PANCHENKOV, G.M.; GRYAZNOVA, Z.V.; YEMEL'YANOVA, V.M.; GANICHENKO, L.G.

Conversion of hydrocarbons on deuteriated alumino silicate catalysts.
Probl. kin. i kat. 9:145-151 '57. (MIRA 11:3)
(Deuterium) (Catalysts) (Chemical reaction, Rate of)

PANCHENKOV, G.M.

Discussion. Probl. kin. i kat. 9:168-170 '57. (MIRA 11:3)
(Catalysts) (Hydrogen--Isotopes)

PANCHENKOV, G.M.; AKISHIN, P.A.; VASIL'YEV, N.N.

Mass-spectroscopic analysis of alumino silicate catalysts. Probl. kin. i kat. 9:378-385 '57. (MIRA 11:3)
(Catalysts) (Mass spectroscopy)

PANCHENKOV, G.M.; SEMIOKHIN, I.A.; AKISHIN, P.A.

Chemistry of isotope separation. Vest. Mosk. un. Ser. mat., mekh., astron. fiz., khim. 12 no. 6:199-214 '57. (MIRA 11:10)

1. Kafedra fizicheskoy khimii Moskovskogo gosudarstvennogo universiteta.

(Isotopes)

PONCHENKOV, G. M.

A CHEMICAL METHOD FOR THE SEPARATION OF BO-

A chemical exchange [illegible]

[illegible]

ron on an industrial scale. (tr-auth)

Separation by chemical exchange [illegible]

[illegible]

[illegible] of the packing in the reaction [illegible] on the sepn. of N isotopes, and the effect of NH_3 partial pressure during the reaction $N^{15}H_{3\,gas} + N^{14}H_4NO_{3(soln.)} \rightarrow N^{14}H_{3(gas)} + N^{15}H_4NO_{3(soln.)}$ was investigated. Coarse-grain, medium-pore SiO_2 and Al_2O_3 gels [illegible]

[illegible] (2 ml/min) [illegible] a pressure of 1 atm. The isotope sepn. was improved at lower NH_3 partial pressure, was affected by the [illegible] packing and was best with [illegible] grains about [illegible] mm in size.

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PANCHENKOV, G.M.

76-10-8/34

AUTHORS: Panchenkov, G.M., Semiokhin, I.A., Kalashnikov, O.P.

TITLE: Separation of Stable Nitrogen Isotopes according to the Chemical Exchange Method. II. (Razdeleniye stabil'nykh izotopov azota metodom khimicheskogo obmena. II.)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 10, pp. 2224-2228 (USSR)

ABSTRACT: The influence of the flow velocity and the temperature on the separation of the nitrogen isotopes is investigated in a counter flow column according to the reaction

$$N^{15}H_{3(r)} + N^{14}H_4NO_{3(p-p)} \rightleftarrows N^{14}H_{3(r)} + N^{15}H_4NO_{3(p-p)} .$$

It is shown that the time for obtaining a stationary state is reduced with the flow velocity and the temperature rise. It is detected that an optimum flow velocity (solution inlet, return of the ammonia into the column resp.) exists under the conditions prevailing in the device. At this optimum current velocity the maximum separation of the nitrogen isotopes is obtained. It is shown that the total coefficient of the isotope concentration is reduced at an increase of temperature from 20° to 40° (in all flow velocities investigated here) in order to

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Separation of Stable Nitrogen Isotopes according to the Chemical Exchange Method II.

increase then according to the further temperature rise. Such a dependence is explained by the variation of the concentration coefficient at the cost of the simultaneous variation of the equilibrium constants of exchange reactions occurring in the column, of the exchange velocity and of the mole part of the dissolved ammonia with the temperature. There are 8 figures and 3 Slavic references.

ASSOCIATION: Moscow State University imeni M.V. Lomonosov
(Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova)

SUBMITTED: August 6, 1956

AVAILABLE: Library of Congress

Card 2/2

20-114-3-34/60

AUTHORS: Gorshkov, V. I., Panchenkov, G. M.

TITLE: On the Mechanism of Ionic Exchange
(K voprosu o mekhanizme ionnogo obmena)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 3, pp. 575-578 (USSR)

ABSTRACT: The existing concepts of the mechanism of ionic exchange do not offer any sufficient ideas with respect to the influence of the conditions under which the reaction takes place, e.g. of the temperature or of the solvent, upon the equilibrium of ionic exchange. On the basis of results obtained during investigations of the equilibrium of ionic exchange, and also on the basis of phenomena described in the relevant scientific publications it may be possible to suggest the following concepts of the process of cationic exchange: A resin represents an acid with a high number of molecules. If immersed into a polar solvent, e.g. into water, this resin is ionized as result of the interaction with the molecules of the solvent. But as the resin anions are connected with each other, they cannot freely be distributed over the entire volume of the solvent. Because of the effects of the electrostatic forces,

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also the cations cannot propagate here. As the result, an "ionic cloud", is formed around the surface of the resin; this "ionic cloud" has a relatively high concentration of cations. In solutions of strong electrolytes, however, it is possible that at concentrations of more than 0,05 N there takes place an ionic association, an approaching of the contrary sign under the influence of electrostatic forces. This phenomenon must take place also for the cations and the anions of the resin. It is possible that on the outer surface of the resin there is formed a diffuse ionic layer with a sufficiently deep penetration of cations into the solvent. In the interior of the resin net, on the other hand, the thickness of the diffuse layer - because of the mutual repulsion between the opposed cations - is considerably thinner than the thickness of the outer diffusion layer. This thickness is the thinner, the closer to each other are the dissociating groups. Therefore it is possible, in a general case, to describe the equilibrium in first approximation as a process of two stages. If the resin is broken into very small pieces or if it represents a little polymerized product (the so-called soluble resins) then the concentration of ions on its surface will not be so high, and the equilibrium will be shifted quite considerably

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On the Mechanism of Ionic Exchange

to the right. In this case, an "ionic cloud" is formed at the particle surface. The paper under review then proceeds to discuss the behavior of resin in weakly acid media, in alcohol solutions, and derives a formula that interprets a number of mathematical interrelations which had appeared in the course of the investigations of the equilibrium of ionic exchange. The same metal has different constants for different resins; this can be explained by the different structure of the carbon skeleton of different resins. With respect to sulphoresins and alkali elements in aqueous-alcoholic solutions (up to 60 % alcohol), a linear dependence of $\lg K$ on $1/D$ was obtained. The paper under review also discusses the influence of alcoholic additions on the constant of acid dissociation, and takes into account the behavior of the acids in solvents. There are 4 figures and 15 references, 9 of which are Slavic.

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20-114-3-34/60

On the Mechanism of Ionic Exchange

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova)

PRESENTED: November 22, 1956, by A. V. Topchiyev, Member of the Academy

SUBMITTED: November 22, 1956

Card 4/4

AUTHORS: Panchenkov, G. M., Gryaznova, Z. V. and Kuvshinnikov, I. M. 20-114-6-38/54

TITLE: Ionic Exchange on Aluminum-Silicate Catalysts in an Alkali Current With Short Duration of Contact (Ionnyy obmen na alyumosilikatnykh katalizatorakh v potoke shchelochi pri malykh vremenakh kontakta)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 114, Nr 6, pp. 1276-1279 (USSR)

ABSTRACT: It was hitherto not possible to determine completely the nature of the aluminum-silicate catalysts which are very important for industry (references 1 - 9). The present work studies the mechanism and the kinetics of the process mentioned in the title under dynamic conditions in an alkaline (NaOH-, LiOH-, and KOH-solutions of various concentrations and velocities of flow) and a neutral medium. For this purpose the authors used the industrial catalysts (14% Al_2O_3+ 86% SiO_2) and (37% Al_2O_3 + 63% SiO_2). Several portions were annealed at 500, 750, 1100 and 1380 $^{\circ}$C. Figures 1 and 2 give the experimental results in an alkaline medium. From figure 1 follows that an ordinary saturation curve is obtained. Its initial section is expressed by 2 straights with good

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Ionic Exchange on Aluminum-Silicate Catalysts in an Alkali Current With Short Duration of Contact

20-114-6-38/54

approximation. The value of the tangent of the inclination angle (V) of the second section depends on the velocity of flow and is proportional to the concentration of the solution. The velocity of the ionic exchange also depends on the degree of the previous heat treatment of the catalyst. Based on these tests it may be stated that a catalyst with a constant activity can be obtained by annealing at 500 - 700 °C for at least 16 hours. Kinetic curves of the ionic exchange of aluminum-silicate catalysts which were deactivated by annealing at 1100 - 1300 °C have no break in their initial section. The most probable cause of the break in the kinetic curves is the difference of the accessibility of the exchangeable centers of the catalyst at the surface and those lying deeper (within the pores and between the packs). In this case the break might be explained by the completed neutralization of the surface centers. Their number can be graphically represented (table 2). In the case of sufficiently low alkali concentrations (up to 0,015 n) alkali is almost completely neutralized by the hydrogen ions of the surface. These ions are neutralized first, those lying deeper subsequently. A non-annealed catalyst has a maximum acidity

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Ionic Exchange on Aluminum-Silicate Catalysts in an Alkali Current With Short Duration of Contact 20-114-6-38/54

and possesses the maximum number of exchange centers in general and especially at the surface. For an alkali concentration of about 0,1 n part of the alkali is used for the solution of the catalyst (reference 10). From the results is to be seen that the slowest stage of the entire process is the diffusion into the interior of the pores. In the point of break, after the terminated surface-neutralization, the velocity of exchange is determined by the diffusion into the interior of the pores alone. Thus an abrupt change of the velocity of process is the cause of the broken instead of the slightly bent curves. This is confirmed by the ionic exchange in the neutral medium. The break of the curves is absent here, as the exchange proceeds about 10^3fold slower. It is also absent in the curves of a crushed catalyst, which also furnishes a confirmation of what has been said. Thus one comes to the conclusion that the concentration of the outer active centers on the aluminum-silicate catalyst may easily be determined when it is neutralized with an alkali solution. The method is, however, only usable when the velocities of the ionic exchange at the surface and in the interior of the

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Ionic Exchange on Aluminum-Silicate Catalysts in an Alkali Current With Short Duration of Contact 20-114-6-38/54

pores are highly different. Thus it is not suitable for all acid and oxide catalysts. There are 2 figures, 2 tables, and 11 references, 8 of which are Slavic.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova)

PRESENTED: January 19, 1957, by A. V. Topchiyev, Academician.

SUBMITTED: January 9, 1957

Card 4/4

PANCHENKOV, G.M.

