

Adsorption Heats and Entropies of Hexane  
and Benzene Vapors on an Aerosils With  
a Surface Modified by Trimethylsilyl Groups

S/020/61/136/002/025/034  
B004/B056

were calculated. With growing modification, a transition from negative to positive values took place. With  $\alpha = 1 \mu\text{-mole/m}^2$ ,  $\partial \Delta S / \partial \alpha$  on aerosil with 0% modification amounted to about -2.5 cal/deg.mole for benzene, and about -0.5 for n-hexane, while the following values were obtained for 100% modified aerosol: benzene, about +2 cal/deg.mole; n-hexane, about +1 cal/deg.mole. This indicated a higher mobility of the adsorbed hydrocarbon molecules on the modified surface. With 100% modification, a non-localized adsorption is assumed. For the initial part of the adsorption isothermal line, which is not yet distorted by capillary condensation, T.H.Hill's equation (Ref. 7) therefore holds. A combination of the geometric modification (hydrothermal treatment in an autoclave) with chemical modification (reaction with trimethylchlorosilane) thus smoothened the surface of silicon dioxide and led to the formation of a homogeneous layer of trimethylsilyl groups, on which the adsorption of n-C<sub>6</sub>H<sub>12</sub> and C<sub>6</sub>H<sub>6</sub> is not localized and the adsorption heat becomes negative. The authors thank I.V.Drogaleva and V.P.Marinkova for their assistance. There are 4 figures, 1 table, and 10 references, 7 of which are Soviet, 2 US, and 1 German.

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*Moscow State U.*

S/020/61/136/004/018/026  
B028/B060

AUTHORS: Vasil'yeva, V. S., Drogaleva, I. V., Kiselev, A. V.,  
Korolev, A. Ya., and Shcherbakova, K. D.

TITLE: Geometrical and Chemical Modifications of Silica Gel for  
Purposes of Gas Chromatography

PERIODICAL: Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 4,  
pp. 852-855

TEXT: The present paper deals with the crystalline and the chemical modifications of  $\text{SiO}_2$ . Silica gel of the type  $\text{ШСК(ShSK)}$  served as the initial material. Industrial silica gel was washed with diluted hydrochloric acid (1:1) for the purification of iron and other metal ions (up to the negative reaction with ammonium thiocyanate, and with distilled water for the purification of  $\text{Cl}^-$  ions (up to the negative reaction with silver nitrate). This purified  $\text{Ш(Sh)}$  silica gel had an inhomogeneous surface and constituted the initial material for the further modification experiments. For the crystalline modification,  $\text{Ш(Sh)}$

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Geometrical and Chemical Modifications of  
Silica Gel for Purposes of Gas Chromatography

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B028/B060

was heated with water in the autoclave at 275°C for 19.5 hours. The resulting product was CΓ (SG) silica gel. Type CΓM(SGM) was obtained by treating SG with liquid trimethyl chloro silane. The analysis of SGM for C content showed that 100 Å of the SGM surface contained 1.22% C, i.e., on an average, 2.7 trimethyl chloro silyl groups. This corresponds to a coating by organosilicon film of an almost maximum density. Prior to the adsorption experiments, the samples were heated for a fairly long time in vacuum adsorbers in small suspended quartz crucibles at 150°C and a pressure of  $1 \cdot 10^{-5}$  mm Hg. In the range of pressure ratios of  $p/p_s$  from 0 to 1, isothermal lines were obtained for the adsorption and the desorption of benzene vapor. In the case of SG the isothermal line deviates sharply toward the lower right side. With the beginning of the capillary condensation the hysteresis curve shifts from  $p/p_s = 0.2$  for SI to  $p/p_s = 0.75$  for SG. At  $p/p_s = 0.1$ , the benzene adsorption  $a$  on SI and SG equals  $2 \mu\text{mole}/\text{m}^2$ , whereas  $a = 0.1 \mu\text{mole}/\text{m}^2$  for SGM. In other words, the benzene adsorption drops to the 20th part with the chemical modification (SGM). Experiments with SGM were conducted jointly with R. S. Petrova, N. Ya. Smirnov, V. I. Kalmanovskiy, N. Balakhnina, and Ya. I. Yashin. ✓

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Geometrical and Chemical Modifications of  
Silica Gel for Purposes of Gas Chromatography

S/020/61/136/004/018/026  
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Experiments concerning the possibilities of application of SGM for chromatography were made with a chromatograph of the firm Griffin and George, featuring a column 4mm in diameter and 1m in length. Benzene was kept in the column at normal temperature for 30 min. At 82°C, the time for benzene was 12'40", and 1'50" for hexane. For benzene-hexane separations by gas-adsorption chromatography, the silica gels used were impregnated with silicon E-301 (Ye-301). As may be seen from Fig. 2 (2B and 2B) benzene-hexane mixtures are more quickly distributed by the method of gas adsorption than by the gas-liquid method. There are 2 figures, 1 table, and 9 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry, Academy of Sciences USSR). Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: December 28, 1960, by D. I. Shcherbakov, Academician

SUBMITTED: July 25, 1960

Card 3/3  
3

KISELEV, A.V., KOUTETSKI, Ya. [Koutecki, I.]; CHIZHEK, Y. [Cizek, J.]

Nature of the interaction between a benzene molecule and a hydroxyl group. Dokl. AN SSSR 137 no.3:638-641 Mr '61. (MIRA 14:2)

1. Institut fizicheskoy khimii AN SSSR i Institut fizicheskoy khimii  
Chekhoslavtskoy AN. Predstavleno akademikom A.A.Balandinym.  
(Benzene) (Hydroxyl group)

BELYAKOVA, L.D.; GROMOV, V.V.; KISELEV, A.V.; SPITSYN, Vikt.I., akademik .

Adsorption of hexane and benzene vapors on nonradioactive and radioactive barium sulfate samples. Dokl.AN SSSR 138 no.5:1199-1142 Je '61. (MIRA 14:6)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.

(Barium sulfate) (Sulfur—Isotopes) (Adsorption)

KISELEV, A.V.; POSHKUS, D.P. [Poškus, D.]

Statistical thermodynamic calculation of adsorption  
equilibrium for benzene on graphite. Dokl. AN SSSR  
139 no.5:1145-1148 Ag. '61. (MIRA 14:8)

1. Institut khimii i khimicheskoy tekhnologii AN Litovskoy SSR  
i Institut fizicheskoy khimii AN SSSR. Predstavleno akademikom  
A.N. Frankinym.  
(Benzene) (Adsorption)

KISELEV, A. V.

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PHASE I BOOK EXPLOITATION

SOV/6246

Soveshchaniye po tseolitam. 1st, Leningrad, 1961.

Sinteticheskiye tseolity; polucheniye, issledovaniye i primeneniye  
(Synthetic Zeolites: Production, Investigation, and Use). Mos-  
cow, Izd-vo AN SSSR, 1962. 286 p. (Series: Its: Doklady)  
Errata slip inserted. 2500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye khimicheskikh  
nauk. Komisiya po tseolitam.

Resp. Eds.: M. M. Dubinin, Academician and V. V. Serpinskiy, Doctor  
of Chemical-Sciences; Ed.: Ye. G. Zhukovskaya; Tech. Ed.: S. P.  
Golub'.

PURPOSE: This book is intended for scientists and engineers engaged  
in the production of synthetic zeolites (molecular sieves), and  
for chemists in general.

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Synthetic Zeolites: (Cont.)

128  
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**COVERAGE:** The book is a collection of reports presented at the First Conference on Zeolites, held in Leningrad 16 through 19 March 1961 at the Leningrad Technological Institute imeni Lensovet, and is purportedly the first monograph on this subject. The reports are grouped into 3 subject areas: 1) theoretical problems of adsorption on various types of zeolites and methods for their investigation, 2) the production of zeolites, and 3) application of zeolites. No personalities are mentioned. References follow individual articles.

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Regeneration of Zeolites in a Gas Stream 203

Vaynshteyn, S. M., G. V. Astaf'yev, Ye. Ya. Giyenko, N. I.  
Lulova, and A. T. Slepneva. Methods of Plant and Quality  
Control of Finished Products During Manufacture of Zeolite  
A Type Adsorbents 212

APPLICATION OF ZEOLITES

Kiselev, A. V., Yu. A. El'takov, and V. N. Semenova. Ad-  
sorption of a Mixture of Thiophene and Heptane on  
Zeolite NaA 218

Pavlova, L. F. Adsorption From n-Hexane-Benzene Solutions  
With Synthetic Zeolite CaA 225

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KHRAPOVA, Ye. V.; KISELEV, A. V.; PETROVA, R. S.;  
SHCHERBAKOVA, K. D.; VASIL'YEVA, V. S.

"The physico-chemical characteristics of the adsorption process  
at phase boundaries through gas chromatography"  
Report to be submitted for the Fourth International Symposium on  
Gas Chromatography, Hamburg, West Germany, 13-16 June 1962

Chemical Faculty, University of Moscow

AVGUL', N.N.; KISELEV, A.V.; LYGINA, I.A.

