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Fe, Co, and Ni catalysts made by precipitating aqueous metal salt solutions with aqueous NH<sub>3</sub> solution at 50-110°; catalyst precipitated at pH7 gives high yield of hydrocarbons. CARBON MONOXIDE; REDUCTION; CATALYSTS; CHEMICAL PREPARATION; IRON COMPOUNDS; COBALT COMPOUNDS; NICKEL COMPOUNDS; AMMONIA
- 02833 CATALYTIC HYDROGENATION OF CARBON MONOXIDE. (to Ruhrchemie and Lurgi Gesellschaft fuer Waermetechnik mbH). British Patent 706,568. 31 Mar 1954.  
Co, Ni, Fe particles as catalyst; catalyst prepared by precipitation of solution of nitrate of Fe, Co, or Ni with alkaline compound such as Na<sub>2</sub>CO<sub>3</sub> possibly with promoter, such as Cu. CARBON MONOXIDE; REDUCTION; COBALT; NICKEL; IRON; CATALYSTS; CHEMICAL PREPARATION



- 02834 APPARATUS FOR HYDROGENATION OF CARBON MONOXIDE. Kayser, H.G.; Rack, P.; Gross, H.W. (to Metallgesellschaft). German(FRG) Patent 902,371. 4 Apr 1954.  
Apparatus for obtaining intimate contact between fresh gas, recycled gas, and liquid reaction products. CARBON MONOXIDE;REDUCTION; EQUIPMENT
- 02835 REACTOR FOR HYDROGENATION OF CARBON MONOXIDE. Jamm, W.; Niederheitmann, W. (to Mannesmann). German(FRG) Patent 910,053. 12 Apr 1954.  
Gas bubbled through suspension of catalyst in oil. CARBON MONOXIDE;REDUCTION;EQUIPMENT; CATALYSTS
- 02836 RECOVERY OF HYDROCARBONS AND OXYGEN-CONTAINING COMPOUNDS BY CATALYTIC CARBON MONOXIDE HYDROGENATION. (to Metallgesellschaft). German(FRG) Patent 910,050. 26 Apr 1954.  
Hydrogenation of CO-containing gases in presence of Fe catalysts at 5-30 atm and later in presence of Co catalyst at normal or slightly elevated pressure. CARBON MONOXIDE; REDUCTION; GASOLINE; DIESEL FUELS; PRODUCTION; CATALYSTS; IRON; COBALT
- 02837 CARBON MONOXIDE HYDROGENATION PRODUCTS. Rottig, W. (to Ruhrchemie). German(FRG) Patent 911,014. 10 May 1954.  
Water gas passed over Fe 100, Cu 5, CaO 10, kieselguhr 10, and alkali 96 parts pre-reduced with H and impregnated with Na<sub>2</sub>CO<sub>3</sub>. CARBON MONOXIDE; REDUCTION
- 02838 CATALYTIC CARBON MONOXIDE HYDROGENATION. Rottig, W. (to Ruhrchemie). German(FRG) Patent 911,848. 20 May 1954.  
Fe catalyst activated by oxides such as CrO<sub>3</sub>, ZnO, MnO, V<sub>2</sub>O<sub>5</sub> and Mo oxide. CARBON MONOXIDE; REDUCTION; CATALYSIS
- 02839 HYDROGENATION OF CARBON MONOXIDE. Atwell, H.V. (to Texas Co.). US Patent 2,680,126. 1 Jun 1954.  
Atomization of gases and catalyst. CARBON MONOXIDE; REDUCTION; HYDROGEN; CATALYSTS; IRON; ALUMINIUM OXIDES; POTASSIUM OXIDES; MEDIUM PRESSURE; HIGH TEMPERATURE
- 02840 IRON CATALYSTS FOR HYDROGENATION OF CARBON MONOXIDE. Koelbel, H.; Langheim, R. (to Rheinpreussen fuer Bergbau und Chemie). German(FRG) Patent 914,373. 1 Jul 1954.  
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- 02841 HYDROGENATION OF CARBON MONOXIDE TO HYDROCARBONS. Rambo, M.L. (to Texas Co.). US Patent 2,683,159. 6 Jul 1954.  
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- 02842 HYDROGENATION OF CARBON MONOXIDE WITH COBALT CATALYSTS. Koelbel, H.; Engelhardt, F. (to Rheinpreussen fuer Bergbau und Chemie). German(FRG) Patent 914,969. 12 Jul 1954.  