KUZMAK, Ye.M., prof. doktor tekhn. nauk, red.; TARAN , V.D., prof.; doktor tekhn. nauk, red.; ZHIGACH, K.F., prof., red.; MURAV'YEV, I.M., prof., red.; TIKHOMIROV, A.A., kand. ekon. nauk, red.; YEGOROV, V.I., kand. ekon. nauk, red.; CHARYGIN, M.M., prof., red.; DUNAYEV, F.F., prof., red.; CHERNOZHUKOV, N.I., prof., red.; CHARNYY, I.A., prof., red.; PANCHENKOV, G.M., prof., red.; DAKHNOV, V.N., prof., NAMETKIN, N.S., doktor khim. nauk, red.; ALMAZOV, N.A., dots., VINOGRADOV, V.N., kand. tekhn. nauk, red.; BIRYUKOV, V.I., kand. tekhn. nauk, red.; TAGIYEV, E.I., red.; GURVICH, V.M., red.; GOR'KOVA, A.A., ved. red.; FEDOTOVA, I.G., tekhn. red.

[Proceedings of the conference of technical schools on the problems of new equipment for the petroleum industry] Mezhvuzovskoe soveshchanie po voprosam novoi tekhniki v neftianoi promyshlennosti. 1958. materialy... Moskva, Gos. nauchno-tekhn. izd-vo neft. i gorno-toplivnoi lit-ry. Vol. 3. [Manufacture of petroleum industry equipment] Neftianoe mashinostroenie. 1958. 222 p. (MIRA 11:11)
(Petroleum industry--Equipment and supplies)

CHERNOZHUKOV, N.I., prof., doktor tekhn.nauk, red.; ZHIGACH, K.F., prof., red.; MURAV'YEV, I.M., prof.,red.; TIKHOMIROV, A.A., kand.ekon. nauk, red.; YEGOROV, V.I., kand.ekon.nauk, red.; CHAHYGIN, M.M., prof., red.; DUNAYEV, F.F., prof., red.; KUZMAK, Ye.M., prof., red.; CHAHNYY, I.A., prof., red.; PANCHENKOV, G.M., prof., red.; DAKHNOV, V.N., prof., red.; NAMETKIN, N.S., doktor khim.nauk, red.; ALMAZOV, N.A., dotsent, red.; VINOGRADOV, V.N., kand.tekhn.nauk, red.; BIRYUKOV, V.I., kand.tekhn.nauk, red.; TAGIYEV, E.I., red.; GUREVICH, V.M., red.; ZAMARAYEVA, K.M., vedushchiy red.; MUKHINA, E.A., tekhn.red.

[Petroleum refining; articles] Pererabotka nefti; materialy. Moskva, Gos.nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry. Vol.2. 1958. 289 p. (MIRA 12:1)

1. Mezhvuzovskoye soveshchaniye po voprosam novoi tekhniki v neftyanoy promyshlennosti, Moscow, 1956. 2. Moskovskiy neftyanoy institut (for Chernozhukov, Panchenkov).

(Petroleum--Refining)

CHERNOZHUKOV, N.I., prof., doktor tekhn.nauk, red.; ZHIGACH, K.F., prof., otvetstvennyy red.; MURAV'YEV, I.M., prof., red.; TIKHOMIROV, A.A., kand.ekon.nauk, red.; YEGOROV, V.I., kand.ekon.nauk, red.; CHARYGIN, M.M., prof., red.; DUNAYEV, F.F., prof., red.; KUZMAK, Ye.M., prof., red.; CHARNYY, I.A., prof., red.; PANCHENKOV, G.M., prof., red.; DAKHNOV, V.N., prof., red.; NAMETKIN, N.S., doktor khim.nauk, red.; ALMAZOV, N.A., dots., red.; VINOGRADOV, V.N., kand.tekhn.nauk, red.; BIRYUKOV, V.I., kand.tekhn.nauk, red.; TAGIYEV, E.I., red.; GUREVICH, V.M., red.; ZAMARAYEVA, K.M., vedushchiy red.; MUKHINA, E.A., tekhn. red.

[Materials of the Interuniversity Conference on Problems of New Practices in the Petroleum Industry] Materialy mezhvuzovskogo soveshchaniya po voprosam novoy tekhniki v neftyanoy promyshlennosti. Moskva, Gos. nauchno-tekhn. izd-vo neft. i gorno-toplivnoi lit-ry. Vol.2. [Petroleum refining] Pererabotka nefti. 1958. 289 p. (MIRA 11:6)

1. Mezhvuzovskoye soveshchaniye po voprosam novoy tekhniki v neftyanoy promyshlennosti. 1956.
(Petroleum--Refining)

ZHIGACH, K.F., prof, red.; MURAV'YEV, I.M., prof. doktor tekhn.nauk, red.; TIKHOMIROV, A.A., kand.ekon.nauk, red.; YEGOROV, V.I., kand.ekon. nauk, red.; CHARYGIN, M.M., prof., red.; DUNAYEV, F.F., prof., red.; CHERNOZHUKOV, N.I., prof., red.; KUZMAK, Ye.M., prof., red.; CHARNYY, I.A., prof., red.; PANCHENKOV, G.M., prof., red.; DAKHNOV, V.N., prof, doktor geologo-mineralogicheskikh nauk, red.; NAMETKIN, N.S., doktor khim.nauk, red.; ALMAZOV, N.A., dots., red.; VINOGRADOV, V.N., kand.tekhn.nauk, red.; BIRYUKOV, V.I., kand.tekhn.nauk, red.; TAGIYEV, E.I., red.; GUREVICH, V.M., red.; DOBRYNINA, N.P., vedushchiy red.; MUKHINA, E.A., tekhn.red.

[Proceedings of an interschool conference on problems of new techniques in the petroleum industry] Materialy Mezhvuzovskogo soveshchaniya po voprosam novoy tekhniki v neftyanoy promyshlennosti. Moskva, Gos. nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry. Vo.1. [Prospecting and exploitation of oil and gas fields] Razvedka i razrabotka neftianykh i gazovykh mestorozhdenii. 1958. 311 p. (MIRA 11:4)

1. Mezhvuzovskoye soveshchaniye po voprosam novoy tekhniki v neftyanoy promyshlennosti.
(Petroleum engineering) (Gas, Natural--Geology)

PANCHENKOV, G.M.

A.V. Topchiyev, G.M. Panchenkov, N.S. Nametkin, A.A. Gundyrev and Ku Ch'ang-li, "Temperature Dependence of the Viscosity and Density of Certain Silicon-Organic Compounds.

Report presented at the Second All-Union Conference on the Chemistry and Practical Application of Silicon-Organic Compounds held in Leningrad from 25-27 September 1958.
Zhurnal prikladnoy khimii, 1959, Nr 1, pp 238-240 (USSR)

PANCHENKOV, G.M.; BARANOV, V.Ya.

Kinetics of the thermal cracking of n-hexadecane in the flow.
Izv. vys. ucheb. zav.; neft' i gaz no.1:103-110 '58. (MIRA 11:8)

1.Moskovskiy neftyanoy institut im. akad. I.M. Gubkina.
(Hexadecane) (Cracking process) (Chemical reaction, Rate of)

PANCHENKOV, G.M.; BARANOV, V.Ya.

Standardization of a design for laboratory tube furnaces.
Izv. vys. ucheb. zav.; neft' i gaz no.6:77-79 '58. (MIRA 11:9)

1. Moskovskiy neftyanoy institut im. akad. I.M. Gubkina.
(Furnaces)

SOV/65-58-9-5/16

AUTHORS: Panchenkov, G. M. and Baranov, V. Ya.

TITLE: Thermal Cracking of n-Hexadecane as Homogeneous Systematic Reaction of the First Order Carried out in a Current. (Termicheskiy kreking n-geksadekana kak gomogennaya posledovatel'naya reaktsiya pervogo poryadka, provodimaya v potoke)

PERIODICAL: Khimiya i Tekhnologiya Topliv i Masel, 1958, Nr 9, pp 24 - 29, (USSR)

ABSTRACT: Thermal cracking of hydrocarbons is a complex reaction. It can be considered as an irreversible homogeneous reaction of the first order. Previous publications on the systematic investigation of these reactions are mentioned. (Ref.1 - 5). In an earlier report (Ref.7) the kinetics of thermal cracking of n-hexadecane were calculated. If the rate of cracking is taken as a measure of the yield of the fraction boiling at 285°, then this reaction can be considered as a systematic chemical reaction; this assumptions is confirmed by the yield-curves of this fraction which pass through a maximum, and also by the fact that the curves showing the yield of the gas and of this fraction depend on the depth

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Thermal Cracking of n-Hexadecane as Homogeneous Systematic Reaction of the First Order Carried out in a Current.

of conversion of the starting material (Fig.1). The reaction proceeds according to the following equation:

$$A \xrightarrow{k_1} v_1A_1 + v_2A_2 + v_3A_3 \xrightarrow{k_2} v_4A_1 + v_5A_2$$

where A = the starting material, A_1 = the gas, A_2 = the condensation products, v = the corresponding stoichiometric coefficients and k_1 and k_2 = the rate constants of the first and second cracking stage. The yield of the "intermediate product" A_3 and of the two rate constants of the thermal cracking process are calculated. If n-hexadecane is subjected to cracking at 520°, 550° and 580°C the rate constants of the first and second stage of the reaction are identical (Fig.2). The stoichiometric coefficients v_3 for the fraction boiling at 285° is taken as "intermediate product". The theoretically calculated yields of this fraction were substantially identical to those obtained during practical experiments (Fig.4). If the depth of conversion of n-hexadecane

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Thermal Cracking of n-Hexadecane as Homogeneous Systematic Reaction of the First Order Carried out in a Current.

is below 0.6 the equation for the homogeneous first order reaction changes into a simple first order reaction proceeding in the current. There are 4 Figures, 7 References: 2 English and 5 Soviet.

ASSOCIATION: MNI im. akad. Gubkina

1. Hydrocarbons--Fractionation 2. Hydrocarbons--Chemical reactions
3. Mathematics

Card 3/3

76-32-2-19/38

AUTHORS: Panchenkov, G. M., Gorshkov, V. I., Kuklanova, M. V.

