General
Chem. - 4

CA

Poisoning of platinum catalysts with low contents of the active metal on a carrier, in dehydrogenation catalysis. Kh. M. Minachev, N. I. Shuikin, and I. D. Rozhdestvenskaya (Inst. Org. Chem. Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1952, 603-15.—Dehydrogenation of cyclohexane was run, without externally fed H_2, on 2.5 g. of catalysts contg. 3.21, 1.41, 0.63, and 0.27% Pt on activated C, reduced in H_2 4 hrs. at up to 310°; the feed rate of cyclohexane in all expts. was 0.5 ml./5 min. (space velocity 0.65 l./l. catalyst/hr.). In the absence of poisons, the gas evolved in the temp. range 473-520° was 98.5% H_2 over the whole duration of the runs (45-100 min.); consequently, the amt. (ml.) of H_2 evolved is taken as the rate v of the reaction. From rectilinear plots of log z (degree of conversion) as a function of $1/T$, the activation energies E, in the above order of decreasing Pt contents, are 14.8, 15.2, 17.4, 18.1 kcal./mole, and the frequency factors $k_0 = 3.28 \times 10^9$, 1.66×10^9 (?), 8.88×10^9, 1.07×10^9. Evidently, the no. of active centers increases with decreasing amt. of Pt in the catalyst, whereas their activation energy increases. Poisoning was done at 280°; each expt. was continued only as long as there was no H_2S in the outgoing gas, i.e. as long as there was an assurance that all the org. S introduced was held by the catalyst. The poisons used were: PrSH, iso-AmSH, thiophene, thiophane, Et_2S, $(iso\text{-}Am)_2S$, H_2S, and CS_2; they were introduced by portions of 0.0005 g./2.5 g. (10 ml.) catalyst. With 3.21% Pt, the 1st 3 portions of any of these poisons did not practically change its z, but each following portion reduced the activity by about 6-10%; however, the activity remained significant even after 11 portions. The different poisons have about the same action, except that on 3.21% Pt, PrSH, iso-AmSH, and thiophene, lower the activity more rapidly than do the other poisons. The degree of poisoning with any of these org. sulfides in about the same as with H_2S, at equal S contents; this suggests that possibly the catalyst splits H_2S off each of these org. sulfides, and the actual catalyst poison is H_2S. The amt. of S necessary to exert a poisoning effect is high; 6-7% S (of the wt. of the Pt) is necessary to reduce the activity by 70-80%, which corresponds to 1 atom S/3 atoms Pt. This is true for Pt on C; on other carriers, the same poisoning effect is brought about by relatively smaller amts. of S. Pt on SiO_2 gel is poisoned more easily than is Pt on C, and Pt on ultraporous glass even more easily; 1% Pt on SiO_2 gel is poisoned by 0.0022 g. S, as against 0.0055 g. S for Pt on C. This poisoning effect bears practically only on a decrease of K_0, with E remaining practically unaffected. Poisoning of 1.08% Pt on porous glass required only 0.0020 g. S. The relatively low susceptibility of Pt on C to poisoning is attributed to its large sp. surface area. The poisoned catalysts showed undiminished catalytic activities at temps. lower than or equal to the temp. at which the poisoning was done; lowered activity was observed only at highter temps. The activation

over

energies of all poisoned catalysts were practically the same as before poisoning; only K_0 is decreased, by a factor of 4.3-22.4. The lattice structure (by x-rays) of the Pt catalysts remains unchanged after the poisoning. The activity of the poisoned Pt on C catalysts can be easily and almost fully restored by passing cyclohexane at 300°. The activity of Pt on SiO_2 gel can be restored only to the extent of 84%. and Pt on porous glass cannot be regenerated at all. Poisoning by CO was investigated on the 1.41% Pt catalyst on C. At 280°, 91.4 ml. CO passed over the catalyst in a mixt. with cyclohexane reduced the activity of the catalyst one-half, and greater amts. of CO brought about a further lowering by 10-12%; still greater amts. had no further effect. At 300°, only the 1st portion of poison is effective. Catalysts poisoned by CO can be easily and fully regenerated by passing small amts. of cyclohexane. N. Thon

MINACHEV, Kh. M.

25T7

25T7 USSR/Chemistry - Nickel Catalysts Jan/Feb 53

"The Hydrogenating and Dehydrogenating Capability of Nickel Catalysts on Different Carriers," N. I. Shuykin,① Kh. M. Minachev and② L. M. Feofanova,③ Inst of Org Chem, Acad Sci USSR

Iz Ak Nauk SSR, OKhN, No 1, pp 96-99

The authors studied the hydrogenating and dehydrogenating capability of a series of nickel catalysts in relation to the amount of finely-dispersed nickel in the catalyst, and to the nature of the carrier. They demonstrated that the most active nickel catalysts were obtained when Al_2O_3, ZnO and Cr_2O_3 were used as carriers; nickel deposited on ferric oxide is not suitable as a catalyst for hydrogenation and dehydrogenation. The authors also detd that catalysts on carriers with a percentage of nickel up to 20% do not effect the splitting of cyclohexane below 350°.

MINACHEV, Kh. M.

① 12

Hydro- and dehydrogenation of hydrocarbons in the presence of ruthenium and rhodium catalysts with a low content of the metal. Kh. M. Minachev, N. I. Shuikin, and I. D. Rozhdestvenskaya (N. D. Zelinskii Inst. Org. Chem., Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1954, 338-43.—The activity of 1% Ru-Al_2O_3, 1% Ru-C, 1% Rh-Al_2O_3, and 1% Rh-C catalysts was examd. in hydrogenation and dehydrogenation reactions involving C_6H_6, cyclohexane, 1-methylcyclopentene, and 1-octene. Rh catalysts were active in dehydrogenation even at 300°, while at 340-60° they gave 92-5% yield of benzene; Ru was less active. In hydrogenation reactions both types were close to Pt in activity. For dehydrogenation of cyclohexane the activation energy of Rh-C was 16,800 cal./mole, with K_0 1.44×10^8, while Ru-C had 30,200 and 1.77×10^{11}, resp. X-ray examn. of the catalysts showed that Ru-C gave only one weak band for $d = 2.06$ A.; Ru-Al_2O_3 gave $d = 2.12$, 1.91, and 1.37 A. Rh-C gave only one weak band for $d = 2.04$ A.; Rh-Al_2O_3 gave $d = 2.14$, 1.92, and 1.38 A. In all cases the bands were wide, indicating high order of dispersion. G. M. Kosolapoff

Minachev, Khm.

USSR/Chemistry - Catalytic conversion

Card 1/2 Pub. 40 - 17/27

Authors : Minachev, Kh. M.; Shuykin, N. I.; Feofanova, L. M.; Treshchova, E. G. and Yudkina, T. P.

Title : Conversions of n-heptane in presence of metals of the Pd group at high temperatures and hydrogen pressures

Periodical : Izv. AN SSSR. Otd. khim. nauk 6, 1067-1074, Nov-Dec 1954

Abstract : The conversions of n-heptane over Ru, Rh, Pd and Pt contacts deposited on silica gel was investigated at hydrogen pressures of 20 at, and temperatures of 460°. It was found that the n-heptane, subjected to above described conditions, experiences several deep conversions with a part of it undergoing complete dehydrocyclization.

Institution : Acad. of Sc.; USSR, The N. D. Zelinskiy Institute of Org. Chemistry

Submitted : February 17, 1954

Priodical : Izv. AN SSSR. Otd. khim. nauk 6, 1067-1074, Nov-Dec 1954

Card 2/2 Pub. 40 - 17/27

Abstract : Benzene and xylenes (in addition to toluene) paraffinic part of the catalysate revealed hydrocarbons of the iso-structure (C_5-C_7). The catalysis products of n-heptane over Ru-SiO_2 showed considerable amounts of methylcyclohexane. Eleven references: 8 USSR, 2 English and 1 German (1903-1953). Tables; graph; drawing.

MINACHEV, Kh. M.

AID P - 1121

Subject : USSR/Chemistry

Card 1/1 Pub. 119 - 4/5

Authors : Minachev, Kh. M. and Shuikin, N. I. (Moscow)

Title : Metals of group VIII as catalysts in conversion of hydrocarbons

Periodical : Usp. khim., 23, no. 6, 737-765, 1954

Abstract : Preparation of catalysts, effect of various factors on their activity, and catalytic conversion of various hydrocarbons based on the work of Zelinskiy and his followers are reviewed. Six tables, 1 diagram, 196 references (157 Russian: 1911-1953).

Institution : None

Submitted : No date

MINACHEV, Kh.M.

3

USSR

The poisoning of nickel catalysts on carriers under the conditions of dehydrogenation catalysis. N. I. Shuikin and Kh. M. Minachev. *Doklady Akad. Nauk S.S.S.R.* 94, 105-8(1954); cf. C.A. 48, 4940h.—The nature of the poisoning of Ni-ZnO and Ni-Al_2O_3 catalysts was studied in dehydrogenation catalysis. Thiophene was used as the poisoning material. Both the activity for the dehydrogenation of cyclohexane and the poisoning were detd. at 285° with a flow rate of the cyclohexane (or the mixt. of cyclohexane and thiophene) of 0.34 l./l. of catalyst. Almost all of the S introduced as thiophene was bound to the catalyst. The Ni-ZnO catalyst required 6 times as much S to decrease its activity as did the Ni-Al_2O_3; this indicates that the S reacts with the carrier as well as with the active metal. This fact is discussed in terms of the lattice parameters of the catalyst.

J. Rovtar Leach

MINACHEV, KH.M.

11

⑤

Transformations of ethylcyclopentane in the presence of Ru and Pd catalysts under hydrogen pressure in a flow system. N. I. Shuikin, Kh. M. Minachev, E. D. Tulupova, and Yu. P. Egorov (N. D. Zelinskii Inst. Org. Chem., Acad. Sci., U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* 95, 1211–14(1954).—Passage of ethylcyclopentane under 20 atm. H at 400° over catalysts composed of Pd-SiO_2, Pd-Al_2O_3, Ru-SiO_2, and Ru-Al_2O_3 resulted in the following data. Pd and Ru on Al_2O_3 yield much aromatic material, while the same substances on SiO_2 either yield no aromatics or at most a small amount of them. Ru-SiO_2 was most effective in cleavage of the cyclopentane ring. The following changes were observed in the reaction products: the initial ethylcyclopentane undergoes extensive ring expansion to a 6-membered ring, along with dehydrogenation to MePh; along with this, considerable hydrogenolysis takes place with formation of *n*-heptane and isomerization to 1,2- and 1,3-dimethylcyclopentanes (mostly trans isomers). G. M. K.

USSR/Chemistry - Conversion processes

Card 1/1 Pub. 22 - 29/56

Authors : Minachev Kh. M., Memb. Corresp. of Acad. of Sc. USSR.; Shuykin, N. I.; Tulupova, E. D.; and Yegorov, Yu. P.

