radiokhimia 4 no.4:512-514 '62.   (MIRA 15:11)
        (Alkaline earth metals) (Ion exchange resins)

PARAMONOVA, V.I.; NIKOL'SKIY, B.P.; NIKOLAIEVA, N.M.

Interaction of uranyl nitrate solutions with alkali metal carbonates. Zhur.neorg.khim. 7 no.5:1026-1035 My '62.
(MIRA 15:7)

1. Leningradskiy gosudarstvennyy universitet, kafedra radiokhimii.
(Uranyl nitrate) (Alkali metal carbonates)

NIKOLSKI, B.P. [Nikol'skiy, B.P.]; BOGATOVA, N.F.

Some problems of the theory of ion exchange. I. Curves of ion
absorption by cationites and anionites. II. Electrolyte
absorption by ionites without exchange. Analele chimie 17
no.2:104-114 Ap-Je '62.

NIKOL'SKIY, B.P.; SHUL'TS, M.M.

Some aspects of glass electrode theory. Zhur. fiz. khim. 36
no.6:1327-1330 Je'62   (MIRA 17:7)

1. Leningradskiy gosudarstvennyy universitet.

RYAZANTSEV, N.V.; NIKOL'SKIY, B.P.

Conditions for the self-compensation of error from current
leakage in the measurement of electromotive force of a galvanic
cell with a glass electrode. Zhur.fiz.khim. 36 no.8:1835-1838
Ag '62.   (MIRA 15:8)

1. Nauchno-issledovatel'skiy institut gidroliznoy i sul'fitno-
spirtovoy promyshlennosti.
          (Electromotive force)   (Electrodes, Glass)

AUTHORS: Nikol'skiy, B. P., Corresponding Member AS USSR, Isakova,
             N. P., and Shul'ts, M. M.

TITLE: Composition of boron alumosilicate glasses and its effect
             upon their electrodic end acid properties

TEXT: The present paper was read at the session of the OS Otdeleniya khimicheskikh nauk AN SSSR (OS of the Department of Chemical Sciences of the AS USSR) on May 30, 1957. It concerns a new method of solving glass electrode problems and such related to hyalurgy in general. The electrode potential as a function of the pH of the electrolytic solution was measured on silicate glasses with a content (mole%) of 0-16.3 of B_2O_3, 0-2 of Al_2O_3, 10-22.7 of Na_2O, and 0-6.4 of CaO: $\varphi = \varphi^0 + \vartheta \log(a_{H^\bullet} + K a_{Na^\bullet})$, where $\vartheta = 2.3RT/F$; $K = a_H \cdot K_{Na^\bullet}/a_{Na^\bullet} \cdot K_{H^\bullet}$ is the exchange coefficient between Na^+ and H^+. With increasing pH, each glass passed from the hydrogen function

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