Adsorption and the heat of adsorption of pyridine and benzene  
vapors on graphitized carbon black. Izv. AN SSSR Otd.khim.nauk  
no.1:32-37 Ja '62. (MIRA 15:1)

1. Institut fizicheskoy khimii AN SSSR.  
(Pyridine) (Benzene) (Heat of adsorption)

BELYAKOVA, L.D.; KISELEV, A.V.

Adsorption of nonpolar molecules having a different structure of electronic shells on adsorbents of different nature. Report No.2: Adsorption of argon and nitrogen on barium sulfate. Izv.AN SSSR. Otd.khim.nauk no.7:1185-1189 J1 '62. (MIRA 15:7)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.  
(Argon) (Nitrogen) (Adsorption)

S/065/62/000/008/001/003  
E075/E135

AUTHORS: Aristov, B.G., Kiselev, A.V., Mirskiy, Ya.V.,  
Pavlova, L.F., and Petrova, R.S.

TITLE: Adsorption from vapours and from solutions on  
molecular sieves

PERIODICAL: Khimiya i tekhnologiya topliv i masel, no.8, 1962,  
7-12

TEXT: Results are given of the investigation of adsorption of  
vapours of H<sub>2</sub>O, N<sub>2</sub>, Kr, n-hexane, benzene and isooctane, and also  
adsorption from liquid solutions of n-hexane, - benzene on porous  
crystals of zeolites of the 4A and 5A type. The adsorption  
isotherms of vapours of H<sub>2</sub>O, N<sub>2</sub>, Kr and n-hexane on the sieve 5A  
rise steeply at first and rapidly reach the saturation stage.  
The adsorption of benzene and isooctane remains very small. The  
adsorption isotherm of n-hexane from solution in benzene was  
measured on the 5A sieve. The filling of the pores with n-hexane  
begins at practically negligible concentrations of n-hexane and  
subsequently only some additional packing of adsorbed molecules  
takes place. The maximum value for the full packing is reached at  
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Adsorption from vapours and from ...

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the equilibrium concentration of n-hexane of about 0.2, this value being similar to that pertaining to the adsorption of n-hexane from vapour. The quantity of adsorbed molecules in one pore in the 5A sieve crystals is not great and is 2.6-2.7 for n-hexane. Molecular sieve 5A adsorbs Kr at  $-196^{\circ}\text{C}$  only on the external surface of the grains. Nitrogen at  $-196^{\circ}\text{C}$  penetrates markedly into the pores of the sieve 4A, but the speed of adsorption is very small and equilibrium is therefore not obtained. There are 4 figures and 1 table. ✓

ASSOCIATION: Institut fizicheskoy khimii; MGU im. M.V.Lomonosova;  
GrozNII  
(Institute of Physical Chemistry; MGU imeni  
M.V. Lomonosov; GrozNII)

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AVGUL', N.N.; KISELEV, A.V.; LYGINA, I.A.

Potential energy of adsorption of sphere-shaped molecules of  
 $\text{CH}_4$ ,  $\text{C}(\text{CH}_3)_4$ , and  $\text{CCl}_4$  on graphite. Izv. AN SSSR. Otd. khim. nauk  
no. 8: 1346-1353 Ag '62. (MIRA 15:8)

1. Institut fizicheskoy khimii AN SSSR.  
(Adsorption) (Molecules)



AVGUL', N.N.; KISELEV, A.V.; LYGINA, I.A.

Molecular-statistical evaluation of the change of thermodynamic functions in CE adsorption on graphite. Izv. AN SSSR. Otd. khim. nauk no. 8:1353-1357 Ag '62. (MIRA 15:8)

1. Institut fizicheskoy khimii AN SSSR.  
(Methane) (Adsorption)

AKTANOVA, S.; KISELEV, A.V.; EL'TEKOV, Yu.A.

Adsorption of aliphatic amines on alumina and silica. Izv. AN SSSR.  
Otd.khim.nauk no.11:1936-1944 N '62. (MIRA 15:12)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarst-  
vennyy universitet im. M.V. Lomonosova.  
(Amines) (Adsorption)

KISELEV, A.V.; PAVLOVA, L.F.

Effect of surface chemistry on the adsorption, the energy, and the heat of the adsorption of benzene from solutions in hexane. *Neftokhimiya* 2 no.6:861-876 N-D '62. (MIRA 17:10)

1. Institut fizicheskoy khimii AN SSSR i Khimicheskij fakul'tet Moskovskogo gosudarstvennogo universiteta im. Lomonosova.

KISELEV, A.V.; KHRAPOVA, Ye.V.; SHCHERBAKOVA, K.D.

Chromatographic determination of the heat of the adsorption of  
lower hydrocarbons on 5A zeolites. Neftekhimiia 2 no.6:877-884  
N-D '62. (MIRA 17:10)

1. Khimicheskii fakul'tet Moskovskogo gosudarstvennogo universiteta  
im. Lomonosova, laboratoriya adsorbtsii i gazovoy khromatografii.

KISELEV, A. V.; PAVLOVA, L. F.

Work and heat of adsorption of solutions. Izv. AN SSSR Otd.  
khim. nauk no.12:2121-2127 D '62. (MIRA 16:1)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gos-  
udarstvennyy universitet im. M. V. Lomonosova.

(Solution(Chemistry)) (Heat of adsorption)

KISELEV, A.V.; SAKODYNSKIY, K.I.; SHCHERBAKOVA, K.D.

Fourth International Symposium on Gas Chromatography in Hamburg.  
Neftekhimiia 2 no.5:804-814 S-O '62. (MIRA 16:1)  
(Hamburg—Gas chromatography—Congresses)

KISELEV, A.V.; FROLOV, B.A.

Isotherms and differential heats of adsorption of some alkanes  
and naphthenes on silica gel. Kin.i kat. 3 no.5:767-773 S-0  
'62. (MIRA 16:1)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
khimicheskiy fakul'tet i Dal'nevostochnyy filial Sibirskogo  
otdeleniya AN SSSR.  
(Paraffins) (Naphthenes) (Heat of adsorption)

KISELEV, A.V.; FROLOV, B.A.

Isotherms and heats of adsorption of vapors of aromatic hydrocarbons on silica gel. *Kin.i kat. 3 no.5:774-783 S-0 '62.*  
(MIRA 16:1)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
khimicheskiy fakul'tet i Dal'nevostochnyy filial Sibirskogo  
otdeleniya AN SSSR.

(Hydrocarbons) (Heat of adsorption) (Silica)



KISELEV, A.V.; SEMENOVA, V.N.; EL'TEKOV, Yu.A.

Adsorption of thiophene+n.heptane from solutions by silica gel, aluminum oxide, and by the molecular sieves 5A and 13X.  
Kin.i kat. 3 no.6:937-941 N-D '62. (MIRA 15:12)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
khimicheskiy fakul'tet i Institut fizicheskoy khimii AN SSSR.  
(Thiophene) (Heptane) (Adsorption)

BELYAKOVA, L.D.; GROMOV, V.V.; KISELEV, A.V.; SPITSYN, Vikt.I.

Adsorption of various substances on radioactive samples  
of barium sulfate. Radiokhimiya 4 no.4:410-421 '62.

(MIRA 15:11)

(Barium sulfate) (Sulfur—Isotopes)  
(Adsorption)

KISELEV, A.V.

Effect of the adsorbent, surface inhomogeneity, and adsorbate -  
adsorbate interaction on the adsorbability of solids. Vest.Mosk.  
un. Ser.2:khim. 17 no.1:3-20 Ja-F '62. (MIRA 1511)

1. Laboratoriya adsorbtsii i gazovoy khromatografii Moskovskogo  
gosudarstvennogo universiteta, i gruppa khimii poverkhnosti instituta  
fizicheskoy khimii AN SSSR.  
(Adsorption) (Solids)

KISELEV, A.V.; LIGHIN, V.I. [Lygin, V.I.]

Applying the infrared spectroscopy to the study of the structure of surface chemical compounds and adsorption. Analele chimie 17 no.4:3-42 0-D '62.

KISELEV, A.V.

Nature of the adsorbent, surface nonhomogeneity, and the interaction adsorbate-adsorbate, and their influence on the adsorption properties of solids. Analele chimie 17 no.4:122-142 O-D '62.

36240  
S/069/62/024/002/003/008  
B110/B144

5.115

AUTHORS: Drogaleva, I. V., Kiselev, A. V., Korolev, A. Ya., El'tekov, Yu. A.

TITLE: Production and properties of ethylene glycol aerosil

PERIODICAL: Kolloidnyy zhurnal, v. 24, no. 2, 1962, 152 - 158

TEXT: The surface of aerosil was modified with ethylene glycol to reduce the adsorption energy and preserve the hydrophilic character and selective action of functional groups. Etherification of silanol groups with ethylene

glycol  $-Si-OH + HOCH_2CH_2OH \longrightarrow -Si-O-CH_2CH_2OH + H_2O$  causes coating of the aerosil surface with ethylene glycoxy groups, one hydroxyl group of which is located at the end. First the increase in the degree of modification is comparatively fast as the time of ethylene glycol action increases, then it slows down. The number of  $\sim CH_2-CH_2-$  groups grafted onto the unit surface varies between 2 and 6 per  $100 \text{ \AA}^2$ . When one hydroxyl group reacts with one diol molecule, the substitution degree of OH groups is:

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Production and properties of ethylene...