Title : Conversions of ethylcyclopentane in the presence of Rh and Pt-catalysts unde hydrogen pressure in a flowing system

Periodical : Dok. AN SSSR 99/5, 777-780, Dec 11, 1954

Abstract : The experimental data obtained during the catalysis of ethylcyclopentane over Rh - Al_2O_3, Pt - Al_2O_3 and Pt - SiO_2 under conditions as described in the title, are presented. The specific characteristics of Rh deposited on Al_2O_3 and Pt on SiO_2 during ethylcyclopentane conversions, are described. The catalyzates obtained, after determining their specific weight, index of refraction and aromatic hydrocarbon content were subjected to rectification for the purpose of separating the hydrocarbons. Physico-chemical analysis o ethylcyclopentane cat-conversion products showed that this hydrocarbon isome izes when in contact with Rh - Al_2O_3 with the expansion into a six-membered cycle and finally dehydrogenates into toluene. Five USSR references (1934-1954). Tables; graph.

Institution : Acad. of Sc. USSR, The N. D. Zelinskiy Institute of Organic Chemistry

Submitted : July 20, 1954

SHUYKIN,N.I.; [redacted]; FEOFANOVA,L.M.; TRESHCHOVA,Ye.G.; YUDKINA,
T.P.; [redacted]

Conversions of methylcyclohexane in contact with metals of the palladium group in flow and at increased temperature and increased hydrogen pressure. Izv.AN SSSR. Otd.khim.nauk no.3: 501-511 My-Je '55. (MIRA 8:9)

1. Institut organicheskoy khimii im. N.D.Zelinskogo Akademii nauk SSSR.

(Cyclohexane) (Catalysts, Platinum metals)

MINACHEV, Kh. M.

USSR/ Chemistry - Catalysts

Card 1/2 Pub. 22 - 23/52

Authors : Freydlin, L. Kh.; Tulupova, E. D.; Borunova, N. V.; Minachev, Kh. M.; and Shuykin, N. E. Memb. Corresp. of Acad. of Sc. USSR

Title : Selective increase of Ni-Al_2O_3 catalyst stability by compressing

Periodical : Dok. AN SSSR, 100/2, 283-286, Jan 11, 1955

Abstract : Investigation was conducted to determine the effect of two different organic substances on the stability of Ni-Al_2O_3 catalysts prior and after compressing the catalyst. The relative stability of the compressed and uncompressed catalysts was established by the change in their activity during dehydrogenation reactions of cyclohexane and narrow Maykop gasoline fractions.

Institution : Acad. of Sc. USSR, The N. D. Zelinskiy Institute of Organic Chemistry

Submitted : July 13, 1954

Periodical : Dok. AN SSSR, 100/2, 283-286, Jan 11, 1955

Card 2/2 Pub. 22 - 23/52

Abstract : It was found that compressing will increase the stability of an $Ni-Al_2O_3$ catalyst during the dehydrogenation of hydro-aromatic hydrocarbons in the presence of a poison-five-membered cyclene. In the case of poisoning with thiophene, which occurs according to a different mechanism, compressing shows no effect on the catalyst stability. Six USSR references (1926-1953). Graphs.

MINACHEV, KH. M.

USSR/ Chemistry - Dehydrogenation catalysts

Card 1/1 Pub. 22 - 28/51

Authors : Shuykin, N. I., Memb. Corresp. of Acad. of Sc., USSR.; Minachev, Kh. M.; and Ryashentseva, M. A.

Title : Active and stable Pd catalyst for dehydrogenation of six-membered cyclanes

Periodical : Dok. AN SSSR 101/1, 107-109, Mar 1, 1955

Abstract : The activity and stability of a newly produced catalyst (containing only 0.5% Pd) were tested on a benzene fraction dehydrogenated at 450-460°, 20 atm of hydrogen pressure and molar hydrogen - hydrocarbon ratio of 5 : 1. The throughput ratio was 1 liter/liter of the catalyst per hr. The results obtained are briefly described. The sulfur content of the benzene fraction showed no effect of the activity of the catalyst. Ten Russian and USSR references (1911-1954). Graph.

Institution : Acad. of Sc., USSR, The N. D. Zelinskiy Institute of Org. Chem.

Submitted : October 4, 1954

MINACHEV, KH. M.

USSR/Organic Chemistry - Synthetic Organic Chemistry, E-2

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61424

Author: Minachev, Kh. M., Shuykin, N. I., Feofanova, L. M., Yegorov, Yu. P.

Institution: ~~None~~ Inst. Organic Chem im N. D. Zelinskiy, AS USSR

Title: Conversions of n-Decane in the Presence of Platinized Alumina at Elevated Temperature and Hydrogen Pressure

Original Periodical: Izv. AN SSSR, Otd. khim. n., 1956, No 3, 352-357

Abstract: Investigated were contact-catalytic conversions of n-$C_{10}H_{22}$ in flow system over platinized alumina (Referat Zhur - Khimiya, 1956, 12800) at elevated temperature and H_2 pressure. n-$C_{10}H_{22}$ (BP 174.11°) prepared by Grignard reaction by action of C_3H_7CHO on C_6H_{13}[illegible]r, and subsequent dehydration of the formed sec-$C_{10}H_{21}OH$ over Al_2O_3 at 320° and hydrogenation of the reaction product in vapor phase in presence of 1% Pt/C at 210° and normal pressure. n-$C_{10}H_{22}$ was brought in contact with catalyst at space velocity 1.1 $hour^{-1}$, and molal ratio H_2:n $C_{10}H_{22}$ = 5:1, H_2 pressure 30-50 atm

Card 1/2

USSR/Organic Chemistry - Synthetic Organic Chemistry, E-2

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61424

Abstract: and temperature 460°. Catalyzates are characterized by $n^{20}D$ and d_4^{20} and content in aromatic hydrocarbons which were separated by adsorption on silica gel. n-alkanes were separated from isoalkanes by means of urea. Products of catalysis were subjected to spectral analysis in IKS-11 spectrometer (slit 0.2 mm, concentration of hydrocarbon in CCl_4 1:50 by volume). It was found that greatest changes on increase in number of CH_3-groups are observed at peaks 3.51, 3.42 and 3.38 μ. With increasing branching of hydrocarbon the first 2 peaks decrease and the third increases. From the magnitude of ratios 3.51:3.38 and 3.42:3.38 an opinion was formed of the extent of branching of the hydrocarbon. It was found that under the described conditions $n-C_{10}H_{22}$ undergoes a series of extensive conversions as a result of which are formed aromatic hydrocarbons 5 and 6-membered cyclanes and mono- and disubstituted isoalkanes $C_7 - C_{10}$. The content of monosubstituted decanes in the total mass of isodecanes is 70%.

Card 2/2

MINACHEV, KH. M.

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27 7

✓ **New palladium catalyst for dehydrogenation of cyclohexanes.** N. I. Shuikin and Kh. M. Minachev (*Rev. Inst. franç. Pétrole*, 1956, 11, 1611—1616).—Precipitated Al(OH)$_3$ is washed and dried at 130—140°, treated with aq. HF, calcined at 500° for 3 hr., powdered and pelleted. The pellets are impregnated with aq. PdCl$_2$, dried and treated at 110° with H_2 until no more aq. vapour is evolved. The catalyst contains Pd 0·6% and is an active, stable, and specific catalyst for the dehydrogenation of alkyl *cyclo*hexanes ... the catalyst increased the

the feed [illegible] of reference [illegible]
gas was 60% [illegible]

MINACHEV, Kh, M.

Addition of methyldichlorosilane and ethyldichlorosilane to allyl halides. V. A. Ponomarenko, B. A. Sokolov, Kh. M. Minachev, and A. D. Petrov. *Proc. Acad. Sci. U.S.S.R., Sect. Chem.* 106, 17-20(1956)(Engl. translation).—See *C.A.* 50, 13726e. B. M. R.

Chem

4

Minachev, Kh. M.

USSR/Chemistry - Organic chemistry

Card 1/1 Pub. 22 - 20/43

Authors : Ponomarenko, V. A.; Sokolov, B. A.; Minachev, Kh. M.; and Petrov, A. D. Memb. Corresp. of AN SSSR

Title : Addition of methyldichlorosilane and ethyldichlorosilane to allyl halides

Periodical : Dok. AN SSSR 106/1, 76-79, Jan 1, 1956

Abstract : The possibility of adding to allyl halides (allyl chloride, metalyl chloride etc) compounds more complex than silico-chloroform ($HSiCl_3$) - silane hydrides - such as methyldichlorosilane and ethyldichlorosilane in the presence of platinized carbon, was investigated. It was found that both silanes in the presence of platinized carbon containing 1% Pt at 160° attach themselves to the allyl- and metalyl chlorides forming homologous gamma-chloralkylalkyldichlorosilane. Other products formed as result of this addition reaction are described. Twenty-one references: 13 USA, 4 USSR, 3 Eng. and 1 French (1947-1955). Graphs.

Institution : Acad. of Sc., USSR, Inst. of Organ. Chem. im. N. D. Zelinskiy

Submitted : July 29, 1955

MINACHEV, KH. M.

7

Tr[illegible]mations of ethylcyclohexane in contact with palladium [illegible] in a flow system under elevated temperature [illegible] pressure of hydrogen. [illegible] Minachev, V. I. [illegible] and Yu. P. [illegible] Zelinskii Inst. Org. Chem. [illegible] Otdel. Khim. [illegible] ethylcyclohexane over Pd [illegible] atm. It resulted in dehydrogenation, hydro[illegible] side chain isomerization [illegible] ring contraction [illegible] ring opening of the [illegible]-membered ring [illegible] pressure [illegible]

Minachev, Kh. M.

7

Conversion of *n*-nonane in a flow system in the presence of platinized aluminosilicate and hydrogen at elevated temperature and pressure. Kh. M. Minachev, N. I. Shuikin, L. M. Feofanova, and Yu. P. Egorov (N. D. Zelinskii Inst. Org. Chem., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1957, 1218-22; cf. *C.A.* 50, 6327*b*.—A Pt aluminosilicate catalyst contg. 1% dispersed Pt was tested in a flow system for its action on C_9H_{20} at 400° and 360° in the presence of H at 20 atm. pressure. At 400°, 100% conversion is obtained with isomerization, hydrocracking, and dehydrocyclization predominating; when the temp. is lowered to 360° hydrocracking is reduced and the yield of isomeric alkanes amts. to about 63%. At 400° and a H pressure of 20 atm. the conversion over an aluminosilicate catalyst is only 14%, which indicates that promotion of the catalyst by Pt is useful for the reforming of gasoline. The following reaction products were isolated or detected: Me_2CHEt, *n*-C_5H_{12}, Me_3CEt, Me_2CHPr, $MeCHEt_2$, *n*-C_6H_{14}, methylcyclopentane, *n*-C_7H_{16}, $CH_2(CH_2CHMe_2)_2$, MePh, *o*-, *m*-, and *p*-xylenes, mesitylene, *m*- and *o*-$MeEtC_6H_4$, 1,2,4-$Me_3C_6H_3$, mono- and disubstituted alkanes C_9, CH_4, C_2H_6, and isomeric C_9H_{20}.