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- 02843 HYDROGENATION OF CARBON MONOXIDE. (to Rheinpreussen Akt.-Ges. fuer Bergbau und Chemie). British Patent 712,117. 21 Jul 1954.  
Removal of water vapor using CaCl<sub>2</sub>. CARBON MONOXIDE; REDUCTION; HYDROGEN; CATALYSTS; IRON; REMOVAL; WATER VAPOR; CALCIUM CHLORIDES
- 02844 CATALYTIC HYDROGENATION OF CARBON MONOXIDE. Rottig, W. (to Ruhrchemie and Lurgi Gesellschaft fuer Waermetechnik mbH). British Patent 712,686. 28 Jul 1954.  
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- 02845 HYDROCARBON SYNTHESIS FROM CARBON MONOXIDE AND HYDROGEN. McAdams, D.R.; Buchmann, F.J. (to Standard Oil Development Co.). US Patent 2,686,195. 10 Aug 1954.  
Preparation of C-supported Fe and Co catalysts. CARBON MONOXIDE; REDUCTION; HYDROGEN; PRODUCTION; HYDROCARBONS; CATALYSTS; CHEMICAL PREPARATION; IRON; COBALT; PROMOTERS; POTASSIUM CARBONATES; SYNTHETIC FUELS
- 02846 HYDROGENATION OF CARBON MONOXIDE. (to Ruhrchemie and Lurgi Gesellschaft fuer Waermetechnik mbH). British Patent 714,839. 1 Sep 1954.  
Catalyst for synthesis of oxygen-containing compounds. CARBON MONOXIDE; REDUCTION; HYDROGEN; CATALYSTS; IRON; ALKALI METAL COMPOUNDS; PROMOTERS; COPPER; SILVER; PRODUCTION; ESTERS; ALCOHOLS
- 02847 CONTROL OF HYDROCARBON-SYNTHESIS REACTIONS. Wadley, E.F.; Anderson, J.A. (to Standard Oil Development Co.). US Patent 2,688,629. 7 Sep 1954.  
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- 02848 CATALYSTS FOR CARBON MONOXIDE HYDROGENATION. (to Ruhrchemie and Lurgi Gesellschaft fuer Waermetechnik mbH). British Patent 718,386. 10 Nov 1954.  
Preparation of Fe catalyst. CARBON MONOXIDE; REDUCTION; HYDROGEN; CATALYSTS; IRON; CHEMICAL PREPARATION; IRON CARBONATES; SODIUM CARBONATES; POTASSIUM CARBONATES; POTASSIUM COMPOUNDS; SILICATES; NITRIC ACID
- 02849 HYDROGENATION OF CARBON DIOXIDE ON NICKEL--KIESELGUHR CATALYST. Dew, J.N.; White, R.R.; Sliepcewich, C.M. (Univ. of Michigan, Ann Arbor). Ind. Eng. Chem.; 47: 140-6(1955).  
Production of CH<sub>4</sub> and CO. CARBON DIOXIDE; REDUCTION; HYDROGEN; PRODUCTION; METHANE; CARBON MONOXIDE; CATALYSTS; NICKEL; KIESELGUHR
- 02850 COAL HYDROGENATION PROCESS STUDIES. V. FURTHER HYDROGENOLYSIS OF THE RESIDUE FROM A RESTRICTED HYDROGENOLYSIS OF PITTSBURGH SEAM COAL AT 375° FOR 12 HOURS. Glenn, R.A. (Carnegie Inst. of Technol., Pittsburgh, PA). Fuel; 34: 201-12(1955).  
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- 02852 HYDROGENATION OF HUNGARIAN COALS IN OIL SUSPENSION. Szucs, M. (Tech. Univ., Budapest). Magy. Tud. Akad., Kem. Tud. Oszt., Kozlem.; 6: 375-86(1955).  
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- OXIDES; MOLYBDENUM OXIDES; TUNGSTEN OXIDES; SODIUM OXIDES; TIN COMPOUNDS; CARBON DIOXIDE; IRON SULFATES; HIGH TEMPERATURE; MEDIUM PRESSURE; CHEMICAL REACTION YIELD; OXALATES
- 02853 FORMATION OF THE PHENOLS IN THE PROCESS OF THE DESTRUCTIVE HYDROGENATION OF THE LOW-TEMPERATURE TAR. Kalechits, I.V.; Salimgareeva, F.G. Trudy Vostochno-Sibir. Filiala, Akad. Nauk SSSR, Ser. Khim.; No. 3, 79-87(1955).  