TITLE: The Effect of the Addition of Organic Solvents on the Ion Exchange Equilibrium (Vliyaniye dobavok organicheskikh rastvoriteley na ravnovesiye ionnogo obmena) I. The Effect of Alcohols on the Equilibrium of Alkaline Ion Exchange on Sulfo-Resins (I. Vliyaniye spirtov na ravnovesiye obmena ionov shchelochnykh metallov na sul'fosmolakh)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 2, pp. 361-367 (USSR)

ABSTRACT: The authors mainly investigated the effect of methylalcohol on the equilibrium constant of alkaline ion exchange in the sulfo resins of inland origin СДВ-3, ЭБС and espatite-1. The kind of dependence of the equilibrium constant on the composition of the mixed solvent and its dielectric constant was checked. The effect of alcohol on various sulfo resins in the exchange process was compared for the purpose of explaining the part played by the carbon skeleton in resin. Finally the effect of alcohol on the exchange of various

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76-32-2-19/38

The Effect of the Addition of Organic Solvents on the Ion Exchange Equilibrium. I. The Effect of Alcohols on the Equilibrium of Alkaline Ion Exchange on Sulfo-Resins

cations was compared and the part played by the salt-anion in the salts of one and the same metal was explained. - The ion exchange of the alkaline metals Li^+, Na^+, and K^+ with the H^+ ion was mainly investigated with chlorides. It is shown that the logarithm of the exchange constant in all investigated ions linearly depends on the quantity 1/D (up to the values of about≈0,02) of the solvent. (D denotes the dielectric constant of the solvent). This shows that on these conditions the basic rôle is played by the change of the electrostatic interaction of ions and not by the change of solvation. It is further shown that an addition of alcohol increases the exchange constants of all three cations, that of LiCl changing least and that of KCl most. Within the range of the used concentrations of water-alcohol solutions (up to 60 % CH_3OH) a linear dependence of the logarithm of the exchange constant on 1/D was obtained. It is shown that with an increase of the concentration these exchange constants in alcohol become greater which can be used for improving the chromatographic separation of alkaline elements. It is shown that the exchange constants with the NaJ solution

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76-32-2-19/38

The Effect of the Addition of Organic Solvents on the Ion Exchange Equilibrium. I. The Effect of Alcohols on the Equilibrium of Alkaline Ion Exchange on Sulfo-Resins

almost coincide with the corresponding exchange constants with the NaCl solution. This means that in the case of similar salts the nature of the anion has little effect on the magnitude of the exchange constant in water as well as on the change of the constant with alcohol addition. On the other hand, however, if a weakly dissociated ion was formed in consequence of the reaction, this influence is a great one. There are 5 figures, 7 tables, and 10 references, 8 of which are Soviet.

ASSOCIATION: Gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: November 3, 1956

1. Ion exchange resins--Properties 2. Methanol--Exchange reactions
3. Organic solvents--Dielectric properties

Card 3/3

AUTHORS: Panchenkov, G. M., Gorshikov, V. I., 76-32-3-18/43
Kuklanova, M. V.

TITLE: The Influence of Organic Solvents Upon the Ionic Exchange Equilibrium (Vliyaniye organicheskikh rastvoriteley na ravnovesiye ionnogo obmena).
II. The Influence of Acetone Upon the Ionic Exchange Equilibrium of Alkali Metals on Sulfo Resins
(II. Vliyaniye atsetona na ravnovesiye ionnogo obmena shchelochnykh metallov na sul'fosmolakh)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 3, pp. 616-619 (USSR)

ABSTRACT: Kressman and Kitchener (ref 1) obtained equilibrium constants of the ionic exchange of K^+ in water-acetone mixtures, but did not explain the obtained results. Bafna (ref 2) does not give any confirmation of his assumptions either, whereas the investigations by Materova, Vert and Grinberg (ref 3) did not yield positive results, perhaps because of knowledge inexact of the activity coefficients in water-acetone solutions. Thus, there exists almost no satisfactory explanation on

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The Influence of Organic Solvents Upon the Ionic
Exchange Equilibrium.
II. The Influence of Acetone Upon the Ionic Exchange
Equilibrium of Alkali Metals on Sulfo Resins

76-32-3-18/43

the influence of acetone upon the ionic exchange equilibrium. The present paper investigates the ionic exchange equilibrium of the alkali metals Li^+, Na^+ and K^+ on the domestic sulfo resins SBS, espatite-1 and the resin SM-12 (the latter contains sulfo and carboxyl groups), where the H-form of the resins was used and work was done in water-acetone solutions. The method of the taking of isothermal lines was described in an earlier paper. From the experimental results follows that acetone exerts a stronger influence on the equilibrium constant than methanol. The change of the constant with increasing acetone concentration is similar for all resins. The presence of the weakly dissociated -COOH groups in the resin SM-12 apparently does not play any part. The increase in the ionic exchange by the influence of acetone according to its strength acts like in water i.e. most on K^+ and least on Li^+. In the investigations of the Li-form of the resin with Na^+ ions it was determined that the values for lgK yield a linear

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The Influence of Organic Solvents Upon the Ionic Exchange Equilibrium. 76-32-3-18/43

II. The Influence of Acetone Upon the Ionic Exchange Equilibrium of Alkali Metals on Sulfo Resins

function of 1/D which indicates that no interaction of the ions with the molecules of the solvent takes place, but that the electrostatic ionic interaction is decisive. When a $Me^+ - H^+$ exchange is performed, the linear function is not attained, which is explained by the fact that in this case an influence of the H^+ ions upon the molecules of the solvent probably takes place. There are 3 figures, 3 tables, and 4 references, 2 of which are Soviet

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: November 13, 1956

Card 3/3

AUTHORS: Panchenkov, G. M., Maksareva, T. S. 76-32-4-31/43

TITLE: Methods and Techniques of Physicochemical Investigations (Metody i tekhnika fiziko-khimicheskogo issledovaniya)
An Optical Micromethod for the Determination of the Coefficients of Diffusion of Liquids (Opticheskiy mikrometod opredeleniya koeffitsiyentov diffuzii v zhidkostyakh)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 4, pp. 922 - 929 (USSR)

ABSTRACT: The method according to I. V. Obreimov (Reference 1) was selected for these investigations; it is, in principle, based on the phenomenon of a diffraction at the end of a plane parallel lamella which is immersed into the liquid. By diffusion a concentration gradient forms in the liquid and thus a change of the coefficient of calculation of a parallel light beam occurs which penetrates the liquid; on this occasion a corresponding diffraction image is obtained which has light and dark spots in the vertical. The calculation of the diffusion coefficient was carried out according to the calculation formula by Ya. P. Gokhshteyn (Reference 2) while the positions of the

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76-32-4-31/43

Methods and Techniques of Physicochemical Investigations. An Optical Micromethod for the Determination of the Coefficients of Diffusion of Liquids

diffraction places were determined by means of tables of error integrals and a formula. From the description of the apparatus can, among other, be seen that a micromethod according to G. M. Panchenkov and I.I. Levina (Reference 3) was used for the determination of the diffraction, the apparatus consisting of the diffusion cell having two bulbs, a thermostat and a light source with an optical system, as well as a camera. Diagrams and pictures are given. The specifically heavy liquid is put into a bulb, and a special method of measurement is given for the determination of the difference of wave lengths for each individual pair of liquids and for every temperature. Some determinations of different pairs of liquids were carried out at 10-80°C; as example o-xylene-mesytilene is given at 20°C, in which case for D = 0,869 $cm^2/24^h$ was obtained, while the diffusion coefficient for potassium chloride 0,1 N-water of 1,565 $cm^2/24^h$ (lit. 1,586 $cm^2/24^h$) coincides well with the one mentioned in references. Calculation tables are given. There are 7 figures,

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Methods and Techniques of Physicochemical Investigations. An Optical Micromethod for the Determination of the Coefficients of Diffusion of Liquids

2 tables and 5 references, 3 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvenny universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: December 10, 1956

AVAILABLE: Library of Congress

1. Liquids--Diffusion 2. Diffusion--Mathematical analysis

Card 3/3

SOV/76-32-8-9/37

AUTHORS: Panchenkov, G. M., Kazanskaya, A. S.

TITLE: The Kinetics of the Catalytic Cracking of n-Alkanes (Kinetika kataliticheskogo krekinga n-alkanov)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 8, pp. 1779-1784 (USSR)

ABSTRACT: n-Hexane, n-heptane and n-octane were investigated. A synthetic aluminum silicate with 30% Al_2O_3 and 70% SiO_2 served as catalyst. The accessible surface of the catalyst amounted to 206 m^2/g. The cracking was carried out in a continuous flow apparatus within the temperature interval of from 520-580°C, with an addition of raw material of from 0,2 to 0,9 volume/volume per hour. The experiment lasted one hour. The reaction kinetics, according to the concept of Langmuir (Lengmyur), was represented as a heterogeneous reaction of first order; and the equation of a straight, $n_0 x = - Ln_c \ln (1 - x) - K$ was derived. An investigation of the theoretically possible values of the coefficient L in dependence on the adsorbability of the raw material and the reaction products is carried out.

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The Kinetics of the Catalytic Cracking of n-Alkanes SOV/76-32-8-9/37

The constants L and K are calculated by means of the equations obtained and the constants of the Arrhenius' equation as well as the activation energies are determined from the values obtained for the diverse temperatures. It was found that the equation mentioned above is a good representation of the cracking reaction. The data obtained are given in a table. There are 4 figures, 1 table, and 5 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy neftyanoy institut im. akad. I.M. Gubkina (Moscow Institute of **Petroleum** imeni I.M. Gubkin, Member, Academy of Sciences, USSR)

SUBMITTED: March 14, 1957

Card 2/2

21(5) SOV/76-32-11-28/32

AUTHORS: Kuznetsova, Ye. M., Makarov, A. V., Panchenkov, G. M.

TITLE: On the Calculation of the Once-Through Coefficient of the Separation of Isotopes for Equilibrium Processes (O raschete odnokratnogo koeffitsiyenta razdeleniya izotopov dlya ravnovesnykh protsessov)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 11, pp 2641-2643 (USSR)

ABSTRACT: The change of the isotope concentration in simple investigations is within the error limits of mass spectrometers. For this reason several tests must be carried out, i.e. the separation must be repeated to obtain the required accuracy. In the present paper a calculation method for the once-through separation coefficient is given for cases where the isotopes are separated according to the method of ion chromatography, a chemical exchange, a formation of a precipitation (according to the theorem by V. G. Khlopin), or according to other equilibrium methods. The authors proceeded from the assumption that the stoichiometric coefficients for the separation reaction are equal to unity. In this case the once-through

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SOV/76-32-11-28/32

On the Calculation of the Once-Through Coefficient of the Separation of Isotopes for Equilibrium Processes

coefficient α coincides with the constant of the chemical equilibrium. The final equation obtained is:

$$\alpha = \frac{t}{t - 1 + \sqrt[n]{\frac{x_o}{y_n}}}$$

x_o = the initial content of isotopes in the first phase

y_n = the content of isotopes in the second phase after n separations

n = number of separation stages (repetitions of separation)

$t = \frac{L}{G}$, where L denotes the amount of the isotope mixture in the first phase, and G the amount of the isotope mixture till the separation process. There is 1 reference.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet, Khimicheskiy fakul'tet (Moscow State University, Chemistry Department)

Card 2/3

5(4) SOV/76-32-12-20/32

AUTHORS: Panchenkov, G. M., Maksareva, T. S., Yerchenkov, V. V.