G. M. Kosolapoff

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4E3d

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MINACHEV, Kh.M.; SHUYKIN, N.I.; RYASHENTSEVA, M.A.; KONONOV, N.F.

Studying metal-oxide catalysts in gasoline reforming. Report No.1: Reforming a gasoline fraction of a boiling point of 96-114° of Il'skiy-Khodyzhenskiy petroleum with a platinum-silicon catalyst. Izv. AN SSSR Otd. khim. nauk no.10:1223-1228 O '57. (MIRA 11:3)

1. Institut organicheskoy khimii im. N.D. Zelinskogo AN SSSR.
(Petroleum--Refining)

62-12-7/20

AUTHORS: Minachev, Kh.M., Shuykin, N.I., Kononov, N.F., Garanin, I.L., Ryashentseva, M.A.

TITLE: The Investigation of Oxide-Metallic Catalyzers of Gasoline Reforming (Issledovaniye okisno-metallicheskikh katalizatorov reforminga benzinov). Information 2. The Reforming of Narrow Gasoline Fractions of the Ilsk Mineral Oil and of the Mineral Oil of the Second Baku by Means of Platinum Catalyzers (Soobshcheniye 2. Reformirovaniye uzkikh benzinovykh fraktsiy il'skikh neftey i neftey Vtorogo Baku na platinovykh katalizatorakh).

PERIODICAL: Izvestiya AN SSSR Otdeleniye Khimicheskikh Nauk, 1957, Nr 12, pp. 1472-1477 (USSR)

ABSTRACT: Recently, the problem of producting active and stable gasolines (with a view of obtaining aromatic hydrocarbons) has been attaining special importance. In previous works (4,5) it was shown that the catalyzer 0.5% Pt - Al_2O_3 has a favorable dehydrating and (with respect to isomers) efficacious activity. In the present paper the authors investigated the activity and stability of the catalyzer 0.5% Pt - Al_2O_3 under the conditions of the reformation of the fraction (boiling point $95-115^{\circ}$) of the mineral oil of Ilsk. It was proved that, specially selected conditions prevailing, the catalyzer

Card 1/2

The Investigation of Oxide-Metallic Catalyzers of Gasoline Reforming. Information 2. The Reforming of Narrow Gasoline Fractions of the Ilsk Mineral Oil and of the Mineral Oil of the Second Baku by Means of Platinum Catalyzers

62-12-7/20

retained its stability in the case of a sufficiently high activity (of up to 2000 hours). Furthermore, a comparative investigation was carried out concerning the properties of the two platinum catalyzers at the conditions of the reformation of the fraction (85-138°) of the mineral oil of the second Baku (Vtoroy Baku). In this connection it was found that the catalyzer 0.5% - Pt-Al_2O_3 is much more advantageous than the catalyzer 0.5% Pt-SiO_2. The advantage it offers consists in the greater yield of aromatic hydrocarbons as well as in a lower degree of gas formation. It was shown that the catalyzer 0.5% Pt-Al_2O_3 is very well suited for reforming gasoline fractions (for the purpose of obtaining aromatic hydrocarbons). Besides, its hydrocracking properties are rather insignificant. There are 2 tables, and 10 references, 7 of which are Slavic.

ASSOCIATION: Institute for Organic Chemistry AN USSR imeni N.D.Zelinskiy (Institut organicheskoy khimii im.N.D.Zelinskogo Akademii Nauk SSSR).

SUBMITTED: June 29, 1956

AVAILABLE: Library of Congress

Card 2/2

1. Gasolene-Oxide-Metallic-Catalyzers 2. Mineral oil-Gasolene fractions-Platinum catalyzers

MINACHEV, KH. M.

AUTHORS: Minachev, KH. M.; and Kononov, N. F. (Moscow)

TITLE: Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen (Kataliticheskiye prevrashcheniya individual'nykh uglevodorodov i ikh estestvennykh smesey / benzinov i ligroinov / pod davleniyem vodoroda)

PERIODICAL: Uspekhi Khimii, 1957, Vol. 26, No. 2, pp. 176-211 (U. S. S. R.)

ABSTRACT: By means of tables, graphs, and extensive textual discussion, the author surveys the status of catalytic reforming of benzines and ligroins from petroleums of varying origin, permitting the output (in addition to fuel) of a considerable number of aromatic hydrocarbons: benzene, toluene, ethylbenzene, and xylenes. Development of petroleum processes in the U.S.A., Canada, Australia is described, wherein mention is made that about 60 installations are operating in the U.S.A. for catalytic reforming (a process which is second in importance only to catalytic cracking) with a total output of benzene and concentrates of aromatic hydrocarbons amounting to 95,000 cubic meters per day. For the U.S.S.R., the petroleum yield by 1960

Card 1/12

Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

should reach 135 million tons and the output of light oil products will be twice that of 1955. The antiknock qualities of Soviet automobile gasolines have been raised to 66 units only since the end of 1955. Reactions occurring during catalytic reforming are described.

The author's thesis is to explain the state of the problem of the catalytic conversions of hydrocarbons (C_5 and higher) and their natural mixtures under the pressure of hydrogen on the basis of studies published in the last several years. The author's study is based mostly on British and American sources. The general topics under which this thesis is developed are underlined and explained below.

Conversions of Individual Hydrocarbons over Oxide-metallic and Oxide Catalysts with an Increased Pressure of Hydrogen in the Flowing System. Seven U. S. patents on this subject are cited and described.

Card 2/12

Catalytic Conversions of Individual Hydrocarbons and Their Natura
Mixtures (Gasolines and Ligroins) under the Pressure of
Hydrogen

The effect of various factors (including sulfurous compounds in the crudes) upon the catalytic properties of oxide-metallic and oxide catalysts is presented (see captions to Table 3, below). The effect of an increased partial pressure of hydrogen and of temperature variation was studied (Ref. 47) in the case of a conversion of cyclohexane 4-methylcyclohexene and 1-methyl-4-isopropylcyclohexene in the presenc of an Ni catalyst on kieselguhr. At pressures from 1-42 atmospheres and temperatures from 230-290°, these hydrocarbons were subjected to hydrogenation and hydrogenolysis accompanied by the isomerization of the skeleton.

Conversions of Individual Hydrocarbons of Various Classes. The substitution of one hydrogen in the cyclohexane ring into the methyl group promotes the increase of the dehydrogenation speed while a replacement of the hydrogen by the ethyl group decreases the speed of this reaction. The relationship of the reactions depends greatl on the parameters of the process and the nature of the catalyst.

Card 3/12

Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

The transformation rate of alkylcyclopentanes in aromatic hydrocarbons apparently is fixed by the rate of their isomerization (further details under table captions below). Of particular interest is the formation of 1.1 dimethyl cyclopentane from methylcyclohexane and of 1,1,2 trimethyl cyclopentane from ethyl cyclohexane; the mechanism of these conversions is as yet unexplained.

Normal alkanes and isoalkanes. The catalytic conversions of alkanes
flowing system under pressure of hydrogen at increased temperatures i
the presence of bi-functional catalysts are accompanied by reactions
dehydrocyclization and of hydrocracking, resulting in derivation of
paraffins with reduced molecular weight both of normal and of iso-
structure. Influence of hydrogen pressure upon other reactions is
described. One conclusion drawn from the isomerization of n-pentane
n-hexane, n-heptane and n-octane is that the t° required for obtai
the same degree of conversions decreases with the icrease of the
carbon chain (more details in Table 14). The presence of five-
membered cyclanes in catalyzates shows that their (the cyclanes')
formation takes place not only at atmospheric pressure and at

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Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

temperatures of 300-315° on platinized carbon containing 20% Pt but also under considerably diverging conditions of the process (t°, pressure, volumetric speed and the nature of the catalyzer).

Aromatic Hydrocarbons. Results of studies of conversions of aromatic hydrocarbons under conditions of catalytic reforming showed that the basic reactions in this case are the demethylation or the very redistribution of substitutes. Chemical rings are presented to show the conversion of hydrocarbons, N. I. Shuykin and associates (59) investigated the behavior of propyl- and isoprophl-benzenes in the presence of nickel deposited on an activated oxide of aluminum under various hydrogen pressures (25-50 atmospheres) and temperatures ranging from 350-464°. A 98% degree of conversion of the hydrocarbons was realized. Five and six-membered cyclanes and paraffin hydrocarbons of both normal and iso-structure were also discovered in the catalyzates. The equilibrium content of p-xylene in mixture with its other isomers and with ethyl-benzene at 482° equals about 20% (more data in Table 15).

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Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

Conversions of Natural Mixtures of Hydrocarbons (of benzine and ligroin fractions). Catalytic reforming (mainly platforming) has obvious advantages in respect to outputs of catalyzates and to its antiknock qualities (Fig. 11). The conversion of hydrocarbon mixtures is more complex than that of individual hydrocarbons. The speeds of some of the pertinent reactions were studied and the reactions can be listed as follows in order of decreasing speed: dehydrogenation, isomerization, hydrocracking, and dehydrocylisation.

The author also gives details under the following points: effect of the composition of crudes and effect of parameters of the process upon the reforming of benzines (chemical composition of crude is presented) commercial realization of the processes of catalytic reforming. Thes processes are divided into three groups: 1. unregenerative processes being accomplished on a fixed catalyst at relatively high pressures; 2. regenerative processes being realized at relatively high pressures and 3. regenerative processes being realized at relatively low pressures on non-platinized moving powder-like or coarsegrained cata

Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

Abbreviated captions of the figures and tables are as follows (in order of occurrence in text):

Table 1: Aromatic hydrocarbon production by the platforming method.
Fig. 1: Growth of U.S. xylene production.
Fig. 2: Conversion of *n*-hexane in presence of various metals (graph).
Fig. 3: Conversion of *n*-hexane in presence of salts of nickel.
Table 2: Value of specific surface of catalysts and carriers.
Table 3: Effect of sulfurous compounds upon aromatization of methyl cyclopentane and cyclohexane (the compounds for which data are given are hydrogen sulfide, diethyl sulfide, and phenyl mercaptan).
Fig. 4: Effect of partial hydrogen pressure on the activity of a ca of platforming.
Fig. 5: Effect of sulfur content on the activity of the platforming catalyst.

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Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

Table 4: Effect of catalyst type and hydrocarbon structure upon composition of catalyzates.

Table 5: Isomerization of n-pentane on bi-functional catalysts.

Fig. 6: Effect of catalyst grain size on depth of conversion of n-heptane (conditions of experiment: 496°, 14.3 atm., $5H_2$: HC.)

Fig. 7: Effect of Ni content upon the output of n-hexane isomers with t° of 290°, 320°, 350°, 380° and 410°.

Fig. 8: Same as for Fig. 7, but upon the output of methane (same t° as Fig. 7).

Table 6: Comparative dehydrocyclization activity of various catalysts.

Table 7: Depth of isomerization of n-pentane in dependence on metal content in catalyst (at 427°).

Table 8: Composition of catalyzates obtained from conversions of five- and six-membered cyclanes over Pt-Al_2O_3 (460°, pressure 15-20 atm.).