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- 02854 PRODUCTION OF AROMATICS BY COAL HYDROGENATION. Woodcock, W.A.; Tenney, A.H. (Carbide and Carbon Chemicals Co., New York, NY). Am. Chem. Soc., Div. Petroleum Chem., Symposium; No. 34, 39-42(1955).  
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- 02857 INVESTIGATION OF BITUMINOUS COAL HYDROGENATION AT PRESSURES EXCEEDING 1000 ATMOSPHERES. Kazanskii, B.A.; Gonikberg, M.G.; Lozovoi, A.V.; Gavrilova, A.E.; Blonskaya, A.I. Trudy Inst. Goryuch. Iskopaemykh, Akad. Nauk SSSR, Otdel. Tekh. Nauk; 6: 3-15(1955).  
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- 02858 UNCATALYZED COAL HYDROGENOLYSIS. Pelipetz, M.G.; Salmon, J.R.; Bayer, J.; Clark, E.L. (U. S. Bur. of Mines, Bruceton, PA). Ind. Eng. Chem.; 47: 2101-3(1955).  
At 400°. COAL; HYDROGENATION; TIN; MOLYBDENUM; HIGH TEMPERATURE; CATALYSTS; CHEMICAL REACTION KINETICS
- 02859 HYDROGENATION OF CARBON MONOXIDE UTILIZING AN ALLOY CATALYST. Probst, R.E. (to Standard Oil Co. of Indiana). US Patent 2,698,862. 4 Jan 1955.  
Alloy contains Mn 5-30%, Cu or Ag 40-70%, and Al or Sn 15-45%; has decreased regeneration frequency. CARBON MONOXIDE; REDUCTION; HYDROGEN; CATALYSTS; MANGANESE ALLOYS; COPPER ALLOYS; SILVER ALLOYS; ALUMINIUM ALLOYS; TIN ALLOYS; REGENERATION
- 02860 IRON CATALYSTS FOR HYDROGENATION OF CARBON MONOXIDE. Rottig, W. (to Ruhrchemie). German(FRG) Patent 923,128. 3 Feb 1955.  
Metal nitrate solution (1000 l.) containing 400 Fe and 0.2 g Cu/l. treated with 1050 l. 10%  $Na_2CO_3$ ; 6.8 Kg Fuller's earth containing 65.6%  $SiO_2$  added; filtered oxides treated with K silicate to form  $K_2O$ . CARBON MONOXIDE; REDUCTION; CATALYSTS; IRON; CHEMICAL PREPARATION; FULLERS EARTH
- 02861 IMPROVED CATALYST FOR HYDROGENATION OF CARBON MONOXIDE. Riblett, E.W.; McGrath, H.G. (to M. W. Kellogg Co.). US Patent 2,702,814. 22 Feb 1955.  
Preparation of catalyst containing Co, MgO, or  $ThO_2$ , and acid-treated bentonite clay. CARBON MONOXIDE; REDUCTION; HYDROGEN; CATALYSTS; CHEMICAL PREPARATION; COBALT; MAGNESIUM OXIDES; THORIUM OXIDES; BENTONITE; CLAYS
- 02862 HYDROCARBONS AND THEIR DERIVATIVES BY HYDROGENATION OF CARBON MONOXIDE. Kayser, H.G.; Rack, P. (to Metallgesellschaft). German(FRG) Patent 897,546. 24 Feb 1955.  
Equipment. HYDROCARBONS; PRODUCTION; CARBON MONOXIDE; REDUCTION; CATALYSIS; EQUIPMENT
- 02863 CARBON MONOXIDE HYDROGENATION ON ALKALI METAL SILICATE-CONTAINING PRECIPITATED IRON CATALYSTS. (to Ruhrchemie). German(FRG) Patent 924,448. 3 Mar 1955.  
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- 02864 IRON CATALYSTS FOR HYDROGENATION OF CARBON MONOXIDE. Rottig, W. (to Ruhrchemie). German(FRG) Patent 925,346. 21 Mar 1955.  
Composition of Fuller's earth affects influences of catalyst. CARBON MONOXIDE; REDUCTION; CATALYSTS; IRON; FULLERS EARTH; ALUMINIUM OXIDES; SILICON OXIDES
- 02865 COAL HYDROGENATION. Doughty, E.W.; Howell, J.H.; Eccles, M.A. (to Union Carbide and Carbon Corp.). British Patent 727,274. 30 Mar 1955.  