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E110/B144

$\theta$ -OH  $\longrightarrow$   $-\text{OC}_2\text{H}_4\text{OH} = \alpha$ -CH<sub>2</sub>-CH<sub>2</sub>- $\alpha$ -OH  $\gg$   $\alpha$ -CH<sub>2</sub>-CH<sub>2</sub>- $\beta$ . Only 2/3 of the OH

groups located on the surface of hydrated silica were substituted. The adsorption isotherms of substituted aerosils showed that the adsorption of nitrogen, n-hexane, and argon vapors was not affected but that of benzene and methanol vapors rapidly reduced. This reduction is due to chemical changes of the surface and their effect on adsorption since the specific surface of aerosil is hardly changed by etherification. In a dense monolayer, the area per molecule is  $\omega_m = s_{N_2}/a_m N$ , where  $a_m$  is the capacity

of the monolayer,  $s_{N_2}$  is the specific surface. Substitution of ethoxy for

silanol groups causes decrease in  $a_m$  for methanol and benzene. With nitrogen and methanol the equilibrium constant decreases with increasing substitution degree. Grafting may be applied to diol substitution: (1) to one or two OH groups; (2) to  $-\text{Si}-\text{O}-\text{Si}-$  bridges, and (3) to bridges and OH groups. More complex compounds may form on the surface since ethylene glycol forms polymer chains in the presence of oxide catalysts. This causes a composite mosaic structure of the modified layer. Screening of silica with ethylene  
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B110/B144

Production and properties of ethylene...

glycol groups improves dispersion and disaggregation of aerosil particles owing to a decrease in their interaction. Disaggregation is important for the introduction of modified aerosil as filler into polyurethanes. The gluing strengths of modified and initial quartz hardly differ. The hydroxyl groups of the quartz surface react vigorously with the isocyanate groups of the glue. The adhesive power is to be preserved, and wetting and complete disaggregation of filler particles in the polymer are to be reached by chemical modification. The aimed regulation of surface properties of highly disperse fillers. Screening of the silica surface by a dense layer of un-polar, chemically inert groups reduces adsorption and adhesion. Modification with dimethyl dichloro silane thus forms a thick, continuous polymethyl siloxane layer eliminating the polar glue-quartz adhesion. There are 2 figures, 4 tables, and 16 references.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR Gruppy khimii poverkhnosti (Institute of Physical Chemistry AS USSR, Group of Surface Chemistry). Moskovskiy universitet im. M. V. Lomonosova Laboratoriya adsorbtsii Khimicheskoy fakul'tet (Moscow University imeni M. V. Lomonosov, Adsorption Laboratory, Chemical Division)

Card 3/4



Production and properties of ethylene...

SUBMITTED: April 26, 1961

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B110/B144

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8/069/62/024/002/005/008  
B101/B110

AUTHORS: Kiselev, A. V., Kovaleva, N. V., Polyakova, M. N., Teener,  
P. A.

TITLE: Adsorption properties of oxidized carbon blacks. 2. Oxidation of channel black in a gas medium

PERIODICAL: Kolloidnyy zhurnal, v. 24, no. 2, 1962, 195-200

TEXT: The authors study the reason why oxidized channel black gives better printing ink than unoxidized channel black. Ukhta gas channel black sample B-1369 (V-1369) was oxidized for 2 hrs with atmospheric oxygen at 450°C and an air stream of 3 liter/min. The weight loss was 4-5%; the O<sub>2</sub> content increased from 4.4 to 8.15%; the specific surface (determined by the BET method) increased from 148 m<sup>2</sup>/g to 295 m<sup>2</sup>/g for N<sub>2</sub> and C<sub>6</sub>H<sub>6</sub>, and 142 m<sup>2</sup>/g for n-C<sub>6</sub>H<sub>12</sub>. The black samples were evacuated to 10<sup>-5</sup> mm Hg at 200°C; next the adsorption isotherm for vapors of n-hexane, benzene, methanol, and water were taken. Results: (1) The total adsorption capacity for all vapor kinds doubled; (2) the adsorption capacity per surface unit, however,

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(2)

S/069/62/024/005/001/010  
B107/P186

AUTHORS: Aristov, B. G., Davyđov, V. Ya., Drogaleva, I. V.,  
Karnaukhov, A. P., Kiselev, A. V., Korolev, A. Ya., Polyakov,  
A. L.

TITLE: The modification of highly dispersed silica aerosil by  
hydrothermal treatment

PERIODICAL: Kolloidnyy zhurnal, v. 24, no. 5, 1962, 513 - 521

TEXT: The influence of temperature and duration of hydrothermal treatment on the aerosil's specific surface area and power to adsorb nitrogen is systematically studied, and some samples were examined by electron microscope. The original material was industrial aerosil prepared by high-temperature hydrolysis of  $\text{SiCl}_4$  as well as the material Bk-1 (VK-1) prepared by burning off silico-organic compounds. The hydrothermal treatment was accomplished at 120 - 410°C in periods ranging between 4 and 132 hr, after which the samples were dried at 150°C and their adsorption of nitrogen at its boiling point was measured. From this the specific surface area was calculated by the BET method. Results in

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The modification of highly dispersed... S/069/62/024/005/001/010  
B107/B186

Table 1 show that the specific surface diminishes with increasing temperature and duration of hydrothermal treatment. Electron microscope exposures showed that this is due to coarsening of the particles. If the absolute amount of adsorption is plotted against  $p/p_s$  (where  $p_s$  is the saturation vapor pressure of the nitrogen) a very reproducible isotherm is obtained (Table 2). Within the range  $p/p_s = 0.015 - 0.3$  this can be

represented by the BET equation:  $\alpha = \frac{\alpha_m C p/p_s}{(1-p/p_s)[1+(C-1)p/p_s]}$  with

$\alpha_m = 10.25 \mu\text{mol}/\text{m}^2$ ,  $C = 164$ . In the range  $p/p_s = 0.2 - 0.8$  the isotherm conforms to Halsey and Hill (references see below). As formulated by

Pierce (reference see below) this reads  $(\alpha/\alpha_m)^{2.75} = (\alpha/10.25)^{2.75}$

$= 1.30/\log(p/p_s)$ . It is pointed out that this isotherm makes it possible

to determine the specific surface area of a nonporous or large-pore silica with hydrated surface area from a single experimentally fixed point, according to the equation  $s = a/\alpha \text{ m}^2/\text{g}$  ( $a$  being the adsorption in  $\mu\text{mol}/\text{g}$  and  $\alpha$  the value of the isotherm for the same  $p/p_s$ ). There are

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The modification of highly dispersed...

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B107/B186

6 figures and 2 tables. The most-important English-language references are: G. D. Halsay, J. Chem. Phys., 16, 931, 1948; T. L. Hill, J. Chem. Phys., 17, 590, 1961; C. Pierce, J. Phys. Chem., 63, 1076, 1959; 64, 1184, 1960.

ASSOCIATION: Moskovskiy universitet, Khimicheskiy fakul'tet (Moscow University, Division of Chemistry)

SUBMITTED: September 9, 1961

Table 1. Specific surface area ( $m^2/g$ ) of aerosil in dependence on temperature and duration of hydrothermal treatment in an autoclave. The specific surface area of the initial aerosil was  $187 m^2/g$ .  
Legend: 1. Temperature in  $^{\circ}C$ ; 2. Duration of treatment in hr; 3. Specific surface area in  $m^2/g$ .

Table 2. Absolute amount of nitrogen gas adsorbed, at its boiling point, on hydrated samples of nonporous amorphous silica. The surface area covered by a molecule of nitrogen corresponding to a monolayer of ( $\omega_m$ ) thickness is put at  $16.2 \text{ \AA}$  and the degree of filling  $\theta = \alpha/\alpha_m$ , wherefrom  
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S/059/62/024/006/001/009  
B101/B180

AUTHORS: Aristov, B. G., Babkin, I. Yu., Kiselev, A. V.

TITLE: Adsorption and heat of adsorption of vapors on alkoxyated silica

PERIODICAL: Kolloidnyy zhurnal, v. 24, no. 6, 1962, 643 - 647

TEXT: Aerosil gels containing groups of 1, 4, or 8 C atoms on their surface were obtained by treating aerosil with absolute methanol at 300°C, or with n-butanol or n-octanol at 280°C and by subsequent evacuation. The specific surface of the aerosils remained unchanged. When vacuum heated the modified layer of the butoxylated specimen was stable up to 350°C. Modification of the surface lowered the N<sub>2</sub> adsorptive capacity at -195°C and the adsorption heat of H<sub>2</sub>O, CH<sub>3</sub>OH, and C<sub>6</sub>H<sub>6</sub>. At low degrees of adsorption, the surface showed marked energetic inhomogeneity, particularly the methoxylated one. The adsorption isotherms of H<sub>2</sub>O, CH<sub>3</sub>OH, and C<sub>6</sub>H<sub>6</sub>, became convex. Adsorption decreases as the length of the modifying radical increases, C<sub>6</sub>H<sub>6</sub> being adsorbed more strongly than CH<sub>3</sub>OH. This is attributed

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Adsorption and heat of...