Table 9: Isomerization of five- and six-membered cyclanes over nickel-alumino-silicate catalysts.

Table 10: Content of aromatic hydrocarbons in catalyzates obtained during the conversions of methyl cyclohexane and ethyl cyclopentane over various catalysts.

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Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

Table 11: Content of products of isomerization and hydrocracking of ethylcyclopentane in naphthenic-paraffinic part of the catalyzate (t° 460°, pressure 20 atm.)

Table 12: Content of aromatic hydrocarbons in catalyzates obtained durin the dehydrogenation of cyclohexane and methylcyclohexane (at t° of 427°, 482°, 510°, 427°, 510°, pressures of 21 and 42 atm.).

Table 13: Products of conversions of normal alkanes.

Table 14: Isomerization of hydrocarbons on a standard nickel catalyst (at pressure of 24.8 atm. and temperatures ranging from 256° -412°).

Fig. 9: Isomerization of n-pentane over an oxide-molybdic catalyst for various ratios of H_2 :HC.

Fig. 10: Isomerization of n-pentane over an oxide-molybdic catalyst at various pressures (0 to 72 atm.) to (t° = 440°).

Table 15: Isomerization of mixture of xylenes (t° = 482°, pressure = 12. atm.).

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Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

Fig. 11:	Outputs of gasolines plotted against their octane qualities.
Table 16:	Transpiration rate of various reactions during the conversion of n-heptane. Catalyst 0.6% Pt-Al_2O_3. T° = 468°, 496°, pressures = 14, 25, and 35 atm.
Fig. 12:	Dependence between yields of catalyzates and initial boiling point of the starting material. The y-axis shows the yield of liquid catalyzate in %; the x-axis, the t° of start of boiling of the starting material.
Table 17:	Characteristics of the crude (data taken from the exposure to reforming of ligroins of both mixed and paraffin bases).
Table 18:	Characteristics of a (platformate?).
Table 19:	Effect of t° on results of reforming (artificial mixture).
Table 20:	Effect of t° on results of reforming.
Table 21:	Effect of t° on results of refoming.
Table 22:	Heats of dehydrogenized naphthenes.
Fig. 13:	Graph showing equilibrium of dehydrogenization of methylcyclohexane.

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Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

Fig. 14: Graph showing equilibrium of dehydrogenization of cyclohexane.
Fig. 15: Graph showing equilibrium of dehydroisomerization of methylcyclopentane-cyclohexane-benzene.
Table 23: Influence of pressure on results of reforming (straight-run gasoline at t° of 119-207°).
Table 24: Influence of pressure on results of reforming (synthetic gasoline at t° of 131-197°).
Fig. 16: Effect of output rate upon degree of conversion of n-hexane at a varying temperature.
Table 25: Effect of rate of output of starting material upon results of reforming (ligroin of mid-continental oil, fraction 110-202°).
Table 26: Effect of output rate of starting material on results of reforming (synthetic gasoline at 131-197°).

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Catalytic Conversions of Individual Hydrocarbons and Their Natural Mixtures (Gasolines and Ligroins) under the Pressure of Hydrogen

The chief points contributed by the cited references are outlined above, but several specific personalities are as follows: F. G. Ciapetta and J. B. Hunter (21) who described a method for preparation of oxide-metallic catalysts; N. I. Shuykin and K. M. Minachev, with their associates, who prepared catalysts for studying the conversions of ethyl cyclopentane, methyl cyclohexane and n-heptane; and H. Heinemann and associates who studied the effect of various sulfurous compounds upon catalysts of hydroforming. There are 93 references, 33 of which are Slavic.

ASSOCIATION:

PRESENTED BY:

SUBMITTED:

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Card 12/12

MINACHEV, KH. M.

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8

A study of some metals of group VIII as catalysts in the reaction of addition of alkyldichlorosilanes to unsaturated compounds. A. D. Petrov, Kh. M. Minachev, V. A. Ponomarenko, B. A. Sokolov, and G. V. Odabashyan (N. D. Zelinskii Inst. Org. Chem., Acad. Sci. U.S.S.R., Moscow). Doklady Akad. Nauk S.S.S.R. 112, 273-5(1957);

4E4j —1

4E3c —1

2 MAY

through intermediate formation of EtSiCl$_3$.

AUTHORS: Minachev, Kh. M., Shuykin, N. I., Feofanova, L. M., Yegorov, Yu. P. 62-2-7/28

TITLE: Transformations of n.Hendecane in the Presence of Some Metals of the EighthGroup Under Hydrogen Pressure in a Flow-System (Prevrashcheniya n.undekana v prisutstvii nekotorykh metallov vos'moy gruppy pod davleniyem vodoroda v protochnoy sisteme).

PERIODICAL: Izvestiya AN SSSR Otdeleniye Khimicheskikh Nauk, 1958, Nr 2, pp. 174-180 (USSR).

ABSTRACT: The results of the contact-catalytic transformations of n.heptane and n.decane in the presence of some metals of the eighth group were described in the reports already published. These conversions took place under hydrogen pressure and at raised temperatures. The authors continued their investigations in this field and in the present paper deal with the investigation of the behavior of n.hendecane on Pt-, Pd- and Ni-catalysts. Papers on the investigation of the conversions of high-molecular alkanes are almost completely absent in publications. This is mainly to be explained by the fact that investigations in this direction meet with great difficulties due to the absence of chemical and physical methods for the

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Transformations of n.Hendecane in the Presence of Some Metals of the Eighth Group Under Hydrogen Pressure in a Flow-System. 62-2-7/28

analysis of the hydrocarbon mixtures obtained by the conversions. In the present paper the authors report on the investigation of the catalytic properties of finely dispersed palladium, platinum and nickel, separated in small concentrations on aluminum oxide in the conversions of n.hendecane at 350-450°C under hydrogen pressure (20 at. excess pressure) in a flow-system. It was found that the degree of conversion of the initial hydrocarbon is to a considerable extent dependent on the type of catalyst. It was further shown that under the assumed conditions the fundamental direction of the conversions of n.hendecane are the reactions of isomerization, hydrocracking and partial dehydrocyclization. Finally the problem concerning the ways of formation of aromatic hydrocarbons from n.hendecane was examined. There are 4 tables, and 6 references, 5 of which are Slavic.

ASSOCIATION: Institute for Organic Chemistry imeni N.D. Zelinskiy AN USSR (Institut organicheskoy khimii imeni N.D. Zelinskogo Akademii nauk SSSR).

SUBMITTED: August 28, 1956

AVAILABLE: Library of Congress

Card 2/2

1. **Palladium-Catalytic properties** 2. **Platinum-Catalytic properties** 3. **Nickel-Catalytic properties** 4. **n-Hendecane-Transformations**

62-58-3-8/30

AUTHORS: Minachev, Kh. M., Shuykin, N. I., Feofanova, L. M.

TITLE: Reactions of n.Heptane on Oxide-Metallic Catalysts Under Hydrogen Pressure in a Flow-System (Prevrashcheniya n.gepta na okisno-metallicheskikh katalizatorakh pod davleniyem vod roda v protochnoy sisteme)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh Nauk, 1958, Nr 3, pp. 305 - 308 (USSR)

ABSTRACT: The experimental data on the investigations of the reaction of the 6- and 5-membered cyclanes and n.alkanes in contact with oxide-metallic catalysts were already given in a numbe of previous papers. These investigations also yielded determinations of interesting rules governing the catalytic properties of the metals of the 8th group. In the present paper the authors discuss the results obtained in the investigation of the reactions of n.heptane on Pt, Pd and Rh as well as the experimental data. Of special interest is th statement that simultaneous with the formation of aromatic

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62-58-3-8/30

Reactions of n-Heptane on Oxide-Metallic Catalysts Under Hydrogen Pressure in a Flow-System

and isoparaffinic hydrocarbons a dehydrocyclization of n.hep tane with ring closure (5-membered cycle) was observed. The properties of the products of catalysis of n-heptane, obtained in contact with Pt, Rh as well as alumina catalysts are given in a table. There are 1 table, and 10 references, 9 of which are Soviet.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute for Organic Chemistry imeni N. D. Zelinskiy, AS USSR)

SUBMITTED: October 18, 1956

Card 2/2

MINACHEV, Kh. M.

62-58-4-7/32

AUTHORS: Minachev, Kh. M., Shuykin, N. I., Ryashentseva, M. A.,
Kononov, N. F., Kurdyumova, I. N.

TITLE: Investigation of the Properties of Metal-oxide Catalysts
for Gasoline Reforming (Issledovaniye svoystv okisno-
metallicheskikh katalizatorov reforminga benzinov). Commu-
nication 3: Conversions of the Gasoline Fraction at the
Boiling Point 89,5-126° of the Second Baku Petroleum on
Palladium Catalyst (Soobshcheniye 3. Prevrashcheniya
fraktsii s t.kip. 89,5 -126° benzina neftey vtorogo Baku na
palladiyevom katalizatore)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh Nauk,
1958, Nr 4, pp. 428 - 436 (USSR)

ABSTRACT: The previous papers (References 1,2) contained the data
found in the investigation of the gasoline fractions of
some petroleum types. The influence of the chemical propertie
of the carrier on the activity of the catalyst was already
described in earlier works. This paper gives the experimental
material of the authors. In the presence of 2 different sampl

32-[illegible]-4-7/32

Investigation of the Properties of Metal-oxide Catalysts for Gasoline Reforming. Communication 3: Conversions of the Gasoline Fraction at the Boiling Point 89,5 - 126° of the Second Baku Petroleum on Palladium Catalyst

of a palladium catalyst 0,5% Pd - Al_2O_3 which are different by their working methods the reforming of the fraction (boiling point 85,5 - 126°) was carried out at 470 - 480° C at 20 atmospheres excess pressure. The experiment showed that both samples of the catalyst carry out the dehydrogenation of 6-membered cyclanes as well as the conversion of 5- membered cyclanes into 6- membered ones (with their subsequent dehydrogenation). In the presence of the second experimental catalyst numerous 5-membered cyclanes and paraffines joined the process of formation of aromatic hydrocarbons. This process is still more intensive in the presence of catalyst n.2 than in that of n.1. Moreover the catalizate n.2 distinguishes itself by the richer content of ramified paraffines.

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62-58-4-7/32

Investigation of the Properties of Metal-Oxide Catalysts for Gasoline Reforming. Communication 3: Conversions of the Gasoline Fraction at the Boiling Point 89,5 - 126° of the Second Baku Petroleum on Palladium Catalyst

Furthermore the composition of the initial fraction and of two catalysts were determined by means of a combined method. There are 1 figure ,7 tables,and 2o references, 13 of which are Soviet.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute for Organic Chemistry imeni N. D. Zelinskiy, AS USSR)

SUBMITTED: November 3, 1956

AVAILABLE: Library of Congress

1. Petroleum-Gasoline fractions--Analysis 2. Metal oxide catalysts--Properties

Card 3/3

AUTHORS: Minachev, Kh. M., Shuykin, N. I., SOV/62-58-6-11/37
Ryashentseva, M. A., Kononov, N. F.