TITLE: The Temperature Dependence of the Diffusion Coefficients of Some Organic Liquids (Temperaturnaya zavisimost' koeffiziyentov diffuzii nekotorykh organicheskikh zhidkostey)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 12, pp 2787 - 2791 (USSR)

ABSTRACT: The diffusion coefficients at various temperatures were determined by the diffraction micro method for the pairs of liquids: a) o-xylene-p-xylene, b) o-xylene-mesitylene, and c) 1.36 m solution of p-dichlorobenzene in chlorobenzene-chlorobenzene. Based on the variations of density and viscosity in relation to the temperature found for the individual components, the values for the diffusion coefficients were calculated and compared with those found experimentally. Divergencies remain within the limit of error. There is an approximate exponential dependence between diffusion coefficient and temperature.

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SOV/76-32-12-20/32

The Temperature Dependence of the Diffusion Coefficients of Some Organic Liquids

There are 1 figure, 7 tables, and 10 references, 4 of which are Soviet.

SUBMITTED: June 5, 1957

Card 2/2

20-118-4-36/61

AUTHOR: Panchenkov, G. M.

TITLE: On the Coefficient of Diffusion in Liquids (O koeffitsiyente diffuzii v zhidkostyakh)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 4, pp. 755-759 (USSR)

ABSTRACT: The author started in his previous works on the theory of the viscosity of liquids (reference 1) from the idea that in the mutual separation of molecules to a distance which exceeds the equilibrium distances r_0, forces of attraction act between the molecules. If in that case the total kinetic energy of the molecules which belong to 2 different liquid strata is lower than the binding energy and in case of certain additional conditions holding between these molecules, a binding can occur. The system then behaves for a certain time as a single "kinetic unit". If the total kinetic energy, however, is higher than the binding energy a binding between the molecules cannot form and the molecules will move independently of each other. In case of a

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On the Coefficient of Diffusion in Liquids

20-118-4-36/61

certain here shown condition these molecules can pass over from one liquid stratum to the nearest situated one, i. e. a diffusion is observed. For the passing over of the molecule from one stratum to the other another condition is necessary: it is given here. The differences of the diffusion in liquids and in gases are shown. For the coefficient of diffusion in liquids $D = 2Wr_o\bar{c}$ holds; W denotes a certain advantageous grouping of the molecules and r_o denotes half the distance, corresponding with equilibrium, between the centers of the molecules. The molecules here for the sake of simplicity are assumed to be spherically shaped. The quantities occurring in this formula computed separately and the final term which then results for D is given explicitely. This term gives the dependence of the diffusion coefficient on temperature, on concentration, and on pressure. According to the concentration of the molecules the diffusion coefficient will linearly or non-linearly depend on the concentration (with maximum, minimum, or point of inflection).
A table illustrates the agreement of this formula with experiments for various compounds. The computed diffusion

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On the Coefficient of Diffusion in Liquids 20-118-4-36/61

coefficients for the systems O-xylene-n-xylene and benzene-monodeuterobenzene surmount with increasing temperature more and more the corresponding experimental values, for a small change of the coordination number leads to a considerable change of the computed diffusion coefficient. The values of the coordination numbers are compiled in a table. The author analogously computed some other systems and found a good agreement of theory with experiment.
There are 1 table, and 6 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (State University M. V. Lomonosov, Moscow)

PRESENTED: July 8, 1957, by A. V. Topchiyev, Member, Academy of Sciences USSR

SUBMITTED: June 25, 1957

AVAILABLE: Library of Congress

Card 3/3

PANCHENKOV, G. M., TOPCHIYEVA, K. V., KALIKO, M. A., PIGUZOVA, L. I., AGAFONOV, A. V., KAMAKIN, N. M., MIRSKIY, Y. S.

"Studying the Nature of Activity of Alumosilicate Catalysts."

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

5(3)

AUTHORS: Panchenkov, G. M., Kolesnikov, I. M. SOV/152-59-3-20/25

TITLE: On the Kinetics of Dehydrogenation of Boundary Hydrocarbons (O kinetike degidrogenizatsii predel'nykh uglevodorodov)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1959, Nr 3, pp 91-95 (USSR)

ABSTRACT: The first author gave a general method for the calculation of the velocity of continuously proceeding chemical reactions and physico-chemical processes for both static and not static systems (Refs 1, 2, 3, 4). The present paper shows the possibility of using the kinetic equation set up (Refs 3, 4) for the utilization of the dehydrogenation of n-butane in the presence of a chromium-aluminum-catalyst. The experimental data required for this purpose were taken from a paper by G. D. Lyubarskiy (Ref 5). Dehydrogenation was carried out continuously under dilution with additions of varying amounts of nitrogen. It is stated that the kinetic equation is applicable to considerable and inconsiderable dilutions and low and high reaction rates of limit hydrocarbons. The utilization of experimental data shows that the kinetics of dehydrogenation of n-butane by a chromium-aluminum-catalyst is well explained

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On the Kinetics of Dehydrogenation of Boundary Hydrocarbons SOV/152-59-3-20/25

by the equation: $-x - \frac{1+\beta}{\beta} \ln (1 - x) = \frac{k_1}{n_o}$, where:

x = reaction quantity,

$\beta = \frac{\Upsilon - b_A p + b_B p + b_C p}{1 + b_A p + \gamma(1 + b_p p)}$ (Υ = stoichiometric coefficient,

b_A, b_B, b_C, b_p are the adsorption coefficients of the limit hydrocarbon, the unsaturated hydrocarbon, the hydrogen and the inert dilution gas;

$\gamma = \frac{n_p}{n_o}$, the ratio between the number of the gram moles of the dilution gas (n_p) and the number of gram moles of the saturated hydrocarbon);

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$k_1 = \frac{kl}{\beta}$ ($k = \frac{k' S_o b_A p}{1 + b_A p + \gamma(1 + b_p p)}$ k' = constant of the reaction

On the Kinetics of Dehydrogenation of Boundary Hydrocarbons SOV/152-59-3-20/25

velocity, S_o = surface of the catalyst with respect to the unit of length of the layer in the direction of flow, 1 = length of the reactor). In a diagram with the abscissa $-2{,}3 n_o \lg(1 - x)$ and the ordinate $n_o x$ the values lie on a straight line. In the case of increasing dilution of the n-butane by nitrogen the angle of inclination of the straight line to the abscissa becomes steeper. The apparent activation energy is calculated according to the equation by Arrhenius to amount to 38000 cal/mol ± 500. There are 3 figures, 1 table, and 5 Soviet references.

ASSOCIATION: Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im. akad. I. M. Gubkina (Moscow Institute of Petroleum Chemical and Gas Industry imen akad. T. M. Gubkin)

SUBMITTED: November 30, 1958

Card 3/3

PANCHENKOV, G.M.; KOLCHIN, A.M.; AKISHIN, P.A.

Mass spectrometric study of the thermionic emission of cesium with various emitters. Fiz. tver. tela 1 no.6:919-922 Je '59. (MIRA 12:10)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova. (Thermoionic emission)

PANCHENKOV, G.M.; SKOBLO, V.A.

Dynamic method for sorption measurements. Izv. vys. ucheb. zav.; neft' i gaz 2 no.4:63-69 '59. (MIRA 12:10)

1. Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im. akad. I.M. Gubkina.
(Gases--Absorption and adsorption)

MAKARENKOV, V.V.; MESHCHERYAKOV, A.P.; PANCHENKOV, G.M.; PLATE, A.F.;
SHUYKIN, N.I.; YAKOVLEVSKIY, V.V.

Effect of the structure of individual hydrocarbons and ethers on their combustion rate. Izv. vys. ucheb. zav.; neft' i gaz 2 no.4: 71-78 '59. (MIRA 12:10)

1. Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im. akad. I.M. Gubkina.
(Hydrocarbons) (Ethers) (Combustion)

PANCHENKOV, G.M.; KOLESNIKOV, I.M.

Kinetics of the formation of isopropylbenzene and diisopropylbenzene from benzene and proplene on aluminosilicate catalyst. Izv. vys. ucheb. zav.; neft' i gaz 2 no.5:55-62 '59. (MIRA 12:8)

1. Moskovskiy institut neftekhimicheskoy o gazovoy promyshlennosti im. akademika I.M. Gubkina.
(Alkylation) (Benzene)

PANCHENKOV, G.M.; KARRYYEV, Ch.S.

Self-purification of Romashkino diesel fuel by hydrogenation.
Izv. vys. ucheb. zav.; neft' i gaz 2 no.7:75-80 '59.
(MIRA 12:12)

1.Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti
im. akad. I.M. Gubkina.
(Diesel fuels) (Hydrogenation)

PANCHENKOV, G. M.; KOLESNIKOV, I.M.

Kinetics of coke formation on an aluminosilicate catalyst in the alkylation of benzene by propylene. Izv.vys.ucheb.zav.; neft' i gaz 2 no.9:79-80 '59. (MIRA 13:2)

1. Moskovskiy institut neftekhmicheskoy i gozovoy promyshlennosti imeni akademika I.M.Gubkina.
(Coke) (Aluminum silicates) (Alkylation)

PANCHENKOV, G.M.; SKOBLO, V.A.

Sorption kinetics of benzene vapors over a wide range of temperatures. Izv.vys.ucheb.zav.; neft' i gaz 2 no.12:69-75 '59. (MIRA 13:5)

1. Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti imeni akademika I.M. Gubkina.
(Benzene) (Sorption)

PANCHENKOV, G.M.

Theory of periodic precipitates. Vest.Mosk.un.Ser.mat., mekh., astron., fiz., khim. 14 no.1:197-201 '59. (MIRA 13:8)

1. Kafedra fizicheskoy khimii Moskovskogo universiteta.
(Liesegang rings)

5 (2), 5 (3) SOV/75-14-4-5/30

AUTHORS: Gorshkov, V. I., Kuznetsov, I. A., Panchenkov, G. M.

TITLE: The Influence of Organic Solvents on the Chromatographic Separation of the Li^+-, Na^+-, and K^+-ions on Sulfone Resins

PERIODICAL: Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 4, pp 417-421 (USSR)

ABSTRACT: The authors worked out the optimum conditions of a chromatographic separation of sodium and potassium and a mixture of lithium, sodium, and potassium. They specially investigated the separation in solvent mixtures, i.e. in the concentration range of the organic solvent (60-80 %) in which the equilibrium constants of the exchange of the ions to be separated for hydrogen show the greatest differences. The investigations were carried out with the cationites espatite-1, KU-2, and SDV-3. The particles of the first two resins were 0.25-0.5 mm thick, and 0.10-0.25 mm in the case of SDV-3. Columns of various height 15 mm thick were used. The alkali elements to be separated were inserted in the form of chlorides, and eluted in the corresponding solvent mixture with a solution of hydrochloric acid. The quantitative determination of metal ions in the eluate was carried out by measuring the concentration change of the acid emanating from the column as well

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The Influence of Organic Solvents on the Chromatographic SOV/75-14-4-5/30
Separation of the Li^+-, Na^+-, and K^+-ions on Sulfone Resins

as by the evaporation of the individual fractions titration of the chloride with silver nitrate against fluorescein as an indicator. Both methods gave the same results. In the cationites espatite and KU-2, the quantitative separation of sodium and potassium is possible in an aqueous medium. The separation of lithium and sodium failed, however, in the aqueous medium both in the case of espatite and SDV-3. The use of solvent mixtures as media improves considerably the separation of a mixture of lithium, sodium, and potassium on the sulfone resins under investigation. For practical applications, chromatographic separation on the resin SDV-3 proved to be best suitable. Complete separation is obtained if 80%-methanol is used as a solvent. Lithium is thereby eluted with a 0.12 N solution of hydrochloric acid in 80%-methanol, and sodium with a 0.25 N solution of hydrochloric acid in 80%-methanol. Potassium is finally eluted with a still more concentrated aqueous hydrochloric acid. The elution rate was 5.4 ml/min. The results of the separation on the various sulfone resins under different conditions are graphically shown by 6 figures. The investigations carried out are described in detail. There are 6 figures and 11 references, 5 of which are Soviet.