Coal-oil paste preparation for coal hydrogenation process. COAL; HYDROGENATION; COAL PASTES; OILS; CHEMICAL PREPARATION
- 02866 PRESSURE HYDROGENATION OF COAL, TAR, MINERAL OIL, OR THEIR DISTILLATION OR REACTION PRODUCTS. Hupe, R.; von Szeszich, L.; Brendlein, H. (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). German(FRG) Patent 926,664. 21 Apr 1955.  
Use of Fe-containing bauxite, clay, or zeolite catalysts as effective as molybdena catalysts in hydrogenation to form gasoline provided  $H_2S$  is present to 1-12% of substrate. HYDROGENATION; COAL; TAR; MINERAL OILS; CATALYSTS; GASOLINE; PRODUCTION; IRON; ALUMINIUM OXIDES; CLAYS; ZEOLITES; HYDROGEN SULFIDES
- 02867 HYDROGENATION OF CARBON MONOXIDE. Herbert, W. (to Metallgesellschaft). German(FRG) Patent 927,990. 23 May 1955.  
Reaction carried out in several steps with Fe catalysts; use of H-rich gas; yield is 42% hard wax, 18% paraffins, 17% oil, and 23% gasoline. CARBON MONOXIDE; REDUCTION; IRON; CATALYSTS; GASOLINE; PRODUCTION; OILS; WAXES
- 02868 HYDROGENATION OF COAL, TAR, AND MINERAL OILS. Urban, W. (to Scholven-Chemie). German(FRG) Patent 932,123. 25 Aug 1955.  
Equipment. COAL; TAR; MINERAL OILS; HYDROGENATION; EQUIPMENT
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- 02870 COAL AS A RAW MATERIAL. Jones, W.I. Roy. Inst. Chem. Lectures, Monographs and

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CARBONIZATION;HYDROGENATION;COAL GASIFICATION;  
CHEMISTRY
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AND DEHYDROGENATION FIELD IN THE MEDIUM-  
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hydrogenation of brown coal tar. COAL;  
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GASOLINE;PRODUCTION;BROWN COAL;COAL TAR
- 02872 CATALYTIC CARBON MONOXIDE  
HYDROGENATION. Rottig, W. (to Ruhrchemie).  
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Co., Inc.). US Patent 2,738,311. 13 Mar  
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mainly heavy oils with minor amounts of middle  
oils and gasoline. COAL;HYDRGGENATION;  
BITUMINOUS COAL;LIGNITE;LIQUID PRODUCTS;  
DISTILLATION
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Herbert, W.; Danulat, F.; Hubmann, O. (to  
Metallgesellschaft). German(FRG) Patent  
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Starting gas obtained by gasification of  
fuels under pressure with steam and O or O-  
enriched air. CARBON MONOXIDE;REDUCTION;METHANE;  
PRODUCTION
- 02875 PREPARATION OF COAL FOR HYDROGENATION.  
Sellers, F.B. (to Texaco Development Corp.).  
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SULFATES
- 02876 CATALYSTS FOR HYDROGENATION OF CARBON  
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of Fe(NO<sub>3</sub>)<sub>3</sub> solution with Na<sub>2</sub>CO<sub>3</sub> solution.  
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CHEMICAL PREPARATION;IRON;PRECIPITATION;IRON  
NITRATES;SODIUM CARBONATES;COPPER;POTASSIUM  
CARBONATES
- 02877 CATALYTIC LOW-TEMPERATURE HYDROGENATION  
OF BROWN-COAL TARS CONTAINING MONO- AND  
MULTIVALENT PHENOLS AND SOLID PARAFFINS.  