TITLE: Investigation of the Properties of Metal-Oxide Catalysts of Gasoline Re-Forming (Issledovaniye svoystv okisnometallicheskikh katalizatorov reforminga benzinov) Communication 4. Re-Forming the Fraction With Boiling Point 89,5-126° of the Benzine of the Mineral Oils of the Volga-Ural Group on a Palladium Catalyst treated with hydrogen sulfide (Soobshcheniye 4. Reformirovaniye fraktsii s t. kip. 89,5-126° benzina neftey volzhsko-ural'skoy gruppy na palladiyevom katalizatore, obrabotannom serovodorodom)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk, 1958, Nr 6, pp. 719-725 (USSR)

ABSTRACT: The problem to be solved by this paper was the investigation of the activity and stability of a sulfurous palladium catalyst under the conditions of the re-formation of the fraction (boiling point 89,5 - 126°) of benzine obtained from the mineral oils of the Volga-Ural group. Under given conditions the catalyst carries out the dehydrogenation of

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Investigation of the Properties of Metal-Oxide SOV/62-58-6-11/37
Catalysts of Gasoline Re-Forming. Communication 4.
Re-Forming the Fraction With Boiling Point 89,5 - 126° of the Benzine of
the Mineral Oils of the Volga-Ural Group on a Palladium Catalyst
treated with hydrogen sulfide

6-membered cyclanes and, besides, also the dehydroisomerizati of 5-membered cyclanes, the skeleton isomerization of alkanes and the de-sulfurization of benzine. A catalyst consisting of 0,5% Pd on Al_2O_3, which had previously been treated with hydrogen sulfide, showed more resistivity against the effect of organic sulfurous compounds than palladium catalysts that had not yet been subjected to the action of hydrogen sulfide. The individual composition of the initial fraction was investigated. There are 1 figure, 6 tables, and 8 references 5 of which are Soviet.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy, AS USSR)

SUBMITTED: December 13, 1956

Card 2/3

Investigation of the Properties of Metal-Oxide Catalysts of Gasoline Re-Forming. Communication 4. Re-Forming the Fraction With Boiling Point 89,5-126° of the Benzine of the Mineral Oils of the Volga-Ural Group on a Palladium Catalyst treated with hydrogen sulfide

SOV/62-58-6-11/37

1. Metal oxides--Catalytic properties 2. Palladium catalysts--Performance 3. Hydrogen sulfide--Chemical effects 4. Benzenes--Synthesis 5. Mineral oils --Fractionation

Card 3/3

AUTHORS: ~~Minachev, Kh. M.,~~ Shuykin, N. I., Vinogradov, V. L.

SOV/62-58-7-12/26

TITLE: A Comparative Investigation of the Catalytic Properties of Platinum on the Conditions of Benzine Aromatization at Atmospheric and Increased Hydrogen Pressure (Sravnitel'noye izucheniye kataliticheskikh svoystv platiny v usloviyakh aromatizatsii benzina pri atmosfernom i povyshennom davleniya vodoroda)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk, 1958, Nr 7, pp 866 - 869 (USSR)

ABSTRACT: During the last years the authors of the present paper have dealt with the investigation of the catalytic properties of the Pt-, Pd-, Rh-, Ni- and Co catalysts (Refs 1-10). In the present paper the authors report on the investigation of the activity and stability of the 4% platinized charcoal on the conditions of the aromatization of the benzine fraction at atmospheric pressure and different temperatures. Furthermore the activity and the stability of 0,8% platinized charcoal w investigated on the same conditions as prevailing in the cas of the 4% one. The results of the investigations are: The

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A Comparative Investigation of the Catalytic SOV/62-58-7-12/26
Properties of Platinum on the Conditions of Benzine Aromatization at
Atmospheric and Increased Hydrogen Pressure

greatest activity and stability was found with the 0.8% catalyst Pt - C, which operated at 460° and at 20 atmospheres absolute pressure. It is of interest to learn that the two catalysts do not carry out any other reactions but the react of the dehydration of the 6-membered cycles. There are 1 figure, 1 table, and 15 references, 15 of which are Soviet.

ASSOCIATION: Institut organicheskoy khimii im.N.D.Zelinskogo(Institute of Organic Chemistry imeni N.D.Zelinskiy)

SUBMITTED: January 3, 1957

Card 2/2

SHUYKIN, N.I.; MINACHEV, Kh.M.; RYASHENTSEVA, M.A.

Producing aromatic hydrocarbons by dehydrogenation of narrow benzin fractions obtained in straight-run distillation. Dokl. AN Azerb. SSR 14:769-776 '58. (MIRA 11:11)

1. Institut organicheskoy khimii imeni N.D. Zelinskogo AN SSSR.
(Hydrocarbons) (Dehydrogenation)

SHUYKIN, N.I.; MINACHEV, Kh.M.; NOVIKOV, S.S.; KONONOV, N.F.; GARANIN, I.L.

Reforming straight-run gasolines by low-temperature dehydrogenation on platinized charcoal. Zhur.prikl.khim. 31 no.11:1732-1738 N '58.
(MIRA 12:2)

(Gasoline)

SHUYKIN, N.I.; MINACHEV, Kh.M.; GARANIN, I.L.; NOVIKOV, S.S.; KONONOV, N.F.

Production of toluene concentrates from petroleum fractions by low-temperature dehydrogenation on platinated charcoal. Zhur.prikl.khim. 31 no.11:1765-1767 N '58. (MIRA 12:2)
(Toluene) (Petroleum products)
(Dehydrogenation)

5 (2,3,4)

AUTHORS: Minachev, Kh. M., Ryashentseva, M. A., Rubinshteyn, A. M. SOV/62-59-5-9/40

TITLE: Investigation of the Properties of Metal Oxide Catalysts for Benzine Reforming (Issledovaniye svoystv okisno-metallicheskikh katalizatorov reforminga benzinov). Communication 5. Some Peculiarities of the Catalytic and Physical Properties of Palladium Catalysts (Soobshcheniye 5. Nekotoryye osobennosti kataliticheskikh i fizicheskikh svoystv palladiyevykh katalizatorov)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 5, pp 819-825 (USSR)

ABSTRACT: Platinum catalysts were used in the processing of various types of petroleum; later on, palladium catalysts were used because they are cheaper and more active; however, they were not too stable. In a previous paper (Refs 1,2) the authors had discussed catalysts which contained organic sulphur compounds or had been treated with hydrogen sulfide and which showed various degrees of stability and activity. The literature contains sufficient experimental data on sulphurous metal catalysts (Refs 3,4,5,6) but there is no explanation of the mechanism of the protective property of hydrogen sulfide for metal catalysts of

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Investigation of the Properties of Metal Oxide SOV/62-59-5-9/40
Catalysts for Benzine Reforming. Communication 5.
Some Peculiarities of the Catalytic and Physical Properties of Palladium
Catalysts

group 8 of the periodical system. In this work the authors attempt to explain the circumstances mentioned in connection with the catalysts for benzine reforming investigated in the works (Refs 1,2). In connection with it investigations are carried out of the X-ray structure, the specific surface, the sulphur and coke content on the catalysts used up, and the kinetics of the dehydrogenation of cyclohexane on new as well as used up catalysts of the three catalysts: 0.5% Pd-Al_2O_3 (Nr 1), 0.5% Pd-Al_2O_3 treated with HF (Nr 2), and 0.5% Pd-Al_2O_3 treated with HF and H_2S (Nr 3). All data obtained experimentally are summarized in tables 1-5 and the figure. The investigations showed: the specific surfaces of the catalysts (Nr 1) and (Nr 2) are equal, the specific surface of (Nr 3) amounts to 2/3 the size of either (Nr 1) or (Nr 2). (Nr 2) only showed considerable sintering. The phase analysis showed that the catalysts contained crystalline γ-Al_2O_3 and Pd only and that with (Nr 3) a sulphur com-

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Investigation of the Properties of Metal Oxide SOV/62-59-5-9/40
Catalysts for Benzine Reforming. Communication 5.
Some Peculiarities of the Catalytic and Physical Properties of Palladium
Catalysts

pound of palladium appears on the surface only. With dehydrogenation of cyclohexane at normal temperatures the size arrangement of the specific activity decreases from (Nr 1) to (Nr 3). The temperature coefficient of the reaction rate on the catalyst (Nr 3), however, is considerably greater than that of (Nr 2) and (Nr 3). Since benzine reforming proceeds at temperatures of 300 - 480°, the catalyst (Nr 3) proved the most active in benzine reforming. The increase of activity and stability (73 hours as compared to 46 and 27 hours until using up) is caused by the presence of PdS at the surface of the catalyst (Nr 3). There are 1 figure, 5 tables, and 7 references, 6 of which are Soviet.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy of the Academy of Sciences, USSR)

SUBMITTED: July 24, 1957

Card 3/3

66965
SOV/32-25-11-13/69

~~5(3)~~ 5.5600

AUTHORS: Kondrat'yev, D. A., Markov, M. A., Minachev, Kh. M.

TITLE: Analysis of Mixtures of C_5 to C_7 Hydrocarbons by the Method of Liquid - Gas Chromatography

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 11, pp 1301-1304 (USSR)

ABSTRACT: A simple device with a microflame detector (Ref 1) designed for the analysis of paraffin hydrocarbons, naphthenes, aromatic, and some unsaturated C_5 to C_7 hydrocarbons has been developed. The construction of the dosing evaporator and the microflame detector was based on a device developed by B. A. Rudenko (Izvestiya AN SSSR, in the press). The detector is, in principle, a burner consisting of a capillary 1 mm in diameter. The burner is located at the upper output of a column 6 m long, and is connected to a Chromel-Alumel thermocouple (Fig 1: Scheme of the device). Data obtained with the detector are recorded by automatic recording potentiometer of the types PS1-01 or EPP-09, with a second PP potentiometer connected thereto. The hydrocarbons may be analyzed by means of a thermostat of the

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Analysis of Mixtures of C_5 to C_7 Hydrocarbons
by the Method of Liquid - Gas Chromatography

type TS-15M at constant or variable temperature. The best separating efficiency was reached when two columns (each 3 m long) were used, the one filled with diatomite brick chips (0.25 to 0.5mm) and tricresyl phosphate, and the other filled with diatomite brick chips and dioctyl phthalate. Separation was first effected at 15 - 20°C (for 15 minutes), and all normal and isoparaffin hydrocarbons C_5 to C_7 were separated from one another, whereafter temperature was raised to 85°C (1.5° per minute). Hydrogen was passed through the system with a rate of 60 cm^3 per minute. The chromatogram of a 15-component (C_5 to C_7 hydrocarbon) mixture shows that all substances could be separated except for the pairs 2,3-dimethylbutane - 2-methylpentane, cyclopentane - 3-methylpentane, and cyclohexane - 3-methylhexane. Results of an analysis of an artificial hydrocarbon mixture (Table 1) as well as with catalyzates at elevated temperature and hydrogen pressure (Table 2) are given. There are 3 figures, 2 tables, and 2 Soviet references.