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The Influence of Organic Solvents on the Chromatographic SOV/75-14-4-5/30
Separation of the Li^+-, Na^+-, and K^+-ions on Sulfone Resins

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: April 30, 1958

Card 3/3

5(4),21(5)

AUTHORS: Panchenkov, G. M., Tolmachev, A. M., Kondratova, V. B. SOV/76-33-3-38/41

TITLE: On a New Method of Isotope Separation (O novom metcde razdeleniya izotopov)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 3, pp 734-735 (USSR)

ABSTRACT: Contrary to previous assumptions it was shown (Refs 1-3) that the isotopes of various elements have unequal molar volumes such as hydrogen, lithium, and mercury isotopes. In this paper the authors decribed the separation of oxygen isotopes by means of bis-(N,N'-disalicylal ethylenediamine)-μ-aquo-dicobalt (Ref 4), which strongly absorbs oxygen at 40° C and loses it again at 60° C. In order to determine a "screening effect" of this substance for isotope molecules of oxygen, the authors computed the distribution coefficient α in glass-bulbs of a capacity of 2,000, 1,000, 500, 250, and 125 ml at a pressure of between ≈ 760 and ≈ 380 torr and a temperature of $20 \pm 3^\circ$ C. The results of measurement are listed (Table); they indicate that isotopes may be separated in the

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On a New Method of Isotope Separation SOV/76-33-3-38/41

gas and liquid phase according to the aforesaid method. Corresponding investigations are presently being made by the authors of this paper. There are 1 table and 5 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. Lomonosova (Moscow State University imeni Lomonosov)

SUBMITTED: December 3, 1958

Card 2/2

SOV/76-33-9-7/37

21(5)

AUTHORS: Semiokhin, I. A., Panchenkov, G. M., Korovkin, V. K., Borisov, A. V. [redacted]

TITLE: Separation of Oxygen Isotopes in the Process of Electrosynthesis of Ozone

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 9, pp 1933-1938 (USSR)

ABSTRACT: The equilibrium constant of the reaction of isotope exchange $2\ O_3^{16} + 3\ O_2^{18} \rightleftarrows 2\ O_3^{18} + 3\ O_2^{16}$ (1) in a silent electric discharge was calculated in the Laboratoriya khimii i razdeleniya izotopov MGU (Laboratory of Chemistry and Isotope Separation of MSU) by means of the approximation method by V. M. Tatevskiy (Ref 1), it amounts to 1.174 at 20°C. In order to determine the dependence of the distribution of the oxygen isotopes on the duration of gas in the discharge zone, on the length of the ozonizer, on the method of ozone concentration, and on the way of taking samples, investigations were performed by means of a special device (Fig 1) made of molybdenum glass. The oxygen was conducted through a system to be purified and dried and was then introduced into the ozonizer. The ozone

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Separation of Oxygen Isotopes in the Process of Electrosynthesis of Ozone

concentration of the oxygen-ozone mixture was measured and the ozone was adsorbed in silica gel to be either analyzed by means of a mass spectrograph or (in multistage investigations) was dissociated by heat-treatment and was again converted into ozone in the ozonizer. The pressure was measured by means of an ionization thermocouple vacuummeter type VIT-1 or by a Hg-manometer respectively. The current supply of the ozonizer was accomplished by a sound-frequency generator type ZG-2A and a translation amplifier type TU-500-3, by the use of a transformer of the type OM-6. The current intensity of the ozonizer was measured by means of a "Mul'titset" type Ts-312, the voltage being measured by means of a static voltmeter type S-96. The ozone concentration was determined iodometrically, the analysis of the isotope composition of the oxygen was performed by means of the apparatus type MS-3. The factor of the specific energy U/v permitting the comparison of the performance efficiency of electrochemical processes as shown by experiments in the Laboratoriya kataliza i gazovoy elektrokhimii MGU (Laboratory of Catalysis and Gas Electrochemistry of the MSU) this factor was applied to the analysis of measur-

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Separation of Oxygen Isotopes in the Process of Electrosynthesis of Ozone

ing results in relation to the concentration coefficient S. It was observed that a steady state in the isotope exchange between oxygen and ozone is reached for U/v = 2wh/l that means in about 1 second. The enrichment of ozone with O^{18} depends practically neither on the length of the ozonizer nor on the method of ozone-concentration nor on the sample taking. Values of 1.08 to 1.10 for S were obtained by one-stage investigations in ozonizers of different lengths (20-65 cm) at 20°C and 750 torr. The following scientists were mentioned: Ye. N. Yeremin, S. S. Vasil'yev and N. I. Kobozev. There are 6 figures and 4 references, 3 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: February 13, 1958

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SOV/76-33-11-46/47

~~21(5)~~

AUTHORS: Semiokhin, I. A., Panchenkov, G. M., Zhurov, Yu. A.

TITLE: New Data on the Application of the Isotope Exchange Between CO_2 and $CO_3^=$ for the Separation of the Isotopes of Carbon and Oxygen 79

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 11, pp 2633-2635 (USSR)

ABSTRACT: The separation of the carbon isotopes according to the bicarbonate method is difficult, because of the low degree of solubility of CO_2 in salt solutions, which was also proved by the experiments of N. N. Tunitskiy et al (Ref 2). The solubility of CO_2 in bicarbonate solution can be increased by the addition of organic solving agents which mix with water. Experiments were made with the addition of 5% of methanol or 5% of acetone to a 20% potassium bicarbonate solution. The column (2 m high and 16 mm in diameter) was filled with a synthetic aluminum silicate catalyst (16.0% of Al_2O_3) and the bicarbonate solution was passed through at a rate of 4.0±0.1 ml/minute. The experimental results (Fig 1) show that the addition of methanol has no influence on the separation of the carbon isotopes, while an in-

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SOV/76-33-11-46/47

New Data on the Application of the Isotope Exchange Between CO_2 and $CO_3^=$ for the Separation of the Isotopes of Carbon and Oxygen

crease of the general separation coefficient was achieved with acetone. The experiments of Urey et al (Ref 5) showed that this was not achieved with pure acetone. Investigations have still to be carried out on the side-reaction CO_2 + acetone $\rightarrow$ acetone.CO_2; acetone.$C^{12}O_2 + C^{13}O_2 \rightleftarrows$ acetone.$C^{13}O_2 + C^{12}O_2$. The isotope exchange in the system $CO_2 - HCO_3 - CO_3$ is recommended for the concentration of the isotope O^{18}. Since a worker of the laboratory of V. K. Korovkin according to the method of Bigeleisen (Ref 6) calculated the constant of equilibrium of the reaction

$3CO_2^{16} + 2CO_3^{=18}$ solution $\rightleftarrows$ $3CO_2^{18} + 2CO_3^{=16}$ solution to be $K_{293} = 1.42$, it could be assumed that O^{18} will accumulate in the gas-phase. The separation coefficient calculated with the equation of A. I. Brodskiy (Ref 7) is $\alpha_{293} = 1.06$. Carbon dioxide was used as initial substance, a 12.4% KOH-solution served as absorption

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5(4)

AUTHORS: Panchenkov, G. M., Baranov, V. Ya. SOV/20-126-3-42/69

TITLE: The Kinetics of the Thermal Cracking of Hydrocarbons (Kinetika termicheskogo krekinga uglevodorodov)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 3, pp 608-611 (USSR)

ABSTRACT: In the introduction to the present paper it is pointed out that the exact deduction of the equation for the kinetic reaction in cracking is not possible, and equation (1) gives the conversion of the initial substance into a number of products. In the following, equation (2) is developed, from which it may be seen that the rate of cracking depends on the rate of two processes: On the rate of decay of the molecule of the initial substance and on the process of the interaction of the radicals with the molecules of the initial substance. It follows further that the concentration of radicals exercises a considerable influence upon this rate. Equation (3) gives the rate of radical formation, and formula (5) is obtained for the condition of the steady fraction of the radicals by means of the hitherto obtained results from formula (1). This formula (5) is then given according to a previous paper by G. M. Panchenkov by formula (6) for the case in which cracking is continuous. By integration, formula (8) is obtained from this

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The Kinetics of the Thermal Cracking of Hydrocarbons SOV/20-126-3-42/69

formula (6). In a similar manner, the same development is made for the cracking of benzine, and formula (14), which is analogous to formula (8), is obtained. Finally, a diagram (Fig 1) shows the results obtained according to formula (8). The experiments were carried out at 510, 540 and 570° C and at atmospheric pressure, and show a constant rate of cracking and an activation energy of 55 kcal/mol. There are 1 figure and 2 Soviet references.

ASSOCIATION: Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im. I. M. Gubkina (Moscow Institute for the Petroleum-chemical and Gas Industry imeni I. M. Gubkin)

PRESENTED: February 19, 1959 by A. V. Topchiyev, Academician

SUBMITTED: February 18, 1959

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5.3700(B)

SOV/20-129-6-35/69

~~5(4)~~

AUTHORS: Gundyrev, A. A., Nametkin, N. S., Panchenkov, G. M., Topchiyev, A. V., Academician

TITLE: The Dielectric Constants and the Dipole Moments of Some Organosilicon Compounds

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 6, pp 1325-1327 (USSR)

ABSTRACT: The authors determined the dielectric constants of 15 organosilicon compounds at a frequency of 7.95.10^5 cps:hexaalkyl derivatives of disilane methane, disilane ethane, disiloxane and linear polyethyl siloxanes. The values determined at 25±0.05° are given in table 1. (Abstracter's note: This table has erroneously been printed under the heading "dipole moments" instead of "dielectric constants"). Within the series of hexaalkyl derivatives of disilane methane and disilane ethane the dielectric constant in each series increases from the hexamethyl- to the hexabutylene derivatives, the greatest change occurring in transition from the hexamethyl- to the hexaethyl derivative. The dielectric constants of the hexaalkyl derivatives of di- siloxane vary anomalously with an increase in the molecular weight of the compounds. From the densities mentioned in table 2, refraction indices and dielectric constants of the compounds with different concentrations dissolved in n-hexane, the dipole

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PANCHENKOV, G.M.