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B101/B180

to the increasing contribution of the entropy term in the equation for the adsorption equilibrium  $C_6H_6$  molecules adsorbed on a layer of long radicals are less mobile than in the liquid state, while methanol molecules are firmest on a methoxy layer. As the imperfections of the modified aerosil surface are completely covered by water even at a small  $p/p_s$  ratio, adsorption will be very low at a high  $p/p_s$  ratio. There are 4 figures and 1 table. ✓

ASSOCIATION: Moskovskiy universitet, Khimicheskiy fakul'tet, laboratoriya adsorbtsii i gazovoy khromatografii (Moscow University, Division of Chemistry, Laboratory of Adsorption and Gas Chromatography)

SUBMITTED: September 4, 1962

Card 2/2

BABKIN, I. Yu.; KISELEV, A. V.

Increase in adsorption energy in the compression of nonporous silica particles with a chemically modified surface. Koll. zhur. 24 no.6:648-650 N-D '62. (MIRA 16:1)

1. Laboratoriya adsorbtsii i gazovoy khromatografii, khimicheskiy fakul'tet Moskovskogo universiteta.

(Heat of adsorption) (Silica)



KISELEV, A. V.; KHOPINA, V. V.

Adsorption of toluene from n. heptane solutions by channel  
black and activated charcoal fired at 800, 1700 and 3000°C.  
Koll. zhur. 24 no.6:682-686 N-D '62. (MIRA 16:1)

1. Institut fizicheskoy khimii AN SSSR, gruppa khimii pevetkh-  
nosti, Moskva.

(Toluene) (Adsorption) (Carbon, Activated)

KISELEV, A. V.; SHIKALOVA, I. V.

Adsorption of hydrocarbons from binary solutions on silica  
gel. Koll. zhur. 24 no.6:687-695 M.D '62. (MIRA 16:1)

1. Moskovskiy universitet, khimicheskiy fakul'tet, laboratoriya  
adsorbtsii.

(Hydrocarbons) (Adsorption) (Silica)

KISELEV, A.V.; LYGIN, V.I.

Use of infrared spectroscopy for investigating the structure  
of surface chemical compounds and adsorption. Usp.khim. 31  
no.3:351-384 Mr '62. (MIRA 15:3)

1. Laboratoriya adsorbtsii i gazovoy khromatografii khimicheskogo  
fakul'teta Moskovskogo gosudarstvennogo universiteta imeni  
M.V.Lomonosova.

(Surface chemistry) (Adsorption) (Spectrum, Infrared)

ISIRIKYAN, A.A.; KISHLEV, A.V.

Absolute adsorption isotherms for nitrogen, benzene, and  
n-hexane vapors and the heats of adsorption of benzene and  
n-hexane on graphitized carbon blacks. Part 1. Zhur. fiz.  
khim. 36 no.6:1164-1172 Je'62 (MIRA 17:7)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova  
i Institut fizicheskoy khimii AN SSSR.

ISIRIKYAN, A.A.; KISELEV, A.V.

Adsorption isotherms of nitrogen, benzene, and n.hexane vapors and the heats of adsorption of benzene and n.hexane on graphitized carbon black. Part 2: Adsorption on graphitized channel blacks. Zhur.fiz.khim. 36 no.8:1723-1730 Ag '62. (MIRA 15:8)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova, khimicheskoy fakul'tet i Institut fizicheskoy khimii AN SSSR.  
(Adsorption) (Carbon black)

POSHKUS, D.P.; KISELEV, A.V.

Contribution to the statistical thermodynamic calculation of  
adsorption equilibria in the system argon - graphite. Zhur.fiz.  
khim. 36 no.8:1735-1742 Ag '62. (MIRA 15:8)

1. Institut khimii i khimicheskoy tekhnologii AN Litovskoy SSR i  
Gruppa khimii poverkhnosti Instituta fizicheskoy khimii AN SSSR.  
(Argon) (Graphite) (Adsorption)

GALKIN, G.A.; KISELEV, A.V.; LYGIN, V.I.

Infrared spectrum of benzene adsorbed on a silica surface. Zhur.  
fiz.khim. 36 no.8:1764-1768 Ag '62. (MIRA 15:8)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarstvennyy  
universitet imeni Lomonosova, khimicheskiy fakul'tet.  
(Benzene--Spectra) (Silica)

BEREZIN, G.I.; KISELEV, A.V.; SERDOBOV, M.V.

Continuously heated adiabatic differential calorimeter with  
continuous adsorbate feed for measuring the heat of adsorption  
on small solid surfaces. Zhur. fiz. khim. 36 no.9:2091-2095  
S '62. (MIRA 17:6)

1. Institut fizicheskoy khimii AN SSSR.



AKSHINSKAYA, N.V.; BEZNOGOVA, V.Ye.; KISELEV, A.V.; NIKITIN, Yu.S.

Geometric modification of the skeleton of xerogels. Part 1.

Zhur.fiz.khim. 36 no.10:2277-2280 0 '62. (MIRA 17:4)

1. Laboratoriya adsorbtsii i gazovoy khromatografii khimicheskogo fakul'teta Moskovskogo gosudarstvennogo universiteta imeni Lomonosova.

ARISTOV, B.G.; KARNAUKHOV, A.P.; KISELEV, A.V.

Theory of the corpuscular structure of adsorbents. Part 3:  
Simultaneous adsorption and capillary condensation. Zhur.fiz.khim.  
36 no.10:2153-2161 O. '62. (MIRA 17:4)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
khimicheskiy fakul'tet.

S/076/62/036/011/010/021  
B101/B180

AUTHORS: Babkin, I. Yu., and Kiselev, A. V. (Moscow)

TITLE: Adsorption and heat of adsorption of various vapors on a trimethylsilylated aerosil surface

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 11, 1962, 2448-2456

TEXT: The vapors were carbon tetrachloride, methanol and water, on the surface of a tridymite aerosil covered with a layer of grafted trimethyl silyl groups which greatly reduced the adsorption. The adsorption of nonpolar  $\text{CCl}_4$  is not affected by defects in the trimethyl silyl layer, but that of methanol and water occurs first in these places with formation of H bonds. The modifying layer reduces the selectivity of the aerosil surface with regard to large non-polar molecules such as  $\text{C}_6\text{H}_6$ ,  $\text{C}_6\text{H}_{14}$ , and  $\text{CCl}_4$ , making their heats of adsorption lower than those of condensation.

The variation in the entropy curve (Fig. 7) shows that hydrocarbon molecules adsorbed on the surface have greater mobility than in the liquid, whereas the methanol and water molecules are localized in the layer

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Adsorption and heat of adsorption...

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defects, particularly in the first stage of adsorption. Tridymite covered with trimethyl silyl groups has lower adsorptivity than graphitized carbon black for nonpolar molecules. The adsorption of  $\text{CH}_3\text{OH}$  on modified tridymite, however, is at first higher than on graphitized carbon black, because H bonds are formed with the hydroxyl groups of the layer defects. In the whole range investigated water is adsorbed on tridymite more strongly than on carbon black. There are 9 figures and 1 table.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova, Khimicheskiy fakul'tet (Moscow State University imeni M. V. Lomonosov, Chemical Division)

SUBMITTED: July 7, 1961

Fig. 7. Change in adsorption entropy on trimethylsilated aerosil for (1)  $\text{CCl}_4$ ; (2)  $\text{C}_6\text{H}_6$ ; (3)  $\text{C}_6\text{H}_{14}$ ; (4)  $\text{H}_2\text{O}$ ; (5)  $\text{CH}_3\text{OH}$

Card 2/3

ARISTOV, B.G.; KARNAUKHOV, A.P.; KISELEV, A.V.

On the corpuscular theory of the structure of adsorbents.

Pt. 4. Zhur. fiz. khim. 36 no.11:2486-2490 N'62.

(MIRA 17:5)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
khimicheskiy fakul'tet.

ARISTOV, B. G.; DAVYDOV, V. Ya.; KARNAUKHOV, A. P.; KISELEV, A. V.

Corpuscular theory of the structure of adsorbents. Part 5:  
Adsorption of nitrogen and carbon tetrachloride vapors on  
model adsorbents obtained by compression of aerosols. Zhur. fiz.  
khim. 36 no.12:2757-2763 D '62. (MIRA 16:1)

I. Moskovskiy gosudarstvennyy universitet imeni Lomonosova i  
Institut fizicheskoy khimii AN SSSR.

(Adsorbents) (Nitrogen) (Carbon tetrachloride)

DAVYDOV, V.Ya.; KISELEV, A.V.; LYGIN, V.I.