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Analysis of Mixtures of C_5 to C_7 Hydrocarbons SOV/32-25-11-13/69
by the Method of Liquid - Gas Chromatography

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N.D.Zelinskiy of the Academy of Sciences of the USSR)

Card 3/3

(4)

AUTHORS: Rubinshteyn, A. M., Minachev, Kh. M. SOV/79-29-8-10/81
Akimov, V. M.

TITLE: The Dependence of the Distribution of Platinum in the Impregnated Pt-C Catalyst on the Concentration of the Initial Solution H_2PtCl_6 and on the Nature of Carbon Granulation

PERIODICAL: Zhurnal obshchey khimii, 1959, Vol 29, Nr 8, pp 2503 - 2508 (USSR)

ABSTRACT: The authors previously made a radiographic investigation of the penetration of platinum into the catalyst grain of the platinized carbon having different grain size (Ref 1); however, the determinations were not carried out accurately. Besides, the fibrous structure of the carbon obstructed exact density measurements on the photographs. The photorecording method was therefore abandoned, and the ionization method, according to the X-ray apparatus URS-50-I, was used under strict conditions of comparison. These experiments were further intended to explain whether the depth of platinum penetration into the carbon depends on the concentration of the initial solutions. The distribution of the platinum in the carbon grain was determined in the impregnated Pt-C catalysts according to the absorption

Card 1/2

The Dependence of the Distribution of Platinum in the Impregnated Pt-C Catalyst on the Concentration of the Initial Solution H_2PtCl_6 and on the Nature of Carbon Granulation SOV/79-29-8-10/81

of X-rays which had been measured by the above ionization method These catalysts contained 20.4 and 2% platinum, and the grain sizes of the carbon amounted to 2-10 mm. It was confirmed that the concentration of platinum decreased from the surface inward, and it was ascertained that with the decrease of the concentration of platinum in the initial solution, the concentration gradient of the platinum also decreases as the latter penetrates into the grain (i.e. that the diluted solutions yield catalysts with better distribution of the metal). The catalytic activity in the various dehydrogenations of cyclohexane and in the hydrogenation of benzene was also determined. The corresponding results are tabulated. There are 4 figures, 1 table, and 3 Soviet references.

ASSOCIATION: Institut organicheskoy khimii Akademii nauk SSSR (Institute of Organic Chemistry of the Academy of Sciences, USSR)

SUBMITTED: July 14, 1958

Card 2/2

SOV/79-29-9-34/76

3(5)

AUTHORS: Shuykin, N. I., Bel'skiy, I. F., Minachev, Kh. M.

TITLE: Hydrogenation of the Furan Compounds by Means of Metals. VIII. Groups of the Periodic System

PERIODICAL: Zhurnal obshchey khimii, 1959, Vol 29, Nr 9, pp 2969-2973 (US

ABSTRACT:

Owing to the results of previous investigations (Refs 1-5) th
problem arose which of the metals of group VIII are like palladium, capable of bringing about the catalytic hydrogenation
the furan cycle in a wide temperature range, and which of the
are the most active ones. The catalytic properties of osmium,
iridium, and ruthenium, applied to carbon, were investigated
the hydrogenation of silvane and α-vinyl furan in the vapor
phase and at various temperatures. α-Vinyl furan is hydrogena
on all these catalysts at 150° into α-ethyl furan in yields
95-100% (Scheme 1). On Ir-C and Ru-C a small portion (~5%)
α-ethyl furan formed is subjected to hydrogenolysis on the
C-O bond 1-5 (Scheme 2). Hydrogenation of silvane on Os-C, I
Ru-C at higher temperatures shows that these catalysts are n
able to reduce the furan cycle, but are only capable of
hydrogenolysis on the C-O bond 1-5 under the formation of th

Card 1/3

SOV/79-29-9-34/76

Hydrogenation of the Furan Compounds by Means of Metals. VIII. Groups of the Periodic System

methylpropyl ketone (Scheme 3). The results of this paper as well as those already previously obtained permit to draw some general conclusions. All catalysts containing metals of group VIII, applied to carbon could be in hydrogenation condit ally divided in the vapor phase under comparable temperature conditions into two groups, depending on their effect upon the furan cycle: 1) The catalysts of the platinum type (Pt, Os, Ir, Ru, Rh) show either a weak or practically no capability of hydrogenation of the double bond in the furan cycle. On these catalysts only hydrogenolysis of the furan cycle on the C-O bond 1-5 occurs at 200-300°. 2) The catalysts of the palladium type are in a sufficiently wide temperature range capab of hydrogenating the double bond in the furan cycle. Hydrogenolysis of this cycle occurs only at higher temperatures. There are 7 Soviet references.

ASSOCIATION: Institut organicheskoy khimii Akademii nauk SSSR (Institute of Organic Chemistry of the Academy of Sciences, USSR)

Card 2/3

MINACHEV, Kh.M.; KONDRAT'YEV, D.A.

Poisoning of a platinum catalyst with thiophene under conditions of reforming. Khim.sera-i azotorg.soed.sod.v neft.i nefteprod. 3:345-352 '60. (MIRA 14:6)

1. Institut organicheskoy khimii AN SSSR.
(Petroleum—Refining) (Catalysis) (Thiophene)

MINACHEV, Kh.M.; ISAGULYANTS, G.V.; KONDRAT'YEV, D.A.

Poisoning of a platinum catalyst by thiophene under conditions of reforming. Report No.2: Use of thiophene containing the radioactive isotope S^{35}. Izv.AN SSSR Otd.khim.nauk no.5:902-906 My '60. (MIRA 13:6)

1. Institut organicheskoy khimii imeni N.D. Zelinskogo Akademii nauk SSSR.
(Thiophene) (Sulfur--Isotopes) (Platinum)

MINACHEV, Kh.M.; SHUYKIN, N.I.; MARKOV, M.A.

Effect of the specific surface of a platinized aluminosilicate on the degree of n-nonane conversion. Report No.1: Change in the activity of platinized aluminosilicate in the course of the treatment of the carrier with hydrogen. Izv.AN SSSR Otd.khim. nauk no.5:907-912 My '60. (MIRA 13:6)

1. Institut organicheskoy khimii imeni N.D. Zelinskogo Akademii nauk SSSR.
(Aluminosilicates) (Platinum) (Nonane)

S/062/60/000/007/012/017/XX
B004/B064

AUTHOR: Minachev, Kh. M., Kondrat'yev, D. A., and Shchukina, O. K.

TITLE: Investigation of the Poisoning of the Platinum Catalyst by Tiophene Under the Conditions of Reforming. Communication 3. The Influence of Temperature and Hydrogen Pressure

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1960, No. 7, pp. 1263 - 1266

TEXT: In continuation of their investigations (Refs. 1,2) of the poisoning of 1%- and 5% platinum-aluminum oxide catalysts, the authors studied a) the influence of temperature (425 - 500°C) at constant hydrogen pressure (20 atm) and b) the influence of H_2 pressure (between 10 and 40 atm) upon the dehydrogenation of cyclohexane containing 2.65% tiophene at 425° and 475°C. A 1% platinum-aluminum oxide catalyst was used. The yield of dehydrogenation stabilized

Card 1/2

Investigation of the Poisoning of the
Platinum Catalyst by Tiophene Under
the Conditions of Reforming.
Communication 3. The Influence of Temperature and Hydrogen Pressure

S/062/60/000/007/012/017/XX
B004/B064

at 20, 30, and 40 atm and 425, 450, 475 and 500°C after 1 - 2 hours. No stabilization of the yield occurred at 10 atm and 450° and 475°C; the activity of the catalyst decreased steadily in the course of 20 hours. The stabilized yield increased with rising temperature (425 ⟶ 500°C) and decreased with rising pressure (20 ⟶ 40 atm). The specific surface of the deactivated catalyst decreases with increasing temperature, with pressure changes, however, it remains almost the same. A complete decomposition of thiophene occurs when both temperature and pressure rise. There are 2 figures, 2 tables, and 6 references: 5 Soviet and 1 US.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo
Akademii nauk SSSR
(Institute of Organic Chemistry imeni N. D. Zelinskiy
of the Academy of Sciences USSR)

SUBMITTED: January 8, 1959

Card 2/2

S/062/60/000/008/023/033/XX
B013/B055

AUTHORS: Minachev, Kh. M., Shuykin, N. I., and Markov, M. A.

TITLE: Investigation of the Effect of the Specific Surface of Platinized Alumosilicate on the Degree of n-Nonane Conversion

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1960, No. 8, pp. 1466-1470

TEXT: This paper is a continuation of the studies on the effect of the specific surface of catalysts on the degree of hydrocarbon conversion. For this purpose, the authors studied the conversion of n-nonane on alumosilicate catalysts with widely varying specific surfaces. Two 0.5% platinum/alumosilicate catalysts with specific surfaces of 320 m^2/g (K-1) and 60 m^2/g (K-2) were used. A standard alumosilicate catalyst for the cracking process was used as carrier for the preparation of the platinum catalysts. To prepare the latter, the carrier was saturated with a dilute H_2PtCl_6 solution. The data of the n-nonane used were in agreement with those given in Ref. 4. Infrared spectra showed the n-nonane to be free

Card 1/3

Investigation of the Effect of the Specific Surface of Platinized Alumosilicate on the Degree of n-Nonane Conversion

S/062/60/000/008/023/033/XX
B013/B055

of isomers. The experimental apparatus has been described in Ref. 1. The experiments were carried out in a continuous system at 360 to 450°C, a hydrogen pressure of 10 atm and a flow rate of 1 h^{-1}. The molar ratio of hydrocarbon and hydrogen was 1:5. A fresh catalyst was used for each experiment. The results of the examination of the catalyzates are listed in Tables 1 and 2 and graphically represented in Figs. 1 - 3. These data show that the degree of hydrocracking of hydrocarbons considerably decreases with decreasing specific catalyst surface. This is in agreement with data given in Ref. 2. The yields of hydrocracking products on K-1 catalysts were found to increase more rapidly with a temperature rise than on K-2 catalysts. At temperatures of 420° - 450°C, hydrocracking on K-2 is insignificant, which enables C_9-isoalkanes to be obtained in comparatively high yields (54% at 450°C). On K-1, the maximum yield of isononanes is obtained at 380°C (53%). Since aromatization occurs to a noticeable degree only at 400°C, aromatic hydrocarbons can be obtained over K-2 before C_9 isoalkane yields are reduced. The total yield of hydrocracking products under the experimental conditions was 45.7% over K-1, and 25.3% over K-2. The experiments have thus shown that by decreasing the specific surface

Card 2/3

Investigation of the Effect of the Specific Surface of Platinized Alumosilicate on the Degree of n-Nonane Conversion

S/062/60/000/008/023/033/XX
B013/B055

of the catalyst the process can be carried out at higher temperatures without the occurrence of hydrocracking. There are 3 figures, 2 tables, and 4 Soviet references.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy of the Academy of Sciences USSR)

SUBMITTED: February 18, 1959

Card 3/3

S/062/60/000/008/009/012
B004/B054

AUTHORS: Minachev, Kh. M., Ryashentseva, M. A., and Rudenko, B. A.