PHASE I BOOK EXPLOITATION SOV/4941

Mezhvuzovskoye soveshchaniye po khimii nefti, Moscow, 1956.

Sbornik trudov Mezhvuzovskogo soveshchaniya po khimii nefti
(Collection of Transactions of the Inter-University Con-
ference on Petroleum Chemistry) [Moscow] Izd-vo Mosk.
univ., 1960. 313 p. Errata slip inserted. 1,600 copies
printed.

Organizing Committee of the Conference: Chairman: B. A.
Kazanskiy, Academician; Vice-Chairman: S. I. Khromov,
Docent; G. M. Panchenkov, Professor; A. F. Plate, Pro-
fessor; Secretary: Ye. S. Balenkova, Scientific Worker.
Editorial Board: Resp. Ed.: A. F. Plate; I. V. Gostun-
skaya, I. N. Tits-Skvortsova, L. A. Erivanskaya.

PURPOSE: This collection of articles is intended for the
teaching staff of universities and schools of higher ed-
ucation training specialists for the petroleum and petrol-
eum-refining industries.

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COVERAGE: The collection includes articles dealing with the
present state of the petroleum industry, the scientific
research problems in petroleum chemistry, the chemistry
of petroleum, the composition of petroleum and petroleum
products, the scientific principles of refining petroleum
into motor fuels and lubricants, and the manufacture of
synthetic products from hydrocarbon gases and petroleum.
One article discusses the effect of chemical composition
and additives on fuel combustion in jet engines. The ma-
terial was presented at the Inter-University Conference
on Petroleum Chemistry, held at the Moscow State Universi-
ty imeni M. V. Lomonosov November 26-28, 1956. No person-
alities are mentioned. References accompany most of the
articles.

TABLE OF CONTENTS: None given

The authors and the titles of articles are as follows:

Introduction by B. A. Kazanskiy, Academician

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Collection of Transactions (Cont.)

and Reforming of Petroleum Products 177

Panchenkov, G. M., Moscow Petroleum Institute imeni I. M. Gubkin and Moscow State University imeni M. V. Lomonosov. Kinetics of Catalytic Cracking of Individual Hydrocarbons 194

Shuykin, N. I., Institut organicheskoy khimii im. N. D. Zelinskogo AN SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy, Academy of Sciences USSR). Contact Catalytic Conversions of Individual Hydrocarbons Under Hydrogen Pressure in a Continuous Flow System 218

Stepukhovich, A. D., Saratovskiy gosudarstvennyy universitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy). Kinetics and Mechanism of Retardation and Initiation in Cracking Paraffinic Hydrocarbons 230

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ZHIGACH, K.F., prof., otv.red.; MURAV'YEV, I.M., prof.; red.; TIKHOMIROV,
A.A., kand.ekonom.nauk; red.; VINOGRADOV, V.N., kand.tekhn.nauk,
red.; SIDORENKO, N.V., red.; BRENTS, A.D., red.; CHARYGIN, M.M.,
prof., red.; DUNAYEV, F.F., prof., red.; CHARNYY, I.A., prof.,
red.; CHERNOZHUKOV, N.I., prof., red.; KUZMAK, Ye.M., prof., red.;
DAKHNOV, V.N., prof., red.; PANCHENKOV, G.M., prof., red.; NAMETKIN,
N.S., prof., red.; TAGIYEV, E.I., prof., red.; BIRYUKOV, V.I., kand.
tekhn.nauk, red.; YEGOROV, V.I., kand.tekhn.nauk, red.; ALMAZOV,
N.A., dotsent, red.; GUREVICH, V.M., red.; ISAYEVA, V.V., vedushchiy
red.; POLOSINA, A.S., tekhn.red.

[Development of the gas industry of the U.S.S.R.; from the proceedings of the Interuniversity Scientific Conference on the Problems of the Gas Industry] Mezhvuzovskaia nauchnaia konferentsiia po voprosam gazovoi promyshlennosti. Razvitie gazovoi promyshlennosti SSSR; materialy. Moskva, Gos.nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry, 1960. 405 p. (MIRA 13:11)

1. Mezhvuzovskaya nauchnaya konferentsiya po voprosam gazovoy promyshlennosti. 2. Glavgaz SSSR (for Brents). 3. Moskovskiy institut neftekhimicheskoi i gazovoi promyshlennosti im. akad.Gubkina (for Charygin, Charnyy).
(Gas industry)

PANCHENKOV, G. M.

"Kinetics of Heterogenous Catalytic Flow Reactions. Academie des Sciences d'U.R.S.S."

report submitted for Catalysis 2nd Intl. Cong., Paris, 4-9 Jul. 60.

Inst. of Catalysis, Siberian Affil., AS USSR.

S/189/60/000/002/001/008/XX
B017/B067

AUTHORS: Panchenkov, G. M., Makarov, A. V., and Pechalin, L. I.

TITLE: Separation of Boron Isotopes 19 by the Method of Chemical Exchange

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 2, khimiya, 1960, No. 2, pp. 3 - 12

TEXT: Chemical exchange is a fundamental method of separating isotopes of light elements. Boron isotopes were separated with the aid of the interaction between boron tetrafluoride and the boron tetrafluoride anisole complex. The separating column is schematically shown in Fig.1. In this method, the B^{10} isotope is enriched in the liquid phase. Fig.2 schematically shows the working method. The isotope composition of the samples converted into boron tetrafluoride was determined by the mass spectrograph MC-3 (MS-3) with an accuracy of about 1%. In further experiments with the boron tetrafluoride anisole complex in the exchange column, the authors studied, above all, the dependence of the separation coefficient on temperature and the flow velocity of the solution of the

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S/165/60/000/002/006/008
A104/A129

15.8102

AUTHORS: Panchenkov, G.M., and Karryyev, Ch.S.

TITLE: Polymerization of propylene over an aluminosilicate cracking catalyst

PERIODICAL: Akademiya nauk Turkmenskoy SSR. Izvestiya. Seriya fiziko-tekhnicheskikh, khimicheskikh i geologicheskikh nauk, no. 2, 1960, 105-108

TEXT: The authors describe results of tests on the polymerization of propylene carried out at atmospheric pressure, temperature intervals of 100-300°C and gas supply of 2,0-20,0 l/h by industrial aluminosilicate cracking catalyst. The chemical composition and properties of the catalyst were as follows: volume 50 cm^3; weight 0,70 g/cm^3; diameter of beads 305m^2/g; activity index 39,2; Al_2O_3 - 12,8%; SiO_2 - 85,1%; Fe_2O_3 - 0,2% and H_2O at 800°C - 1,9%. The experimental installation designed in the laboratory of the Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im. Gubkina (Moscow Institute of Petrochemical and Gas Industry im. I.M.Gubkin)

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S/165/60/000/002/006/008
A104/A129

Polymerization of propylene ...

is shown in Fig.1. Basic structural and operational data are given in Ref. 15, Panchenkov, G.M. and Baranov V.Ya., Neft' i gaz, 1958, no. 1. Propylene was obtained by catalytic dehydration of pure isopropyl alcohol at 350°C and a volumetric supply rate of 1.0 $hour^{-1}$. Active aluminum oxide annealed at 450°C was used as dehydrating catalyst. Gas formed during dehydration returned together with the steam to the reciprocal bead cooler, then entered the calibrated gasometer and was displaced by a water solution of NaCl of 1.2 specific gravity. Analysis showed a content of 97,99% of propylene in gas. Maximum polymerization was recorded at 200°C at moderate gas supply rates. Optimum temperatures for the formation of dimeric fractions was 200-230°C; for trimeric and tetrameric fractions 140-170°C. A gas supply rate exceeding 3 l/h and temperatures above 230°C resulted in decreased depth of polymerization and lower polymer fraction yield. The reaction of the polymerization of propylene over aluminosilicate cracking catalyst is accompanied by the reaction of hydrogen redistribution. There are 4 figures, 1 table and 15 references: 9 Soviet-bloc and 6 non-Soviet-bloc.

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S/165/60/000/002/006/008
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Polymerization of propylene ...

ASSOCIATION: Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im. I.M. Gubkina (Moscow Institute of Petrochemical and Gas Industry im. I.M. Gubkin)

SUBMITTED: December 24, 1959

X

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23491
S/165/60/000/002/007/008
A104/A129

158102

AUTHORS: Panchenkov, G.M., Karryyev, Ch.S., and Al'tshuler, S.V.

TITLE: Polymerization of propylene by aluminosilicate catalyst of 50% Al_2O_3 and 50% SiO_2

PERIODICAL: Akademiya nauk Turkmenskoy SSR. Izvestiya. Seriya fiziko-tekhnicheskikh, khimicheskikh i geologicheskikh nauk, no. 2, 1960, 109-112

X

TEXT: The authors describe results obtained at polymerization of propylene by an aluminosilicate ball catalyst of 50% Al_2O_3 + 50% SiO_2. Laboratory equipment and test methods were described in Refs. 14 and 15, Panchenkov, G.M., Vestnik MGU, 1946, no.2, and Izvestiya AN TSSR, 1960, no.2. The polymerization was investigated at 180, 200 and 220°C, atmospheric pressure and a volumetric gas supply rate of 20-80 $hours^{-1}$. The amount of catalyst was 50 m^3 for all tests. All tests were accompanied by increased temperatures due to the exothermic nature of the polymerization reaction. After tests the polymer was distilled into dimeric, trimeric and tetrameric fractions. Residues evaporating at temperatures above 220°C, higher poly-

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S/189/60/000/003/005/013/XX
B003/B067

AUTHORS: Panchenkov, G. M., Makarov, A. V., Rozynov, B. V.

TITLE: Exchange Kinetics of Boron Isotopes Between Boron Trifluoride and Its Anisol Complex 19

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 2, khimiya, 1960, No. 3, pp. 7-10

TEXT: The authors state that their paper whose content corresponds to the publication by Palko A. A., Healy R. M., Landau L. J., Chem. Phys., 1958, 28, p. 214 was completed already in 1957, whereas the mentioned publication was issued only in 1958. They studied the heterogeneous exchange of the boron isotopes B^{10} in BF_3 (enriched to 83%) for a natural boron isotopic mixture contained in the BF_3—anisol complex. The apparatus made of pyrex glass which was used for the investigation is schematically shown in Fig. 1 and fully described in the paper. The BF_3 used, was obtained from the reaction $C_6H_5N_2BF \rightleftarrows C_6H_5F + N_2 + BF_3$. Measured amounts

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S/165/60/000/003/001/009
A104/A129

AUTHORS: Panchenkov, G. M.; Karryyev, Ch. S., Al'tshuler, S. V.