Variation of the spectrum of surface hydroxyl groups and  
the heat of adsorption on silica surface. Dokl. AN SSSR  
147 no.1:131-134 N '62. (MIRA 15:11)

1. Khimicheskiy fakul'tet Moskovskogo gosudarstvennogo  
universiteta im. M.V. Lomonosova. Predstavleno  
akademikom A.N. Frumkinym.

(Hydroxyl group—Spectra)  
(Heat of adsorption)

GERASIMOV, Yakov Ivanovich, prof.; DREVIN, Vladimir Petrovich;  
YEREMIN, Yevgeniy Nikolayevich; KISELEV, Andrey  
Vladimirovich; LEBEDEV, Vladimir Petrovich; PANCHENKOV,  
Georgiy Mitrofanovich; SHLYGIN, Aleksandr Ivanovich;  
NIKOL'SKIY, B.P., prof., retsenzent; SHUSHUNOV, V.A., prof.,  
retsenzent; LUR'YE, G.Ye., red.; SHPAK, Ye.G., tekhn. red.

[Course in physical chemistry] Kurs fizicheskoi khimii. [By]  
IA.I.Gerasimov i dr. Moskva, Goskhimizdat, 1963. Vol.1. 624 p.  
(MIRA 17:1)

1. Chlen-korrespondent AN SSSR (for Gerasimov, Nikol'skiy).
2. Kafedra fizicheskoy khimii Leningradskogo gosudarstvennogo universiteta (for Nikol'skiy, Shushunov).



L 13516-63 EPF(c)/EMP(j)/EMT(m)/BDS Pr-4/Pc-4 RM/WW/AB  
ACCESSION NR: AP3002780 S/0204/63/003/003/0417/0424 74  
AUTHOR: Zhdanov, S. P.; Kiselev, A. V.; Yashin, Ya. I. 66  
TITLE: Utilization of large-pore glass in gas-chromatographic separations of liquid hydrocarbons  
SOURCE: Neftekhimiya, v. 3, no. 3, 1963, 417-424  
TOPIC TAGS: adsorption chromatography, alkane, aromatic hydrocarbon, alkylbenzene, ethylene, ethane, benzene, hydrocarbon gas chromatography  
ABSTRACT: A gas-adsorption chromatographic method for the separation of normal alkanes and aromatic hydrocarbons using large-pore glass at temperatures up to 150C has been proposed. The investigation of the dependence of the effectiveness of the columns with the large-pore glass on the linear velocity of the carrier has shown a possibility of utilizing such columns at great linear velocities. From the chromatograms obtained at various temperatures, the heat of adsorption of a number of hydrocarbons on the hydroxylated silica surface has been determined. The heat of adsorption of normal alkanes and normal alkylbenzenes increases linearly with the increase of number of atoms of hydrogen. The heat of adsorption of ethylene is greater than the heat of adsorption of ethane, and the heat of adsorption of benzene and alkylbenzene is greater than the heats of adsorption of the corresponding  
Card 1/2

Figures.

ASSOCIATION: Laboratoriya adsorbtsii i gazovoy khromatografii khimicheskogo fakul'teta Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Laboratory of Adsorption and Gas Chromatography of the Department of Chemistry, Moscow State University); Dzerzhinskiy filial OKBA Goskhimkomiteta i Laboratoriya silikatnykh sorbentov Instituta khimii silikatov AN SSSR (Dzerzhinskiy branch of OKBA Goskhimkomitet and Laboratory of Silicate Sorbents of the Institute of the chemistry of silicates, Academy of Sciences SSSR)

SUBMITTED: 11Dec62

DATE ACQ: 23Jul63

ENCL: 00

SUB CODE: CH, FL

NO REF SOV: 010

OTHER: 003

Card 2/2

KISELEV, A.V.; NIKITIN, Yu.S.

Effect of initial porosity on the nature of change in pore structure of aluminosilica gels and silica gels during their sintering. Kin. i kat. 4 no.4:648-651 J1-Ag '63. (MIRA 16:11)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova, khimicheskii fakul'tet.

KISELEV, A.V.; LOPATKIN, A.A.

Geometric structure of cavities of the A and X-type zeolites.  
Kin.i kat. 4 no.5:786-791 S-0 '63. (MIRA 16:12)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
khimicheskoy fakul'tet.

L 12730-63 EPR/EPF(c)/EWP(j)/EWT(m)/BDS AFFTC/ASD Ps-l/Pr-l/Pc-l RM/WW  
ACCESSION NR: AP3002285 S/0062/63/000/006/1017/1022 75  
73

AUTHOR: Aristov, B. G.; Babkin, I. Yu.; Borisova, F. K.; Kiselev, A. V.; Korolev, A. Ya.

TITLE: Changing the surface properties of polyethylene by oxidative treatment

SOURCE: AN SSSR. Izv. Otdeleniye khimicheskikh nauk, no. 6, 1963, 1017-1022

TOPIC TAGS: surface properties, polyethylene, oxidizing, surface polarity, adhesive properties, adsorption

ABSTRACT: Treating polyethylene with an oxidizing chrome composition (potassium dichromate and sulfuric acid) for 5 minutes at temperatures below 120 degrees sharply increased its surface polarity, thus improving its adhesive properties, permitting gluing with polar adhesives and printing with inks. Oxidative treatment of low-pressure powdered polyethylene hardly changes its specific surface, as determined by very little difference in low-temperature adsorption of nitrogen between untreated and strongly oxidized material. However, the irreversible adsorption of water and the heat of adsorption were greatly increased, this adsorption being proportional to the degree of oxidation of the sample. Orig. art. has: 3 figures and 1 table.

Association: Moscow St. Un., Inst. of Physical Chemistry  
Card 1/2/

S/069/63/025/001/001/008  
B101/B186

## AUTHORS:

Dzhigit, O. M., Kiselev, A. V., Muttik, G. G.

## TITLE:

Nature of adsorption by zeolites. Differential heat of adsorption of diethyl ether vapor and n-pentane vapor on porous crystals.

## PERIODICAL:

Kolloidnyy zhurnal, v. 25, no. 1, 1963, 34-42

TEXT: The adsorption properties of molecules having similar geometric but different electronic structures were studied. For this purpose diethyl ether and n-pentane adsorbed on porous zeolite crystals of type 13X ( $0.97\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2.96\text{SiO}_2$ ) and 10X ( $0.31\text{Na}_2\text{O} \cdot 0.66\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2.95\text{SiO}_2$ ) were used. The results were compared with those obtained earlier (Zh. fiz. khimii, 36, 919, 1962) for zeolite 5A which also contained  $\text{Ca}^{2+}$  ions. Its channelways, however, were narrower than those of 10X. Results: In 13X, the adsorption heat  $Q_{aE}$  of ether was approximately 80% higher than  $Q_{aP}$  of pentane.  $Q_{aE}$  was almost constant as the amount  $a$  (mmoles/g) of adsorbed

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B101/B186

Nature of adsorption by ...

substance increased, and always larger than  $Q_{aP}$  owing to electrostatic interaction between ether dipoles and  $Na^+$  ions of zeolite.  $Q_{aP}$  increased with  $a$  and passed a maximum owing to interaction among pentane molecules which were more densely packed on the zeolite surface. The curve  $Q_a$  versus  $a$  of 10X first dropped for ether as well as pentane owing to inhomogeneities of the electrostatic field formed by  $Ca^{2+}$  and  $Na^+$  ions. In contrast to  $Q_{aE}$ ,  $Q_{aP}$  increased with  $a$ , but less intensively than in 13X.  $Q_a$  (kcal/mole) is given for the degrees of population  $\theta = 0.1$  and  $0.5$  for ether on 5A: 25.6, and 22.0; on 10X: 22.3 and 20.2; on 13X: 21.1 and 21.0; for pentane on 5A: 14.2, and 15.6; on 10X: 13.5 and 13.0; on 13X: 12.2 and 14.0. Adsorption on zeolites with high adsorption energy affects the molecular packing of the adsorbates. Thus, the ratio  $a_E/a_P$  of the concentrations of adsorbed ether and pentane at  $p/p_B = 0.5$ , is 1.12 in 5A, 1.18 in 10X, and 1.19 in 13X, whereas  $c_E/c_P$  of the liquids is only 1.11.