TITLE: Transformations of n-Hexane, Methyl Cyclopentane, and Cyclohexane on Rhenium - Alumina Catalyst at Increased Hydrogen Pressure

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1960, No. 8, pp. 1471-1480

TEXT: In the introduction, the authors give a review of publications concerning rhenium catalysts: papers by M. S. Platonov et al. (Refs. 1-7), A. A. Balandin et al. (Ref. 8), and an East German patent (Ref. 9). The present paper reports on the experimental examination of rhenium catalysts. Catalysis was carried out at temperatures of 290 - 480°C, a hydrogen pressure of 5-30 atm, and a ratio of hydrogen : hydrocarbon = 5 : 1. The catalysts with 5 and 15% of Re on Al_2O_3 showed little activity. Up to 78% of aromatic compounds could be obtained from cyclohexane at 385°C and 5 atm of H_2-pressure with a catalyst containing 20% of Re. An admixture of 5%

Card 1/3

Transformations of n-Hexane, Methyl Cyclopentane, and Cyclohexane on Rhenium - Alumina Catalyst at Increased Hydrogen Pressure

S/062/60/000/008/009/012
B004/B054

of Zn, or a treatment with HF, had no influence on the activity of this catalyst. Higher temperatures and high H_2-pressure produced cracking. The catalysts were produced by dissolving metallic rhenium in HNO_3 on the water bath, impregnating the Al_2O_3, annealed for 5 h at 500°C and pressed to cylinders 5 by 5 mm, with rhenic acid, drying at 130°C (3 - 4 h), and reducing by means of hydrogen at 470 - 480°C (10 h). The products of catalysis were analyzed by determining the specific gravity and the refractive index, as well as the aromatic fraction (reaction with H_2SO_4). In part, a gas-chromatographic separation was made at 50°C in a column 2 m long which contained kieselguhr impregnated with tricresyl phosphate. Hydrogen was used as a carrier. The separating effect of the column was checked by means of an artificial mixture of various hydrocarbons (Table 1, Fig. 1). Only the mixture of n-hexane with cyclopentane could not be separated, so that the composition of this fraction had to be clarified by determining the boiling point. At 385°C and 5 atm, the catalysis of cyclohexane (Table 2, Fig. 2) yielded 34% of aromatic hydrocarbons in the aromatic fraction. [Abstractor's Note: This contradicts the statement that 78% of aromatic hydrocarbons were

Card 2/3

Transformations of n-Hexane, Methyl Cyclopentane, and Cyclohexane on Rhenium - Alumina Catalyst at Increased Hydrogen Pressure

S/062/60/000/008/009/012
B004/B054

obtained.] The rest consisted of non-reacted cyclohexane, alkanes, and 4.6% of methyl cyclopentane. The catalysis of n-hexane (Table 3) (300°C, 5 atm) and methyl cyclopentane (Table 4) (305°C, 5 atm) yielded only negligible amounts of aromatic hydrocarbons. The formation of methyl cyclopentane (0.2%) was observed in the case of n-hexane, and the formation of cyclopentane (1.5%) and cyclohexane (1.4%) in the case of methyl cyclopentane. There are 2 figures, 4 tables, and 13 references: 11 Soviet, 1 British, and 1 Eastern German.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy of the Academy of Sciences, USSR)

SUBMITTED: March 13, 1959

Card 3/3

S/062/60/000/010/011/018
B015/B064

AUTHORS: Minachev, Kh. M., Ryashentseva, M. A., and Shuykin, N. I.

TITLE: Catalytic Transformations of Cyclohexane, Methyl Cyclopentane, and n-Hexane on a Palladium Alumina Catalyst at Increased Temperature and Increased Hydrogen Pressure

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1960, No. 10, pp. 1844 - 1847

TEXT: In previous papers (Refs. 1-4), the authors investigated the catalytic properties of 0.5% palladium alumina catalysts in the re-forming of small gasoline fractions of petroleum from the Il'skiy, Khadyzhenskiy, Ural, and Volga deposits. To confirm the results obtained, the authors studied the transformation of cyclohexane, methyl cyclopentane, and n-hexane on 0.5% palladium-containing alumina catalysts under the optimum conditions of re-forming gasoline fractions (480°C, 20 atm, H_2:HC = 5, v = 1.0 hours^{-1}). The experiments were carried out in a continuous-flow apparatus. The catalyzate obtained from cyclohexane

Card 1/3

contained 50% benzene, while C_6 paraffin hydrocarbons with approximately 8% and five-membered cyclanes with approximately 43% were detected in the naphthene paraffin component (Table 1, composition), i.e., a dehydrogenation to benzene, an isomerization with a contraction of the cycle, and a slight hydrogenolysis under the formation of alkanes took place. Approximately 9.5% aromatic hydrocarbons and, besides unchanged n-hexane, approximately 5% paraffin hydrocarbons with iso-structure were obtained from the transformation of n-hexane. Besides unchanged methyl cyclopentane, methyl cyclopentane (Table 2) yielded approximately 11% 2,3-dimethyl butane, 3-methyl pentane, n-hexane, n-pentane (approximately 3.8%), and approximately 1.2% cyclohexane of the paraffin components, and 33% benzene as the aromatic component of the catalyzate. Thus, methyl cyclopentane undergoes an isomerization to cyclohexane and subsequent dehydrogenation to benzene, as well as hydrogenolysis and hydrocracking under the formation of n-pentane. A Scheme is given on the basis of the results obtained, and it is stated that the present

V

Catalytic Transformations of Cyclohexane,
Methyl Cyclopentane, and n-Hexane on a
Palladium Alumina Catalyst at Increased
Temperature and Increased Hydrogen Pressure

S/062/60/000/010/011/018
B015/B064

experiments confirm the formation mechanism of aromatic hydrocarbons in re-forming the above gasoline fractions. There are 2 tables and 6 Soviet references.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy of the Academy of Sciences USSR)

SUBMITTED: May 14, 1959

✓

Card 3/3

S/081/62/000/001/007/067
B156/B101

AUTHORS: Minachev, Kh. M. Isagulyants, G. V., Kondrat'yev, D. A.

TITLE: Investigation of the poisoning of a platinum catalyst, in reforming conditions, by thiophene containing the radioactive isotope S^{35}

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 1, 1962, 73-74, abstract 1B540 (Sb. "Khimiya seraorgan. soyedineniy, soderzhashchikhsya v neftyakh i nefteproduktakh, v. 4". M., Gostoptekhizdat, 1961, 160-165)

TEXT: The general laws for the poisoning of platinized Al_2O_3 containing 5% Pt by thiophene labeled with radioactive sulfur, when dehydrogenating cyclohexane in a flow system at an H_2 pressure of 20 atm and a temperature of 450°C, are studied. Radiochemical analysis enabled the sulfur content of the catalyst to be determined, this varying between 0.063 and 0.14% accordin to the concentration of thiophene in the initial mixture. The activity of

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S/081/62/000/001/007/067
B156/B101

Investigation of the poisoning ...

the catalyst decreases linearly as its sulfur content is increased. The process of regeneration of the catalyst is accompanied by the removal of sulfur from it, but full activity is restored when the catalyst still contains ~40% of the sulfur which it contained before regeneration began. [Abstracter's note: Complete translation.]

Card 2/2

S/062/61/000/001/009/016
B101/B220

AUTHORS: Minachev, Kh. M. and Ryashentseva, M. A.

TITLE: Conversion of n-hexane, methyl cyclopentane, and cyclohexane on a rhenium alumina catalyst treated with hydrogen sulfide

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, no. 1, 1961, 103-107

TEXT: In Ref. 6 the authors reported on the catalytic properties of rhenium alumina catalysts. In the present investigation, a rhenium alumina catalyst treated with hydrogen sulfide was used. Its ability to convert cyclohexane, methyl cyclopentane, and n-hexane (the same substances as used in Ref. 6) into aromatic hydrocarbons has been studied. The purpose was to obtain a high yield of benzene. The catalyst was manufactured by dissolution of metallic rhenium in 12% HNO_3 and impregnation of Al_2O_3 with the rhenium acid obtained. The catalyst contained 20% rhenium. The treatment with H_2S was performed as described in Ref. 7 The tests with the hydrocarbons were made at 500-510°C; p_{H_2} - 5 atm;

volume rate of the hydrocarbons 1.0 hr^{-1}; H_2 : hydrocarbon ratio = 5:1. The reaction products were chromatographically analyzed by using a method developed by the authors in the laboratory (Ref. 9). Three diagrams show the results obtained by conversion of the hydrocarbons. Compared with a rhenium alumina catalyst not treated with H_2S, the catalyst treated with H_2S proved to be more effective for dehydrogenation of cyclohexane, dehydrogenation and isomerization of methyl cyclopentane, and dehydrogenation and cyclization of n-hexane to benzene. M. S. Platonov is mentioned. There are 1 figure, 1 table, and 10 references: 8 Soviet-bloc and 6 non-Soviet-bloc.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy, Academy of Sciences USSR)

SUBMITTED: July 31, 1959

S/062/61/000/001/009/016
B101/B220

Conversion of n-hexane...

Legend to Diagrams:

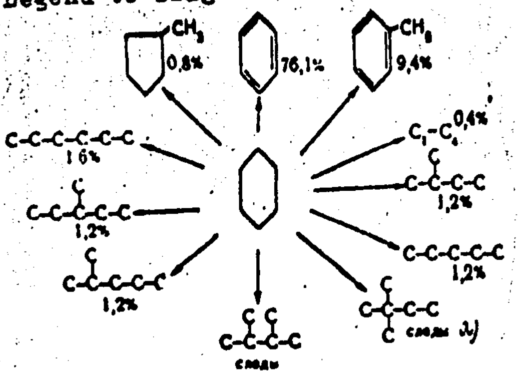

Diagram 1. Conversion of cyclohexane. a) traces

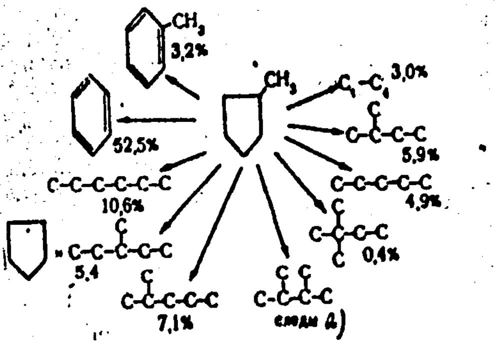

Схема 2. Превращения метилциклопентана

Diagram 2. Conversion of methyl cyclopentane. a) traces.

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Conversion of n-hexane...

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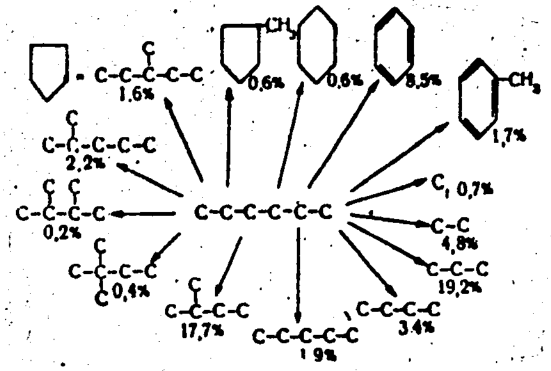

Diagram 3. Conversion of n-hexane.