TITLE: Thermodynamic conditions of the polymerization of propylene into low-molecular compounds

PERIODICAL: Akademiya nauk Turkmenskoy SSR. Izvestiya. Seriya fiziko-tekhnicheskikh, khimicheskikh i geologicheskikh nauk, no. 3, 1960, 26 - 32

TEXT: The article describes the methods and gives the results of calculations in respect of equilibrium constants and equilibrium yields of the polymerization reaction of propylene into low-molecular compounds at various temperatures and pressures. Being a successive reaction the polymerization can be expressed as $2A_1 \rightleftarrows A_2 + A_1 \rightleftarrows A_3 + A_1 \rightleftarrows A_4$ etc., where A_1, A_2, A_3, A_4 represent the respective quantities of monomer, dimer, trimer and tetramer moles. The approximate value of the isobaric potential ΔZ_T is determined by

$$\Delta Z_T = \Delta H_{298} - T \cdot \Delta S_{298} \qquad (1)$$

In standard state, i.e. ΔZ^o, the isobaric potential is linked with the equilibrium constant K_{eq} by

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$$\ln K_{eq} = -\frac{\Delta Z^{o}}{RT} \qquad (2)$$

Substitution of Equation (1) in Equation (2) produces

$$\lg K_{eq} = -\frac{\Delta H_{298}}{2.3 \cdot R \cdot T} + \frac{\Delta S_{298}}{2.3 \cdot R} \qquad (3)$$

The dimer equilibrium yield or the degree of conversion of the initial propylene can
be determined with the help of given T - P. At the equilibrium moment of the di-
merization reaction $2A_1 \rightleftarrows A_2$, the quantity of A_1 and A_2 moles is proportional to
$2 \cdot (1-x)$ and x, i.e.

$$K_{eq} = \frac{x(2-x)}{4 \cdot P \cdot (1-x)^2} \qquad (4)$$

which shows, that conversion depth x is linked to its specific pressure equilibrium
constant product

$$A = K_{eq} \cdot P \qquad (5)$$

and can easily be determined based on dependency x on value $A = K_{eq} \cdot P$ of reaction
$2\ B \rightarrow A$. Knowledge of the isobaric potential and equilibrium constant reveals merely

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the principal possibilities of the process which might, under adverse circumstan-
ces, progress at extremely low speed. Higher temperatures and the use of cata-
lysts are inevitable for the acceleration of the process. Approximate estimation
of the trimer andtetramer reaction can be obtained by the monotype reaction method
described by A. V. Kireyev, [Ref. 2: Kurs fizicheskoy khimii (Course of Physical
Chemistry), Goskhimizdat 1955] according to

$$\lg K_{eq,2} = \lg K_{eq,1} + \frac{\Delta H^{o}_{1} - H^{o}_{2}}{2.3 \cdot R \cdot T} \qquad (6)$$

which enables the determination of the equilibrium constant of reaction 2 to be
made if the equilibrium constant of reaction 1 and heat content variations of both
reactions are known. There are two monotype reactions:

$A_1 + A_1 \rightleftarrows A_2$ reaction 1

$A_2 + A_1 \rightleftarrows A_3$ reaction 2

Reaction 1 shows the dimerization reaction. Determination of the thermal effect
for the formation of the final product. The
is based on the temperature necessary [illegible] ideal gaseous state can be estab-

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lished on the basis of typical numbers and the addition of corrections in respect of various groups as per molecule of the compound. Equilibrium yield values of trimer (or tetramer) reaction A + B ⇄ C is determined as

$$K_{eq} = \frac{x(2-x)}{P\cdot(1-x)^2}; \quad A = K_{eq} \cdot P \qquad (7)$$

i.e., the equilibrium moment of the quantity of moles in the derived substance C is proportional to x and that of A and B to 1 - x; total quantity is 2 - x. The theoretical yield of trimers and tetramers is determined according to auxiliary quantity values. Resulting values of equivalent constants and equivalent yields of trimer and tetramer reactions reveal that the polymerization of propylene produces satisfactory yields of: dimers at 250 - 300°C; trimers at 200 - 220°C; tetramers at 150 - 180°C. There are 6 tables, 1 figure and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Moskovskiy institut neftekhimicheskoy i gazovoy promyshlenosti im. Gubkina (Moscow Institute of Petrochemical and Gas Industry im.Gubkin)

SUBMITTED: December 24, 1960

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S/165/60/000/003/002/009
A104/A129

AUTHORS: Karryyev, Ch. S.; Panchenkov, G. M., Al'tshuler, S. V.

TITLE: Kinetics of the polymerization of propylene by aluminum silicate and oxide catalysts

PERIODICAL: Akademiya nauk Turkmenskoy SSR. Izvestiya. Seriya fiziko-tekhnicheskikh, khimicheskikh i geologicheskikh nauk, no. 3, 1960, 33 - 37

TEXT: This paper was read at the All-Union Conference on Organic Catalysis convened on November 16 - 20, 1959, in Moscow, and deals with results of investigations of the polymerization of propylene by aluminum silicate and oxide catalysts, carried out in view of its importance in petroleum processing and in petrochemical industry. Tests were performed at atmospheric pressure, temperature ranges from 100 - 300°C and a volumetric velocity of gas supply of 20 - 400 per hour^{-1}. The following catalysts were subjected to investigation: aluminum silicate with varying content of oxidizing components; aluminum silicate with nickelous and chromic oxides; molybdenum oxide and nickel-molybdenum oxide based on alumina. Tests were carried out in an installation consisting of a furnace for obtaining propylene by dehydration of pure isopropyl alcohol over active alumina at 350°C, and a special

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Kinetics of the polymerization of...

polymerization device. The gas supply was measured by a rheometer and the consumption by a ГСБ-400 (GSB-400) gas meter. Before entering the reactor the gas was dried by calcium chloride. All tests were accompanied by an increase in temperature caused by the exothermic nature of the process. Before and after each test the installation was blown through with nitrogen and the original activity of the catalyst was restored by air scavenging at 500°C. After stabilization the polymeride was distilled into dimeric (125°C), trimeric (125 - 170°C) and tetrameric (170 - 220°C) fractions whereas the residue obtained over 220°C and the condensation products comprised the fraction of "higher polymers". Then the following features were determined: density, content of hydrogen, and the content of saturated and unsaturated hydrocarbons for the initial gas, and the density, refraction coefficient, molecular weight and bromide content for the polymeride fractions. The most advantageous temperature for aluminum silicate catalysts is 200°C. At this temperature and a gas supply rate of 20 - 50 per hour^{-1} a maximum depth of propylene conversion was reached (45 - 55%). The respective yields of polymeride fractions were as follows: dimer 23 - 24%; trimer 9 - 11%; tetramer 9 - 12%. Temperatures over 220°C and a gas supply rate exceeding 60 per hour^{-1} decrease the conversion depth and the polymeride shows a higher content of dimer fractions and a lower content of trimer

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Kinetics of the polymerization of...

and tetramer fractions. Investigation into the polymerization capacity of aluminum silicates with varying content of oxidizing components carried out at 200°C and at a gas supply rate of 20 - 50 per hour^{-1} revealed the superiority of catalysts containing 10 - 15% alumina. They showed a maximum conversion depth (55%) and highest yields of dimeric, trimeric and tetrameric fractions, i.e., 24, 10 and 12%, respectively. Increase in the alumina content over 20% leads to a decrease of conversion depth, reducing the yield of dimeric, and increasing the yield of trimeric and tetrameric fractions. Tested separately, neither pure alumina nor silica revealed any catalyzing ability under described conditions. Results of tests on the polymerization of propylene by aluminum silicate catalyst consisting of 50% Al_2O_3 + 50% SiO_2 at 180, 200 and 220°C, atmospheric pressure and at a gas supply rate of 20 - 60 per hour^{-1} published by G. M. Panchenkov (Ref. 13: Izvestiya AN TSSR, no. 2, 1960) showed that a maximum conversion depth (35 - 37%) and highest yields of dimeric (10 - 11%), trimeric (8 - 9%) and tetrameric (9 - 10%) fractions were observed at 200°C and at a gas supply of 20 - 30 per hour^{-1}. The dimeric fraction was subjected to a spectral analysis and showed a content of cis-hexene-2, trans-4 methyl pentene-2 and cis-4 methyl pentene-2. The presence of trans-hexene-2 and other hydrocarbons was presumed but could not be conclusively established. In accordance with thermodynamic calculations and obtained results, the polymerization

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There are 16 references: 11 Soviet-bloc and 5 non-Soviet-bloc. The references to the English-language publications read as follows: H. Gayer, Ind. Eng. Chem., v. 25, 1933; A. Clark, Ind. Eng. Chem., v. 47, no. 7, 1953; E. W. Tamele, Discuss. Faraday Soc., no. 8, 1955; C. L. Thomas, Ind. Eng. Chem., v. 37, no. 6, 1945 and v. 41, 1949.

ASSOCIATION: Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im. I. M. Gubkina (Moscow Institute of Petrochemical and Gas Industry im. I. M. Gubkin)

SUBMITTED: December 24, 1959

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S/152/6C/000/003/001/003
B023/B060

AUTHORS: Panchenkov, G. M., Kolesnikov, I. M.

TITLE: Reaction Kinetics of the Alkylation of Benzene With Methyl Chloride on an Alumosilicate Catalyst

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1960, No. 3, pp. 59-62

TEXT: The authors wanted to study the applicability of kinetic equations set up for bimolecular, irreversible, heterogeneous, multiple-series reactions, for the purpose of interpreting experimental data concerning the alkylation of benzene with methyl chloride on an alumosilicate catalyst. The purpose of the alkylation reaction was the production of toluene. Basing on kinetic data of an earlier paper (Ref. 2) the authors presupposed the alkylation reaction to have the following course:

$$A + B \xrightarrow{k'_1} A_1 + B + E \xrightarrow{k''_2} \nu_1 A_2 + \nu_2 A_3 + E, \qquad (1)$$

where A - benzene, B - methyl chloride, E - hydrogen chloride,

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Reaction Kinetics of the Alkylation of Benzene With Methyl Chloride on an Alumosilicate Catalyst

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A_1 - toluene, A_2 - xylenes, A_3 - "coke", k'_1, k''_2 - rate constants for the first and the second step, respectively, and ν_1, ν_2 are stoichiometric coefficients. With a view to substantiating and confirming scheme (1) the authors checked the data of paper (Ref. 2) with the aid of kinetic equations (Ref. 1). The toluene yield was calculated by the following formula: $x_{A_1} = \frac{(1-x)-(1-x)^K}{K-1}$ (2), where x is the conversion degree of benzene; $K = \frac{k'_2 b_A}{k'_1 b_A}$; b_{A_1}, b_A are adsorption coefficients of toluene and benzene, respectively; x_{A_1} is the yield of toluene referred to benzene. The value of the apparent rate constant for the first reaction step was found to be $k_1^* = \frac{k'_1 b_A b_B p^2 S_o}{(1+\gamma+b_A p+b_B p\gamma)^2}$, and

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Reaction Kinetics of the Alkylation of Benzene With Methyl Chloride on an Alumosilicate Catalyst

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that of the second step, $k''_2 = \frac{k'_1 b_A S_o}{b_B}$, the same denotations holding for x, K, b_{A_1}, b_A, and x_{A_1} as in (2); γ is the ratio between the mole number of methyl chloride and the mole number of benzene introduced into the reaction zone in the unit time. S_o is the area of catalyst per unit of length of the layer in the direction of current. Basing on the dependence of temperature on the apparent rate constants of the alkylation reaction described (Fig. 2), the authors found the values of the apparent activation energies and those of the factors of the Arrhenius equation for the respective reaction steps. For the step of toluene formation from benzene and methyl chloride, the apparent activation energy was 17400 ± 400 cal/mole, and the factor of the Arrhenius equation was 1000-4 mole/cm^{3}h. For the second step - formation of xylenes from toluene and methyl chloride - the apparent activation energy was 12000 ± 300 cal/mole, and the factor was 65 mole/cm^{3}h. In the authors' opinion, the reaction scheme is confirmed by: agreement of experimental data with such calculated

86145

S/152/60/000/004/001/003
B001/B054

11.1210

AUTHORS: Makarenkov, V. V. and Panchenkov, G. M.