There are 4 figures and 1 table. The most important English-language references are: R. M. Barrer, S. Wasilewski, Trans. Faraday Soc., 57,

Card 2/3

S/069/63/025/002/001/010  
A057/A126

**AUTHORS:** Avgul', N.N., Kiselev, A.V., Lopatkin, A.A., Lygina, I.A., Serdobov, M.V.

**TITLE:** Nature of adsorption by zeolites. Heat of adsorption of benzene and n-hexane vapors by zeolite type 13 X (13Kh)

**PERIODICAL:** Kolloidnyy zhurnal, v. 25, no. 2, 1963, 129 - 135

**TEXT:** The differential adsorption heats of benzene and n-hexane vapors on 13Kh zeolite crystals were measured calorimetrically. The measured adsorption heats are approximately twice as high as the corresponding heats of condensation. The initial heat of adsorption of benzene is by about 3 kcal/mole higher than that of n-hexane. Little change was observed in the heat of adsorption of benzene with the degree of adsorption, while a considerable rise occurs for n-hexane. This observation was made also with graphitized soot and explained by the interaction of the n-hexane molecules in the adsorption layer of the non-polarized soot surface. Discussing the possible arrangements of the benzene and n-hexane molecules in larger cavities of the zeolite, the authors state: There

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Nature of adsorption by zeolites. Heat of ....

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A057/A126

are four sites in the cavity walls having cations in their centers which are favorable for the localization of benzene molecules. It can be assumed that the stretched and flexible n-hexane molecules depend less on the position of these cations. Hence, the adsorption of n-hexane is less localized in comparison to benzene. The adsorption on zeolites, however, is highly affected by the geometric and electronic structure of the adsorbed molecules, the geometry of the cavities, and the nature of the electric field of the adsorbent. The packing of molecules of the adsorbate in the zeolite cavities differs, therefore, from their packing in the liquid state. Thus Polyani's potential theory of adsorption cannot be applied to the adsorption of hydrocarbon vapors by zeolites. The state and packing of hydrocarbon molecules in zeolite cavities will find further explanations by experiments with n-alkanes with molecules of different lengths and their substitutes with various functional groups, plane molecules, and different electron structure, as well as adsorption experiments with small molecules (nitrogen, argon) after adsorption of highly adsorptive large molecules, which are loosely filling the cavities. There are 4 figures.

ASSOCIATION: Moskovskiy universitet, Khimicheskly fakul'tet (Moscow University,  
Card 2/3

Nature of adsorption by zeolites. Heat of ....

S/069/63/025/002/001/010  
A057/A126

Chemical Department); Institut fizicheskoy khimii AN SSSR, Gruppya khimii poverkhnosti (Institute of Physical Chemistry of the AS USSR, Team for Surface Chemistry)

SUBMITTED: July 12, 1962

Card 3/3

S/069/63/025/002/003/010  
A057/A126

AUTHORS: Kiselev, A.V., Korolev, A.Ya., El'tekov, Yu.A.

TITLE: On the adsorption on estersils

PERIODICAL: Kolloidny zhurnal, v. 25, no. 2, 1963, 165 - 168

TEXT: In continuation of earlier investigations the authors compare adsorption isotherms of nitrogen and argon vapors at  $-195^{\circ}\text{C}$  and methanol, benzene, and n-hexane vapors at  $20^{\circ}\text{C}$  on aerosil with those obtained on estersils prepared by a treatment of the aerosil surface with ethylene glycol or resorcinol. More than half of the surface of the estersils was covered by ester groups. With respect to adsorption capacity for argon, nitrogen and n-hexane, the adsorbents arranged themselves in the order resorcinolestersil > glycolestersil, whereas with respect to benzene and methanol the order was aerosil > resorcinolestersil > glycolestersil. There are 2 figures and 1 table.

ASSOCIATION: Moskovskiy universitet, Khimicheskiy fakul'tet (Moscow University, Chemical Department); Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry of the AS USSR)

SUBMITTED: May 31, 1962

Card 1/1

KISELEV, A.V.; PAVLOVA, L.F.

Adsorption of benzene and n-hexane on silica gel from their vapor mixture. Koll.zhur. 25 no.5:537-542. S-O '63. (MIRA 16:10)

1. Institut fizicheskoy khimii AN SSSR i Khimicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta.

KISELEV, A.V.; SERDOBOV, M.V.

Isotherms and differential heats of adsorption of n-hexane, benzene,  
and carbon tetrachloride vapors on polytetrafluoroethylene (teflon).  
Koll.zhur. 25 no.5:543-548 S-0 '63. (MIRA 16:10)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

44898

S/076/63/037/001/027/029  
B101/B186

5.4400

AUTHORS: Babkin, I. Yu., Kiselev, A. V.

TITLE: Isotherms and heats of adsorption of various vapors on the hydrated surface of various silicas

PERIODICAL: Zhurnal fizicheskoy khimii, v. 37, no. 1, 1963, 228 - 232

TEXT: The 20°C isothermal line and the heats of adsorption of H<sub>2</sub>O, CH<sub>3</sub>OH, C<sub>6</sub>H<sub>6</sub>, and CCl<sub>4</sub> were plotted for Degussa aerosil,  $s_{N_2} = 180 \text{ m}^2/\text{g}$ , and powdered silica gel 5C-280 (BS-280),  $s_{N_2} = 340 \text{ m}^2/\text{g}$ . The aerosil was treated with water vapor at 200°C for 8 hrs; and at 275°C for 10 hrs, whereupon  $s_{N_2}$  fell to 136 and 43  $\text{m}^2/\text{g}$ , respectively. BS-280 was treated with water vapor at 350°C whereupon  $s_{N_2}$  was 30  $\text{m}^2/\text{g}$ . Before measurements were made and the curves for  $\alpha$  (absolute adsorption) versus  $p/p_s$  and for  
Card 1/2

Isotherms and heats of adsorption...

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B101/B186

$Q_a$  (the differential heat of adsorption) versus  $\alpha$  at 20°C were plotted, the samples were kept in vacuo at 150°C for 25 - 30 hrs. Results: The curves  $\alpha_{H_2O}$  versus  $p/p_s$  and  $Q_a$  versus  $\alpha_{H_2O}$  are the same for the two silicas, and agree with the curve obtained earlier for KCK-2 (KSK-2) silica gel. The same was observed for  $CH_3OH$  and  $C_6H_6$ . The isotherms and the dependence of  $Q_a$  on the degree of adsorption were found not to depend on the type and dispersity of a silica with hydrated surface. The adsorption of  $CCl_4$  was measured on silica with hydrated surface and on silica dehydrated in vacuo at 800°C ( $S_{N_2} = 100 \text{ m}^2/\text{g}$ ). Result: The adsorption and the heat of adsorption of nonpolar  $CCl_4$  are low and do not depend on the degree of surface hydration. There are 4 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova,  
Khimicheskiy fakul'tet (Moscow State University imeni  
M. V. Lomonosov, Chemical Division)  
April 10, 1962

SUBMITTED:  
Card 2/2

BEREZIN, G.I.; KISELEV, A.V.; SINITSYN, V.A.

Heat capacity of the adsorption systems silica gel - water - benzene -  
n - hexane. Zhur.fiz.khim. 37 no.2:325-332 F '69. (MIRA 16:5)

1. Institut fizicheskoy khimii AN SSSR.  
(Silica) (Benzene) (Hexane) (Heat of adsorption)



DAVIDOV, V.Ya.; KISELEV, A.V.; LYGIN, V.I.

Infrared spectroscopy study of the adsorption of  
trimethylcarbinol on aerosil. Zhur.fiz.khim. 37 no.2:  
469-470 F '63. (MIRA 16:5)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
khimicheskiy fakul'tet.  
(Butyl alcohol—Spectra) (Adsorption)

S/076/63/037/003/010/020  
B101/B215

AUTHORS: Kiselev, A. V., Poshkus, D. P. (Moscow)

TITLE: Statistical calculation of the total energy and entropy of benzene adsorbed by graphite

PERIODICAL: Zhurnal fizicheskoy khimii, v. 37, no. 3, 1963, 608-614

TEXT: The statistical calculation of the total energy and entropy of adsorbed benzene at a low occupation  $\theta$  of the surface was based on a calculation of the potential energy of the benzene molecule adsorbed by a graphite surface by using the approximate molecular interaction theory.

The mathematical apparatus of these calculations is based on a publication by the author in Trans. Faraday Soc., 59, 428, 1963, and on a paper by J. W. Dreenan, T. L. Hill (J. Chem. Phys. 17, 775, 1949).

Results:

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Statistical calculation of the total ...

S/076/63/037/003/010/020  
B101/B215

$$U_{\text{адкл}} = \Phi_{00} + RT \left[ \frac{7}{2} + \frac{\int_0^{d/z_{00}} \exp(-\Delta\Phi_0/kT) (\Delta\Phi_0/kT) (kT/h\nu_z) f(\beta) d\beta}{\int_0^{d/z_{00}} \exp(-\Delta\Phi_0/kT) (kT/h\nu_z) f(\beta) d\beta} \right] \quad (12)$$

$$S_{\text{адкл}} = R \left[ \frac{7}{2} + \ln \frac{8\pi^3}{\sigma} \frac{2\pi mkT}{h^3} \frac{2\pi AkT}{h^3} \left( \frac{2\pi CKT}{h^3} \right)^{1/2} \frac{z_{00} \omega_m}{d} \times \right. \\ \left. \times \int_0^{d/z_{00}} \exp\left(-\frac{\Delta\Phi_0}{kT}\right) \frac{kT}{h\nu_z} f(\beta) d\beta + \right. \quad (13) \\ \left. + \frac{\int_0^{d/z_{00}} \exp(-\Delta\Phi_0/kT) (\Delta\Phi_0/kT) (kT/h\nu_z) f(\beta) d\beta}{\int_0^{d/z_{00}} \exp(-\Delta\Phi_0/kT) (kT/h\nu_z) f(\beta) d\beta} \right] - R \ln \theta.$$

where  $\Phi_{00}$  is the adsorption heat of benzene at  $0^\circ\text{K}$ ,  $\theta \rightarrow 0$ ; the indices  $k, l$  stand for classical. For adsorbed benzene at  $293^\circ\text{K}$ , the calculation yields Card 2/3

Statistical calculation of the total ...