Schnabel, B.; Kubicka, R. Czech Patent  
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pure WS<sub>2</sub> or 25% WS<sub>2</sub> + 3% NiS on carrier  
containing 72% Al<sub>2</sub>O<sub>3</sub>. COAL TAR;BROWN COAL;  
HYDROGENATION;CATALYSTS;HIGH TEMPERATURE;HIGH  
PRESSURE;TUNGSTEN SULFIDES;NICKEL SULFIDES;  
ALUMINIUM OXIDES;SYNTHETIC FUELS;PRODUCTION
- 02878 DEGRADATION PRODUCTS OF COAL  
HYDROGENOLYSIS UNDER MILD CONDITIONS. Sakabe,  
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(Resources Research Inst., Kawaguchi). Nenryo  
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presence of CuO-BaO-Cr<sub>2</sub>O<sub>3</sub> catalyst. COAL;  
HYDROGENATION;CATALYSTS;COPPER OXIDES;BARIUM  
OXIDES;CHROMIUM OXIDES;JAPAN;SOLVENT EXTRACTION;  
DISTILLATION;AROMATICS;PRODUCTION
- 02879 EFFECT OF HYDRODYNAMIC CONDITIONS ON  
THE SYNTHESIS OF HYDROCARBONS FROM CARBON  
MONOXIDE AND HYDROGEN AT ATMOSPHERIC PRESSURE.  
Gebler, I.V.; Smol'vanniov, S.E. Khim.  
Tekhnol. Topliv Masel; 1957: No. 8, 51-  
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hydrodynamic conditions had little effect on  
quality composition of products. HYDROCARBONS;  
PRODUCTION;CARBON MONOXIDE;REDUCTION;EQUIPMENT;  
HYDRODYNAMICS;COBALT;CATALYSTS
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R.W.; Anderson, R.B.; Schlesinger, M.D. (U.  
S. Bur. of Mines, Pittsburgh, PA). Ind. Eng.  
Chem.; 49: 2008-10(1957).  
At 6000 psi; NH<sub>4</sub> molybdate + H<sub>2</sub>SO<sub>4</sub> as  
catalyst. COAL;HYDROGENATION;HIGH TEMPERATURE;  
HIGH PRESSURE;GASEOUS PRODUCTS;LIQUID PRODUCTS
- 02881 HYDROGENATION OF COAL. Noda, S.;  
Matsuda, T.; Takahashi, T.; Kakuzen, T.  
(Miike Gosei Co. Ltd., Omuda). Nenryo Kyokai-  
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30-60 min in presence of Fe<sub>2</sub>O<sub>3</sub> or SnCl<sub>2</sub>;  
resultant oils reformed with H at 80-90 Kg/cm<sup>2</sup>  
and 500° in presence of MoO<sub>3</sub> catalyst to give  
75% liquid and solid hydrocarbons. COAL;  
HYDROGENATION;JAPAN;HIGH PRESSURE;HIGH  
TEMPERATURE;CATALYSTS;IRON OXIDES;TIN CHLORIDES;  
SOLIDS;LIQUID PRODUCTS
- 02882 STOICHIOMETRY OF THE HYDROGENATION OF  
CARBON MONOXIDE. Chang, C.-H. Jan Liao  
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CHEMICAL REACTION KINETICS
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Comparison of Fe catalysts containing Cu and  
BaO, or CaO, or SrO. CARBON MONOXIDE;REDUCTION;  
HYDROGEN;COMPARATIVE EVALUATIONS;CATALYSTS;IRON;  
COPPER;BARIUM OXIDES;CALCIUM OXIDES;STRONTIUM  
OXIDES
- 02884 IRON CATALYSTS FOR HYDROGENATION OF  
CARBON MONOXIDE. Rottig, W. (to Ruhrchemie  
and Lurgi Gesellschaft fuer Waermetechnik mbH).  
US Patent 2,768,817. 26 Mar 1957.  
Preparation of iron catalyst from waste  
FeSO<sub>4</sub> solution. CARBON MONOXIDE;REDUCTION;  
HYDROGEN;CATALYSTS;IRON;CHEMICAL PREPARATION;  
IRON SULFATES;PRECIPITATION;AMMONIUM COMPOUNDS
- 02885 REDUCTION OF IRON CATALYSTS OR  
HYDROGENATION OF CARBON MONOXIDE. Koelbel, H.;  
Langheim, R. (to Rheinpreussen fuer Bergbau  
und Chemie). British Patent 771,557. 3 Apr  
1957.  
CARBON MONOXIDE;REDUCTION;HYDROGEN;CATALYSTS;  
IRON
- 02886 HYDROGENATION OF CARBON MONOXIDE. (to  
Rheinpreussen fuer Bergbau und Chemie).  
British Patent 780,880. 7 Aug 1957.  
Synthesis gas containing CO passed up  
through liquid medium having Fe catalyst in  
suspension; conversion of 90% of CO to  
hydrocarbon in one reactor; in several stages,  
98-99% of CO is converted. CARBON MONOXIDE;  
REDUCTION;CATALYSTS;IRON;HYDROCARBONS;  
PRODUCTION
- 02887 HYDROCARBONS BY CATALYTIC HYDROGENATION  
OF CARBON MONOXIDE. (to Ruhrchemie and Lurgi  
Gesellschaft fuer Waermetechnik mbH). British  
Patent 780,577. 7 Aug 1957.  