TITLE: Relationship Between the Rate of Combustion of Individual Hydrocarbons at Low Pressures and Their Antiknock Properties

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1960, No. 4, pp. 81 - 84

X

TEXT: In their previous report (Ref.1), the authors had described the combustion of gas mixtures in the burner in a laminar flow at low pressure (150 mm Hg). The data obtained can be compared with the octane values of the corresponding hydrocarbons indicated in publications, which might be useful for the selection of fuels for engines, as well as for developing a theory of the rate of combustion. In the previous report (Ref.1), the authors proved that a relationship exists between the rate of combustion of hydrocarbons forming part of engine fuels and their structure. The physical meaning of a comparison of rates of combustion and octane values is the establishment of a relationship between the

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rate of combustion of hydrocarbons in normal burning and the transition of normal burning to detonation burning. Hydrocarbons with 6-10 carbon atoms in a molecule were used for this comparison. The rate of combustion was compared with the antiknock properties both for homologous hydrocarbons and for hydrocarbons belonging to different classes of compounds. The rates of combustion of these hydrocarbons were estimated on the basis of complete combustion at equal distance from the flame tip of the Bunsen burner. The authors used n-hexane, n-heptane, n-octane, and n-decane for this purpose. The dependence of complete combustion of these hydrocarbons on their octane values is shown in the diagram. Hence, it can be seen that 1) this dependence is expressed by the equation $\eta_z = a + b\Omega$, where η_z = the complete combustion of hydrocarbons with 6-10 carbon atoms in a molecule, Ω = the octane value of these hydrocarbons, and a and b are coefficients; 2) the rate of combustion increases with decreasing molecular weight, while the antiknock properties improve. The authors compare n-octane, isooctane, and 3-methyl heptane. Hence, it follows that 1) isooctanes have a higher rate of combustion

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Relationship Between the Rate of Combustion
of Individual Hydrocarbons at Low Pressures
and Their Antiknock Properties

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and better antiknock properties than the corresponding alkanes, and 2) isoalkanes with higher rates of combustion show better antiknock properties. A comparison of unsaturated hydrocarbons with the corresponding saturated compounds showed higher combustion rates and better antiknock properties of the former. In compounds of different structures but with the same carbon number (n-C_6H_{12}, cyclo-C_6H_{12}, C_6H_6), higher combustion rates also corresponded with better antiknock effects. There are 1 figure, 1 table, and 4 Soviet references.

ASSOCIATION: Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im.akad. I. M. Gubkina (Moscow Institute of the Petrochemical and Gas Industry imeni Academician I. M. Gubkin)

SUBMITTED: January 26, 1959

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S/152/60/000/005/001/002
B001/B054

AUTHORS: Karryyev, Ch. S. and Panchenkov, G. M.

TITLE: Polymerization of Propylene by Alumosilicate Catalysts of Different Compositions

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, Vol. 1960, No. 5, pp. 87-91

TEXT: In earlier papers (Refs. 14,15) dealing with the polymerization of propylene by alumosilicate catalysts in a cracking procedure under atmospheric pressure, in a temperature range of 100-300°C. and at gas addition rates between 2.0 and 20.0 liters per hour, the authors had found that the optimum temperature at low gas addition rates (2.0-8.0 liters per hour) was 200°C. In the present paper, they describe the results of propylene polymerization by the above catalysts of different compositions to find the best ratio between the aluminum- and silicon oxides in the catalysts under the above optimum conditions (for further details, see Ref. 14). The individual alumosilicate catalysts were

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Polymerization of Propylene by
Alumosilicate Catalysts of Different
Compositions

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prepared by the method of G. M. Panchenkov and K. V. Topchiyeva (Ref. 16) which is based on a separate precipitation of the aluminum- and silicon hydroxides, and their subsequent mixing. The polymerization of propylene at $200^{\circ}C$, under atmospheric pressure, and at a gas addition rate between 2.0 and 8.0 liters per hour, was conducted by catalysts of the following compositions:

1) 0 % Al_2O_3 + 100 % SiO_2
2) 5 % Al_2O_3 + 95 % SiO_2
3) 10 % Al_2O_3 + 90 % SiO_2
4) 30 % Al_2O_3 + 70 % SiO_2
5) 50 % Al_2O_3 + 50 % SiO_2
6) 100 % Al_2O_3 + 0 % SiO_2

Under these conditions, the catalysts of type 1 and 6 (silica gel and aluminum oxide) gave no propylene polymerization (even at temperatures of 170° and $150^{\circ}C$), which confirms the results of Refs. 13,16,17,18, according to which only chemically bound aluminum- and silicon oxides show a catalytic activity in various reactions. The other types

S/152/60/000/008/006/007/XX
B004/B064

AUTHORS: Panchenkov, G. M., Baranov, V. Ya.

TITLE: The Kinetics of the Thermal Cracking of Petroleum Products

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1960, No. 8, pp. 79 - 86

TEXT: The authors report on the thermal cracking of the fraction 310 - 410°C of the paraffin containing Groznyy petroleum. The experiments were carried out at 510, 540, 570, 600, and 630°C. The experimental data were evaluated by means of equations obtained in the course of previous studies (Refs. 7-9). $n_0 x = -(A/B)n_0 \ln(1 - x) - k'pV_r/BR^2T^2$ (2) is written down as radical-chain mechanism for the reaction. n_0 denotes the moles of the initial substance introduced into the reaction zone in the unit time; x is the portion of the initial substance entered into reaction, A,B: constants, k' is the rate constant of the reaction, p - the total gas pressure, V_r - the volume of the reaction zone. For the function

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$n_0x = f[n_0 \ln(1 - x)]$ a straight line with the tangent A/B was obtained. k' was calculated by the equation $k' = -ADn_0 \ln(1 - x) - BDn_0x$ (8), where $D = R^2T^2/pV_r$. A table gives the following values for the coefficients of the equation (8):

T^oC	A/B	$D \cdot 10^{-4}$	$k' \cdot 10^3$ sec^{-1}
510	0.956	6.87	2.64
540	0.878	7.41	10.90
570	0.850	7.96	34.40
600	0.665	8.54	34.80
630	0.604	9.13	49.70

On the assumption of a consecutive reaction the following equation was derived: $x_{A_3} = [\nu_3/(1-K)][(1-x)^K-(1-x)]$ (3). ν_3 is the stoichiometric coefficient of the reaction product A_3, $K = k_2/k_1$ is the ratio of the reaction rate constants of the first and second stage of the reaction. This equation was graphically solved. The activation energy of the first stage was found to be 56,400 cal/mole, of the second to be 67,000 cal/mole. Between 510 - 570°C, the temperature coefficient of the first stage is 1.53, of the second 1.56. A. D. Stepukhovich is mentioned. There are 3 figures,

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The Kinetics of the Thermal Cracking of Petroleum Products

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1 table, and 9 references: 6 Soviet and 3 US.

ASSOCIATION: Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti im.akad.I.M.Gubkina (Moscow Institute of the Petrochemical and Gas Industry imeni Academician I.M.Gubkin)

SUBMITTED: July 6, 1959

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S/065/60/000/011/001/009
E030/E412

AUTHORS: Panchenkov, G.M., Zhorov, Yu.M. and YuY-lin', Yu

TITLE: Features of the Catalytic Cracking of Heavy Distillate

PERIODICAL: Khimiya i tekhnologiya topliv i masel, 1960, No.11 pp.4-7

TEXT: The kinetics of catalytic cracking of heavy gas oil (IBP greater than 500°) from Romashki crude have been determined from plant data. The process is important for supplementing light gas oil which is in short supply for catalytic cracking. Four types of alumina/silica catalyst were tried, with BET surface areas from 305 to 480 m^2/gm. The reaction was found to occur in conditions intermediate between those controlled by internal or external diffusion, and the specific surface area had only a slight effect. It is therefore desirable to use catalysts with a high macroscopic surface area, although they may have a low index. Maximum yields of liquid (boiling up to 260°C) were about 40% at space velocities of 0.6 to 0.7 V/V/hour, but the yield fell as the reaction temperature exceeded 400°C, due to external diffusion control. The activation energy was 10.3 kcal/mole at 400 to 432°C but fell to 7.6 kcal/mole at 465 to 490°C. This fall indicated that external diffusion is

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Features of the Catalytic Cracking of Heavy Distillate

present but it could not be completely dominant or else the activation energies should have been much lower, around 2 to 5 kcal/mole. Further, the cracking must be mainly catalytic, since only about 3% of the raw material would have been thermally cracked at these temperatures, according to published data on thermal cracking. The quality of the product is determined by the side-reactions. The reaction could be improved by using a higher velocity of feeding the raw material, and use of a catalyst with lower activity but greater macroscopic surface area, that is, more finely pelleted (about 0.3 mm size for example). There are 4 figures, 2 tables and 9 Soviet references.

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S/081/61/000/020/074/089
B106/B147

AUTHORS: Panchenkov, G. M., Kolesnikov, I. M.

TITLE: Reaction kinetics of the alkylation of benzene with propylene in the presence of an alumosilicate catalyst

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 20, 1961, 320, abstract 20L41 ([Tr.] Groznensk. neft. in-t, sb. 23, 1960, 106-120)

TEXT: The alkylation reaction of C_6H_6 with propylene in the presence of an alumosilicate catalyst at 260-345° and atmospheric pressure was studied. The kinetic equation for the bimolecular irreversible consecutive reaction was derived. On the basis of this equation, the values of the apparent rate constants were found for the stages of isopropyl benzene and diisopropyl benzene formation. From the temperature dependence of the apparent rate constants of the first and second reaction stages the values of the apparent activation energies were found to be 14,300 and 12,600 cal/mole, respectively. There are 27 references. [Abstracter's note: Complete translation.]

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