S/076/63/037/003/010/020  
B101/B215

a total energy  $U_{a,cl} = -6.93$  kcal/mole and entropy  $S_{a,cl} = 39.01 - 4.57 \log \theta$  entropy units. After subtracting the data for gaseous benzene at  $293^\circ K$ :  $U_g = 1.75$  kcal/mole,  $S_g = 59.02$  e. u., the following values are obtained  $U_{a,cl} = -8.68$  kcal/mole,  $S_{a,cl} = -20.01 - 4.57 \log \theta$  e. u. After quantum mechanical correction,  $\Delta U_a = -8.68$  kcal/mole,  $\Delta S_a = -19.9 - 4.57 \log \theta$  e. u. are obtained under consideration of the approximations by K. S. Pitzer and W. D. Gwinn (J. Chem. Phys., 10, 428, 1942). The data are in good agreement with the experimental data obtained for benzene adsorbed by graphitized carbon black. There are 1 figure and 3 tables.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry AS USSR); Institut khimii i khimicheskoy tekhnologii AN LitSSR (Institute of Chemistry and Chemical Technology of AS LitSSR)

SUBMITTED: February 22, 1962

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L 16914-63  
WW/JD/JW/K

EPR/EPF(c)/EWP(q)/EWT(m)/BDS AFFTC/ASD Ps-4/Pr-4 WR/  
S/076/63/037/004/005/029

AUTHOR: Kiselev, A. V., Poshkus, D. P.

TITLE: Statistical calculation of the total energy and entropy of argon adsorbed on graphite 72 70 27

PERIODICAL: Zhurnal fizicheskoy khimii, V. 37, No. 4, 1963, 770-776

TEXT: A statistical calculation was made of the total energy and entropy of argon which was adsorbed on a graphite surface. The procedure was based on the calculation of the potential energy of argon molecules at the graphite surface using the approximate theory of intermolecular interactions. The effect of various approximations of this function on the values computed for the thermodynamic functions of adsorbed argon was investigated. Expressions were obtained for changes in the thermodynamic functions of argon upon adsorption on graphite in a classical approximation and with an approximate reckoning of the quantum mechanical corrections. The calculated theoretical values for the change in total energy and entropy of argon adsorbed on graphite were in good accord with values which were obtained experimentally using graphitized carbon black. This is similar to the results which were obtained by the authors in a previous work for the case of the adsorption of benzene on graphite. There are 3 tables and a graph. The most Card 1/2

L 16914-63

S/076/63/037/004/005/029

Statistical calculation of the total energy ...

2

important English-language reference reads as follows: S. Ross, W. J. Winkler,  
J. Coll. Sci., 10, 319, 1955.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii, Institut khimii  
i khimicheskoy tekhnologii AN LitSSR (Academy of Sciences of the  
USSR, Institute of Physical Chemistry, Institute of Chemistry and  
Chemical Technology of the Academy of Sciences Lithuanian SSR)

SUBMITTED: February 22, 1962

Card 2/2

AKSHINSKAYA, N.V.; KISELEV, A.V.; NIKITIN, Yu.S.

Geometric modification of a skeleton of xerogels. Part 2.  
Zhur. fiz. khim. 37 no.4:927-928 Ap '63. (MIRA 17:7)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomono:ova.

ABRAMOV, V.N.; KISELEV, A.V.; LYGIN, V.I.

Nature of adsorption by zeolites. Infrared spectrum of benzene adsorbed by zeolites of the type 13X and 10X. Zhur. fiz. khim. 37 no.5:1156-1160 My '63. (MIRA 17:1)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova, khimicheskii fakul'tet.



ZHDANOV, S.P.; KISELEV, A.V.; YASHIN, Ya.I.

Use of porous film-coated granulated glasses in gas chromatography.  
Zhur. fiz. khim. 37 no.6:1432-1434 Je '63. (MIRA 16:7)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
Dzerzhinskiy filial Opytno-konstruktorskogo byuro avtomatiki  
Gosudarstvennogo komiteta khimicheskoy promyshlennosti pri  
Sovete Ministrov i Institut khimii silikatoov AN SSSR.  
(Gas chromatography)

17728-63 EPR/EPF(e)/EWT(1)/EPF(n)-2/EWP(q)/EWT(m)/BDS AFFTC/  
D/SSD Ps-4/Pr-4/Pi-4/P1-4 WH/WW/JW/JD/K

ACCESSION NR: AP3004060

S/0076/63/037/007/1504/1509

AUTHORS: Kiselev, A. V.; Poshkus, D. P.

TITLE: Molecular-statistical calculation of heat capacity of argon and benzene adsorbed on graphite

SOURCE: Zhurnal fizicheskoy khimii, v. 37, no. 7, 1963, 1504-1509

TOPIC TAGS: benzene, argon, graphite, statistical heat capacity calculation, molecular heat capacity calculation

ABSTRACT: This is a continuation of a series of analyses which the authors carried out with respect to calculation of the full energy, entropy and chemical potential of argon and benzene which were adsorbed on the basal face of graphite at low surface coverage, proceeding from the interaction of the molecules of the adsorbate with the atoms of the adsorbent. In this work, authors carry out an analogous molecular-statistical calculation of the heat capacity of argon and benzene on graphite. Treatment is mathematical and results are tabulated. The molecular-statistical calculations were made for the differential molar heat capacities of isolated argon and benzene molecules adsorbed on a uniform basal face of graphite. Authors conclude that the calculated values for the heat capacities of monoatomic

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84  
27

L 17728-63

ACCESSION NR: AP3004060

2

molecules of argon do not overlap for models of localized and non-localized adsorption for various force constants of hindered molecular motion along the surface. This fact may be used for an unequivocal determination of the state of the adsorbed monoatomic molecules from experimental data obtained at low surface coverage. Orig. art. has: 13 tables and 16 formulas.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii (Academy of sciences, SSSR, Institute of physical chemistry); Akademiya nauk LitSSR, Institut khimii i khimicheskoy tekhnologii (Academy of sciences, Lithuanian SSR, Institute of chemistry and chemical engineering)

SUBMITTED: 20June62

DATE ACQ: 15Aug63

ENCL: 00

SUB CODE: PH, CH

NO REF SCV: 011

OTHER: 005

Cerd 2/2

L 18313-63 EPR/EPF(c)/EWT(1)/EWP(q)/EWT(m)/BDS AFFTC/ASD Ps-4/  
Pr-4 RM/WW/JD/WH/JW/K

ACCESSION NR: AP3004974

S/0076/63/037/008/1776/1785

AUTHORS: Isirikyan, A. A.; Kiselev, A. V.

76  
75

TITLE: Adsorption isotherms of vapors of nitrogen, benzene, and N-hexane and heat of adsorption of benzene and N-hexane on graphitized carbon blacks. 3. Thermodynamic characteristics of adsorption equilibria.

SOURCE: Zhurnal fiz. khimii, v. 37, no. 8, 1963, 1776-1785.

TOPIC TAGS: adsorption isotherm, nitrogen, benzene, N-hexane, heat of adsorption, graphitized carbon black, adsorption equilibria.

ABSTRACT: The thermodynamic properties of graphite-benzene and graphite-N-hexane adsorption systems are compared. Adsorption isotherms, differential heats and entropies of adsorption of vapors of N-hexane and benzene are also compared in a constant graphite grain. These properties depend only upon the nature of the adsorbate-adsorbent system and are their physical-chemical characteristics. They are practically free from the effect of adsorbent heterogeneity. The sharp difference of these characteristics for N-hexane and benzene is discussed. Isotherms of adsorption of nitrogen vapors at 195C, N-hexane, and benzene at 20C

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ACCESSION NR: AP3004974

in graphite are described with the aid of various approximate equations of adsorption isotherms on a similar surface, considering and not considering the adsorbate-adsorbate interaction. More complete experimental adsorption isotherms of these vapors on graphitized thermal carbon blacks with a similar surface are described by the equations for localized adsorption in the first layer, considering approximate adsorbate-adsorbate attractions. Orig. art. has: 5 figures, 2 tables, 8 equations.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova  
Khimicheskij fakul'tet (Moscow state university, Faculty of chemistry)

SUBMITTED: 02Feb61

DATE ACQ: 06Sep63

ENCL: 00

SUB CODE: CH, PH

NO REF SOV: 020

OTHER: 011

Card

2/2

ZHURAVLEV, L.T.; KISELEV, A.V.; NAYDINA, V.P.; POLYAKOV, A.L.