Process improved by: recycling part of exit  
gas, dividing recycled gas into 2 streams and  
recycling one without removing CO<sub>2</sub>, and  
removing CO<sub>2</sub> from the other stream to mix with  
fresh synthesis gas. CARBON MONOXIDE;REDUCTION;  
HYDROCARBONS;PRODUCTION;CATALYSIS

- 02888 REACTOR FOR HYDROGENATION OF CARBON MONOXIDE. (to Rheinpreussen fuer Bergbau und Chemie). British Patent 780,971. 14 Aug 1957.  
Hydrocarbons produced in presence of catalyst suspended in liquid medium. CARBON MONOXIDE; REDUCTION; EQUIPMENT; HYDROCARBONS; PRODUCTION; CATALYSTS
- 02889 HYDROCARBONS BY CATALYTIC HYDROGENATION OF CARBON MONOXIDE. (to Rheinpreussen fuer Bergbau und Chemie). British Patent 782,906. 18 Sep 1957.  
Reaction of steam with CO in presence of catalyst containing metal of Group VIII at 150-400° and pressure up to 200 atm. CARBON MONOXIDE; REDUCTION; HYDROCARBONS; PRODUCTION; STEAM; CATALYSTS; HIGH PRESSURE; HIGH TEMPERATURE
- 02890 HYDROGENATION OF CARBON MONOXIDE. (to Rheinpreussen fuer Bergbau und Chemie). British Patent 786,888. 27 Nov 1957.  
Equipment. CARBON MONOXIDE; REDUCTION; EQUIPMENT
- 02891 PRETREATMENT OF OXIDIC IRON CATALYST USED IN HYDROCARBON SYNTHESIS. (to Rheinpreussen fuer Bergbau und Chemie). British Patent 787,124. 4 Dec 1957.  
Treatment of Fe oxide catalyst with O gives longer life than treatment with air. HYDROCARBONS; PRODUCTION; CATALYSTS; IRON OXIDES; CARBON MONOXIDE; REDUCTION; OXYGEN; AIR
- 02892 CATALYTIC HYDROGENATION OF CARBON MONOXIDE. (to Rheinpreussen fuer Bergbau und Chemie). British Patent 787,122. 4 Dec 1957.  
Multistage, liquid medium catalytic process; precipitated Fe catalyst suspension. CARBON MONOXIDE; REDUCTION; CATALYSTS; EQUIPMENT; HYDROCARBONS; PRODUCTION
- 02893 PRODUCTION OF HIGH YIELDS OF AROMATIC HYDROCARBONS BY HYDROGENATION. Goncharova, N.V.; Krivczubova, N.V.; Evseev, G.D.; Voitekhov, A.A.; Kasatkin, D.F.; Karzhev, V.I. Khim. Tekhnol. Toplivi Masel; 3: No. 12, 15-21(1958).  
Hydrogenation of tars from semicoking of coals together with 160-280° fraction from catalytic cracking of vacuum distillate of high-S petroleum using Cr catalyst. AROMATICS; PRODUCTION; COAL TAR; HYDROGENATION; CHROMIUM; CATALYSTS.
- 02894 QUESTION OF THE MECHANISM OF THE INITIAL STAGES OF THE HYDROGENATION OF COAL. II. CHANGE IN COMPOSITION OF ASPHALTENES TAKING PLACE IN THE PROCESS OF COAL HYDROGENATION. Merkov, L.K.; Grechkin, D.B. Trudy Vostochno-Sibir. Filiala, Akad. Nauk SSSR, Ser. Khim.; 1958: No. 18, 70-7(1958).  
COAL; HYDROGENATION; HIGH TEMPERATURE; PRODUCTION; AROMATICS; ASPHALTS
- 02895 CATALYTIC REDUCTION OF TAR COMPONENTS BY MOLYBDENUM TRISULFIDE. II. BICYCLIC HYDROCARBONS (DIPHENYL). III. MONOCYCLIC PHENOLS. IV. CONDENSED-NUCLEUS PHENOLS ( $\alpha$ - AND BETA-NAPHTHOLS). Yamada, M. Coal Tar; 10: No. 12, 727(1958). (In Japanese).  