Card 4/4

S/062/61/000/001/010/016
B101/B220

AUTHORS: Minachev, Kh. M. and Ryashentseva, M. A.

TITLE: Reforming of gasoline on a rhenium-alumina catalyst treated with hydrogen sulfide for the purpose of improving the octane number

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, no. 1, 1961, 107-109

TEXT: In Ref 2, the authors had found that aromatic hydrocarbons resulted from cyclohexane, methyl cyclopentane, and n-hexane on a rhenium-alumina catalyst treated with hydrogen sulfide. This was the reason for the present study in which the catalyst was used for the reforming of the gasoline with the object of increasing its octane number. The production of the catalyst containing 20% rhenium and its treatment with H_2S were described in Ref. 2. Reforming was performed in a continuous system at 500-510°C, $p_{H_2} = 5$ atm; volume rate of the gasoline 1.0 hr^{-1}; molar ratio

Card 1/4

H_2:gasoline = 5:1. The initial product was gasoline of Lyuberetskiy zavod (Lyubertsy Plant). The characteristics of initial gasoline and catalyzates are summarized in a table. The octane number was determined at the Vsesoyuznyy nauchno-issledovatel'skiy institut neftyanoy promyshlennosti (All-Union Scientific Research Institute of the Petroleum Industry). The data obtained prove the usability of a rhenium-alumina catalyst treated with hydrogen sulfide for improving the octane number of low-quality gasoline. There are 1 table and 4 Soviet-bloc references.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy, Academy of Sciences USSR)

SUBMITTED: July 31, 1959

Reforming of gasoline on a ...

S/062/61/000/001/010/016
B101/B220

Характеристика исходного бензина и катализатов, полученных при его реформировании

(500—510°; p = 5 *атм*, v = 1 час$^{-1}$ и H_2:HC = 5)

1 Свойства			Исходный бензин 2	Катализат №1 (после 17 час. работы катализатора) 3	Катализат №2 (после 108 час. работы катализатора) 4
5 Показатель преломления n_D^{20}			1,4145	1,4390	1,4205
6 Удельный вес d_4^{20}			0,7307	0,7453	0,7331
7 Содержание ароматических углеводородов, об. %			10,0	47,0	32,0
8 Содержание сернистых соединений, вес. %			0,056	9 Нет	0,019
10 Разгонка по Энглеру, °C			38,5—196	39,5—212	44—20
11 Начало кипения			38,5	39,5	44,0
10%			70,0	66,5	75,5
50%			128,5	124,5	125,0
90%			183,0	184,5	178,0
12 Конец кипения			196,0	212,0	204,0
13 Октановое число	14 по моторному методу	15 без ТЭС	47,2	79,0	—
		16 с ТЭС	82,5	84,0	—
	17 по исследовательскому методу	15 без ТЭС	47,8	87,2	71,0
		16 с ТЭС	—	—	80,0

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Reforming of gasoline on a ...

S/062/61/000/001/010/016
B101/B220

Legend to the table: Characteristics of initial gasoline and catalyzates obtained by reforming (500-510°C, p = 5 atm, v = 1 hr^{-1} H_2:HC = 5). 1) property; 2) initial gasoline; 3) catalyzate no. 1 (after 17 hours of catalyst action; 4) catalyzate no. 2 (after 108 hours of catalyst action); 5) refractive index; 6) specific gravity; 7) content of aromatic hydrocarbons, % by volume; 8) content of sulfur compounds, % by weight; 9) none; 10 Engler distillation, °C; 11) initial boiling point; 12) final boiling point; 13) octance number; 14) according to road tests; 15) without tetraethyl lead; 16) with TEB; 17) according to laboratory tests.

Card 4/4

MINACHEV, Kh.M.; MARKOV, M.A.; LOGINOV, G.A.

Conversions of five- and six-membered cyclenes on rare-earth oxides. Neftekhimia 1 no.3:356-361 My-Je '61. (MIRA 16:11)

1. Institut organicheskoy khimii AN SSSR imeni N.D. Zelinskogo.

MINACHEV, Kh.M.; RYASHENTSEVA, M.A.; AFANAS'YEVA, Yu.A.

Catalytic isomerization of n-hexane. Neftekhimiia 1 no.4: 482-483 Jl-Ag '61. (MIRA 16:11)

1. Institut organicheskoy khimii AN SSSR imeni N.D. Zelinskogo.

31746
S/204/61/001/004/003/005
E075/E185

5. 1190

AUTHORS: Minachev, Kh.M., Markov, M.A., and Shchukina, O.K.

TITLE: Dehydrogenation of cyclohexane on the oxides of rare earth elements

PERIODICAL: Neftekhimiya, v.1, no.4, 1961, 489-493

TEXT: Eight oxides of rare earth elements and yttrium oxide were used as catalysts for the dehydrogenation of cyclohexane. The catalysts were prepared by dissolving the commercial oxides in 27% nitric acid, and precipitating with 12% ammonia solution at 50-60 °C. The dried and washed precipitates were compressed into 4 x 4 mm cylinders and heated at 560 °C in dry air for 8 hours. The surface areas of the oxides so obtained were determined by benzene vapour adsorption. The dehydrogenations were carried out at 515-590 °C under atmospheric pressure. The catalysts were activated at 560 °C for 2 hours by passing through them currents of air, hydrogen or nitrogen. The catalysts with the greatest activity were produced by the activation with nitrogen. Experimental results show that all the catalysts dehydrogenate cyclohexane to benzene.

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S/204/61/001/004/003/005
E075/E185

Dehydrogenation of cyclohexane ...

The determination of specific areas of the catalysts permitted the calculation of the specific activity and specific coke formation for the various catalysts, and thus their relative overall activities could be compared. The results are given in Table 4. It can be seen that the specific activity and coke formation at 530-560 °C does not differ much inside the yttrium group of the oxides. The yttrium group oxides exceed the cerium oxide group in respect of activity. It was shown that there exists linear dependence between the logarithms of the percentage conversion and the reciprocal temperature of the reaction. The energies of activation calculated from the slopes of the lines had typical values for acidic catalysts in the case of neodymium, gadolinium and holmium oxides, but exceeded 50 kcal for the remaining oxides. There are 4 figures, 4 tables and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc. The English language references read:

Ref.1: R.A. Briggs, H.S. Taylor.
J. Amer. Chem. Soc., v.63, 2500, 1941.
Ref.4: V.I. Komarevsky, Ind. Eng. Chem., v.49, 264, 1957.

Card 2/~~4~~ 3

31746

Dehydrogenation of cyclohexane ... S/204/61/001/004/003/005
E075/E185

ASSOCIATION: Institut organicheskoy khimii AN SSSR im.
N.D. Zelinskogo
(Institute of Organic Chemistry, AS USSR, imeni
N.D. Zelinskiy)

SUBMITTED: June 7, 1961

Card 3/~~4~~3

MINACHEV, Kh.M.; MARKOV, M.A.; SHCHUKINA, O.K.

Dehdrocyclization of n-heptane over rare earth oxides. Neftekhimiia 1 no.5:610-612 S-O '61. (MIRA 15:2)

1. Institut organicheskoy khimii AN SSSR imeni N.D.Zelinskogo.
(Heptane)(Aromatization)(Rare earth oxides)

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5.1190
11.0132

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TITLE: Investigation by means of thiophene-S^{35} of the poisoning of platinum-alumina catalysts containing various proportions of the metal

PERIODICAL: Kinetika i kataliz, v.2, no.5, 1961, 690-693

TEXT: Platinum-alumina catalysts are of a considerable practical importance in the petroleum industry and for this reason the authors carried out previously a series of systematic studies of the poisoning of these catalysts by sulphur during the dehydrogenation of cyclohexane at elevated temperatures (Ref.1, 2 and 3: Izv. AN SSSR, Otd. khim. n., 1960, 300; 1960, 902; 1960, 877). In the present article the results are given of further studies in the above series, the specific purpose of the work being to: 1. derive the relationship existing between Pt concentration in the catalyst mixture and the quantity of sulphur that must be deposited on the catalyst in order to inhibit its catalytic activity; 2. elucidate the distribution of sulphur in the catalyst layer and 3. correlate the degree of catalyst

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poisoning with the concentration of sulphur deposited on it. The catalysts used in the investigations contained 0.05, 0.3, 0.7, 1.0, 3.0, 6.0 and 10% platinum, the rest being alumina. The mixed catalysts were prepared by saturating powdered alumina with the required quantity of chloroplatinic acid. All the catalysts were poisoned during dehydrogenation of cyclohexane by adding to it 2% thiophene labelled with S^{35} radioisotope. The test temperature was 450°C and the pressure in the reaction vessel was maintained at 20 atm H_2. The reaction time was varied up to 10 hours. It was found that up to 90% of all the sulphur deposited on the catalyst during the reaction period of 10 hours is deposited during the first 2 to 3 hours of the test time. The quantity of the sulphur deposited increases also with the increasing concentration of Pt in the mixed catalyst, but this increase is not a linear function of the Pt content in the catalyst. Tests carried out on catalyst regeneration by passing over it pure cyclohexane showed that, after a reaction time of about 5 hours, the quantity of sulphur deposit on the catalyst amounts to about 30% of the initial concentration. No further significant reduction in the sulphur concentration on the catalyst was

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observed after passing the cyclohexane for the next 5 hours. There are 3 figures, 1 table and 10 references: 9 Soviet-bloc and 1 non-Soviet-bloc. The reference to an English language publication reads as follows: Ref. 8: W. P. Hettinger, C. D. Keith, J. L. Gring, J. W. Teter. Ind. Eng. Chem., v. 47, 1955, 719.

ASSOCIATION: Institut organicheskoy khimii im. N. D. Zelinskogo AN SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy, AS USSR)

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MINACHEV, Kh.M.; KHODAKOV, Yu.S.

Kinetics of hydrogenation of the vinyl ether of β-(diethylamino) ethanol and vinyl phenyl ether on 1% pd/Al O. Izv.AN SSSR Otd.khim. nauk no.4:722-724 Ap '61. (MIRA 14:4)

1. Institut organicheskoy khimii im. N.D.Zelinskogo AN SSSR.
(Ether) (Hydrogenation)

MINACHEV, Kh.M.; SMIRNOV, V.S.; KONDRAT'YEV, D.A.; LOGINOV, G.A.

Products of the dehydrocyclization of n-hexane and dehydrogenation of cyclohexane obtained on an alumina-molybdenum oxide catalyst. Izv.AN SSSR Otd.khim.nauk no.4:724-726 Ap '61. (MIRA 14:4)

1. Institut organicheskoy khimii im. N.D.Zelinskogo AN SSSR.
(Cyclohexane) (Hexane)