Determination of small amounts of water and hydroxyl groups  
by deuterium exchange and mass spectrometry. Zhur. fiz. khim.  
37 no.9:2054-2061 S. '63. (MIRA 16:12)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarstvennyy  
universitet imeni Lomonosova.

ZHURAVLEV, L.T.; KISELEV, A.V.; NAYDINA, V.P.; POLYAKOV, A.L.

Determination of surface and internal "structural water" of a silica gel by the deuterium exchange method with mass spectrometric control. Zhur. fiz.khim. 37 no.10:2258-2265 0 '63. (MIRA 17:2)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarstvennyy universitet, khimicheskiy fakul'tet.

ARISTOV, B.G.; BARKIN, I.Yu.; DAVYDOV, V.Ya.; KISELEV, A.V.

Effect of the compression of aerosol on the adsorption energy of  
nitrogen and carbon tetrachloride vapors. Zhur.fiz.khim. 37 no.10:  
2372-2374 0 '63. (MIRA 17:2)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova i Institut  
fizicheskoy khimii AN SSSR.



ARISTOV, B.G.; KISELEV, A.V.

Effect of dehydration of the silica surface on the adsorption  
isotherms of nitrogen and argon vapors. Zhur. fiz. khim. 37  
no.11:2520-2528 N'63. (MIRA 17:2)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarstvennyy  
universitet imeni Lomonosova, khimicheskiy fakul'tet.

KISELEV, A.V.; SERDOBOV, M.V.

Some characteristic correlations between the differential heats of adsorption of benzene, carbon tetrachloride, methylcyclohexane, and perfluoromethylcyclohexane and the filling of the surface of a graphitized carbon black. Zhur. fiz. khim. 37 no.11: 2589-2592 N'63. (MIRA 17:2)

1. Institut fizicheskoy khimii AN SSSR.

DAVYDOV, V.Ya.; KISELEV, A.V.

Infrared spectra of the surface and volume hydroxyl groups of silica. Zhur. fiz. khim. 37 no.11:2595-2596 N°63.

(MIRA 17:2)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

KISELEV, A.V.; YASHIN, Ya.I.

Temperature dependence of the specific interaction of nonpolar molecules with cationized surfaces of zeolites from gas chromatography data. Zhur. fiz. khim. 37 no.11:2614-2615 N'63.  
(MIRA 17:2)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova, khimicheskiy fakul'tet.

ABRAMOV, V.N.; KISELEV, A.V.; LYGIN, V.I.

Ultraviolet spectra of aromatic compounds adsorbed on an aerosil surface with varying degrees of hydroxylation. Zhur. fiz. khim. 37 no.12:2783-2789 D '6). (MIRA 17:1)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova, khimicheskiy fakul'tet.

S/020/63/149/001/018/023  
B101/B144

AUTHORS: Kiselev, A. V., Novikova, V. N., El'tekov, Yu. A.

TITLE: Adsorption of dissolved polydimethyl siloxane by aerosils

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149, no. 1, 1963, 131 - 134

TEXT: The adsorption of polydimethyl siloxane (PDMS) on Degussa aerosils was studied using an interferometer. The PDMS had a molecular weight of 350,000, its maximum concentration in n-hexane was 40 mg per g solution. Three samples of aerosil were used: (1) dried at 250°C; (2) dehydrated at 800°C; (3) impregnated at 180°C in vacuo with trimethyl chlorosilane. The adsorption isotherms rise sharply and the adsorption reaches its limiting value even at low concentrations. There was no difference between samples (1) and (2), but sample (3) adsorbed only half the PDMS as compared with samples (1) and (2). Based on the paper by R. Perkel, R. Ullman (J. Polym. Sci., 54, 127 (1961)) it was found that PDMS adsorption is almost identical on glass and aerosil. The calculated values are:  $\alpha = 1800$  molecules PDMS per  $\mu^2$  glass,  $\alpha = 1400$  molecules PDMS per  $\mu^2$  aerosil. The area  $\omega = 1/\alpha$  occupied by one macromolecule is  $50,000 \text{ \AA}^2$  for glass and  $60,000 \text{ \AA}^2$  for aerosil. From the thickness  $\tau$  of the adsorption

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Adsorption of dissolved ...

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layer,  $\tau = v_m / \omega$ , where  $v_m = 640,000 \text{ \AA}^3$  is the volume of one molecule,  $\tau$  was calculated to be 10  $\text{\AA}$  whereas the value obtained from the Van der Waals model of the stretched PDMS molecule is 7  $\text{\AA}$ . Therefrom it is concluded that the coiled PDMS molecules decoil when they are adsorbed and form a dense monomolecular layer. PDMS adsorption tests with molecular sieve 13X yielded low adsorption values, although the diameter of the channels of the zeolite is 10  $\text{\AA}$ . Presumably, the PDMS molecules cover the outer surface of the molecular sieve and are no longer able to penetrate into the channels. There are 3 figures.

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

PRESENTED: November 16, 1962, by A. N. Frumkin, Academician

SUBMITTED: November 16, 1962

Card 2/2

ZHDANOV, S.P.; KISELEV, A.V.; LYGIN, V.I.; TITOVA, T.I.

Change of the infrared spectrum of zeolites X during their thermal treatment in vacuo. Dokl. AN SSSR 150 no.3:584-587 My '63. (MIRA 16:6)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova i Institut khimii silikatov AN SSSR. Predstavleno akademikom A.N. Frumkinym.

(Zeolites—Absorption spectra)



KISELEV, A. V.; LYGIN, V. I.

"Infra-red spectroscopy of solid surfaces and adsorbed molecules."

report submitted for presentation at the Intl Conf on Physics & Chemistry of  
Solid Surfaces, Providence, 21-26 Jun 64.

KISELEV, A. V.

"Gas Chromatographic Study of the Influence of the Geometry and Chemistry of Silica Surfaces on Their Separating and Adsorption Properties."

Report to be submitted for the Second International Symposium on Advances in Gas Chromatography, Houston, Texas 23-26 March 1964.

24c

U 47304-35 EWT(m)/EPA(w)-2/EWA(m)-2 Pab-10 IJR(c) GS

ACCESSION NR: AT5007921 S/0000/64/000/000/0274/0287 <sup>66</sup><sub>64</sub> <sup>B+1</sup>

AUTHOR: Bayyer, V. N.; Blinov, G. A.; Bondarenko, L. N.; Yerozolimskiy, B. G.; Korobeynikov, L. S.; Mironov, Ye. S.; Naumov, A. A.; Onuchin, A. P.; Panasyuk, V. S.; Popov, S. G.; Sidorov, V. A.; Sil'vestrov, G. I.; Skriniskiy, A. N.; Khabakhpashev, A. G.; Auslender, V. L.; Kiselev, A. V.; Kushnirenko, Ye. A.; Livshits, A. A.; Rodionov, S. N.; Synakh, V. S.; Yudin, L. I.; Abramyan, Ye. A.; Vasserman, S. B.; Vecheslavov, V. V.; Dimov, G. I.; Papadichev, V. A.; Protopopov, I. Ya.; Budker, G. I.

TITLE: Colliding electron-electron, positron-electron, and proton-proton beams

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963. Trudy. Moscow, Atomizdat, 1964, 274-287

TOPIC TAGS: high energy interaction, high energy plasma, particle physics, particle beam, charged particle beam

ABSTRACT: In the Institute of Nuclear Physics, Siberian Department, Academy of Sciences SSSR, programs on high-energy particle physics are mainly concerned with work on colliding charged particle beams. The Institute considers it unsuitable

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Z 147304-65  
ACCESSION NR: AT5007921

for its purpose to install huge accelerators whose construction requires large resources outlaid and long time. For work on colliding electron-electron, positron-electron, and proton-proton beams, three installations are being built, which are in various stages of readiness. Work on colliding electron beams was conducted at the institute (then a laboratory of the Institute of Atomic Energy, Acad. I. V. Kurchatov) in the Fall of 1956, after Kerst's report on accelerators with colliding proton beams of the FFAG type. By that time Soviet scientists had already acquired some experience in obtaining large electron currents; in particular, the mentioned laboratory had installed and then abandoned a device for the spiral storage of electrons (G. I. Budker and A. A. Naumov, CERN Symposium, 1, 76 (1956)), by which, subsequently, circulating currents of the order of 100 amperes were obtained. In 1957 two variants of this device were considered at the same time. The first one consisted of two accelerators with spiral storage and subsequent transition of the particles to synchrotron state in comparatively narrow paths. The second one had storage rings with constant magnetic field and frequent external injection because of the damping of the oscillations under the action of radiation. The first variant was more cumbersome; the second variant contained an element not developed at that time, namely a 100-kilovolt commutator of 10 kilo-amperes with nanosecond front. At the end of 1957, the first positive results were obtained

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