Effects of pressure, temperature, and residence time on hydrogenation of biphenyl. CATALYSIS; REDUCTION; COAL TAR; PRESSURE DEPENDENCE; TEMPERATURE DEPENDENCE; TIME DEPENDENCE; BIPHENYL; CYCLOALKANES; PRODUCTION; NAPHTHOLS; PHENOLS
- 02896 WORK OF CHINESE SCIENTISTS IN THE FIELD OF DESTRUCTIVE HYDROGENATION OF FUELS. Kalechits, I.V.; Khe, S.-L. Khim. Tekhnol. Toplivi Masel; 3: No. 7, 53-62(1958).  
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- 02897 COAL HYDROGENATION CATALYSTS. Chen, K.-C.; Chang, F.-L. Jan Liao Hsueh Pao; 3: 23-34(1958). (In English).  
Catalysts of SnCl<sub>2</sub>O<sub>4</sub> plus NH<sub>4</sub>Cl, SnCl<sub>2</sub>, tin ore plus NH<sub>4</sub>Cl, ZrCl<sub>2</sub>, (NH<sub>4</sub>)<sub>2</sub>MoO<sub>4</sub>, or sulfurized bog iron ore. CATALYSTS; COAL; HYDROGENATION; AUTOCLAVES; CHINA
- 02898 FLUIDIZED-BED REACTIONS, ESPECIALLY HYDROGENATION OF CARBON MONOXIDE. Mungen, R. (to Pan American Petroleum Corp.). US Patent 2,823,219. 11 Feb 1958.  
Equipment; 2-reactor system preferred. CARBON MONOXIDE; REDUCTION; FLUIDIZED BED; EQUIPMENT
- 02899 HYDROGENATION REACTOR. Isaichev, I.I.; Malashin, N.P.; Nedoshivin, A.L. USSR Patent 109,592. 25 Feb 1958.  
CARBONACEOUS MATERIALS; HYDROGENATION; EQUIPMENT
- 02900 INVESTIGATIONS ON AGGLOMERATION DURING LOW-PRESSURE HYDROGENATION OF COAL IN A FLUIDIZED BED. Kawa, W.; Hiteshue, R.W.; Budd, W.A.; Friedman, S.; Anderson, R.B. U. S. Bur. Mines, Bull.; No. 579, 1-11(1959).  
Agglomeration is main difficulty during low pressure hydrogenation of dry, bituminous coal in fluidized bed; pretreatment of coal with alkali carbonate or ammonium molybdate in presence or absence of H prevents agglomeration. COAL; HYDROGENATION; FLUIDIZED BED; BITUMINOUS COAL; AGGLOMERATION; MOLYBDATES; AMMONIUM COMPOUNDS; ALKALI METAL COMPOUNDS; CARBONATES; OILS; PRODUCTION; HYDROGEN
- 02901 COMPOSITION OF COMMERCIAL LIQUID-PHASE HYDROGENATION PRODUCTS. II. COMPOSITION OF THE SLUDGE OF THE HYDROGENATE OF THE HEAVY OIL FROM MEDIUM-TEMPERATURE TARS FROM CHEREMKHOVO COALS. Nikolaeva, D.K.; Sidorov, R.I. Trudy Vostochno-Sibir. Filiala, Akad. Nauk SSSR, Ser. Khim.; 1959: No. 18, 14-20(1959).  
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- 02902 INTERFERENCE OF ARSENIC IN HIGH-PRESSURE HYDROGENATION OF BROWN-COAL TARS. Svajgl, O. (Vyzk. Ustav. Pro Chem. Využití Uhli, Zaluži, Czech.). Chem. Průmysl; 9: 230-4(1959).  
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- 02904 COMPOSITION OF COMMERCIAL LIQUID-PHASE HYDROGENATION PRODUCTS. I. COMPOSITION OF A WIDE FRACTION OBTAINED BY LIQUID-PHASE HYDROGENATION OF THE HEAVY OIL FROM MEDIUM-TEMPERATURE TAR FROM CHEREMKHOVO COAL. Sidorov, R.I.; Trotsenko, Z.P. Trudy Vostochno-Sibir. Filiala, Akad. Nauk SSSR, Ser. Khim.; 1959: No. 18, 5-13(1959).  
COAL TAR OILS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; PRODUCTION; HYDROCARBONS; AROMATICS; ALKANES; CARBONYLS; NAPHTHALENE
- 02905 MECHANISM OF THE INITIAL STAGE OF COAL HYDROGENATION. I. INFLUENCE OF TEMPERATURE ON COAL CONVERSION IN A HYDROGENATION PROCESS.

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- 02906 MECHANISM OF COAL HYDROGENATION. Pinchin, F.J. Bull. Brit. Coal Utilisation Research Assoc.; 23: 465-76(1959).  
Review with 58 references. COAL; HYDROGENATION;REVIEWS
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- 02911 TWO-STAGE PROCESS FOR PRODUCTION OF CHEMICAL INTERMEDIATES, MOTOR OIL AND GASES BY HYDROGENATION OF CHEREMKHOVO COAL TAR. Blonskaya, A.I.; Lozovoi, A.V.; Muselevich, D.L. Trudy Inst. Goryuchikh Iskopaemykh AN SSSR; 9: 5(1959). (In Russian).  
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Pilot plant with simplified flow chart; capacity of 100 tons coal/day; plant operates at 450 to 550°C. COAL;HYDROGENATION;PILOT PLANTS;HIGH TEMPERATURE;FLOWSHEETS;WEST VIRGINIA;PHENOL;CRESOLS;TOLUENE;NAPHTHALENE; QUINOLINES;ANILINE;PRODUCTION
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- 02915 INFRA-RED SPECTROSCOPIC INVESTIGATION OF THE MECHANISM OF TRANSFORMATION OF HIGH-MOLECULAR FRACTION OF SEMI-COKED TAR DURING DESTRUCTIVE HYDROGENATION. Okladnikova, Z.A.; Nakhmanovich, A.S.; Shchergina, N.I. Trudy Vostochno-Sibirskogo Filiala AN SSSR; No. 26, 39(1959). (In Russian).  
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- 02919 COAL HYDROGENATION. Howell, J.H.; Doughty, E.W.; Alspaugh, P.L. US Patent 2,913,388. 17 Nov 1959.  
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- 02923 HYDROGENATING COAL IN A PILOT PLANT WITH A MOLYBDENUM CATALYST. Ginsberg, H.H.; Friedman, S.; Lewis, P.S.; Schlesinger, M.D.; Stewart, A.J.; Hiteshue, R.W. (U. S. Bur. of Mines, Pittsburgh, PA). U. S. Bur. Mines, Rept. Invest.; No. 5673, 35p.(1960).  
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- 02931 COMPOSITION OF THE PRODUCT FROM MEDIUM-PRESSURE HYDROGENATION OF A COAL-TAR DISTILLATE. Vaidyeshwaren, R.; Zaheer, S.H.; Pichler, H. (Regional Research Lab., Hyderabad). Chem. Age India; 12: 105-10(1961).  
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- 02944 STUDIES OF THE KINETICS OF HYDROGENATION REACTIONS. HYDROGENATION OF CRESOL. Gunther, G. Chem. Tech. (Leipzig); 13: No. 12, 720-3(1961). (In German).  
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- 02945 COMPOSITION OF INDUSTRIAL LIQUID-PHASE HYDROGENATES. COMMUNICATION 5. RESEARCH ON THE COMPOSITION OF THE MIXTURES OF AROMATIC HYDROCARBONS OF THE LIQUID-PHASE HYDROGENATES OBTAINED FROM MEDIUM-TEMPERATURE CHEREMKHOVO COAL TAR. Sidorov, R.I.; Trotsenko, Z.P.; Nakhmanovich, A.S. Trudy Vostochno-Sibirskogo Filiala AN SSSR, khimicheskaya seriya; No. 38, 68(1961). (In Russian).  
Mixture contains compounds of the homologous groups of benzene, indan, tetralin, and naphthalene. HYDROGENATION;COAL TAR;BENZENE; AROMATICS;CYCLOALKANES;TETRALIN;NAPHTHALENE
- 02946 RELATIVE ACTIVITY OF IMPREGNATED AND MIXED MOLYBDENUM CATALYSTS FOR COAL HYDROGENATION. Schlesinger, M.D.; Frank, L.V.; Hiteshue, R.W. (U. S. Bur. Mines, Pittsburgh, PA). U. S. Bur. Mines, Rept. Invest.; No. 6021, 12p.(1962).  
When a vehicle oil produced from coal is present, coal is hydrogenated to same high conversion whether Mo catalyst is impregnated on coal or mixed with slurry; hydrogenation at 8500-10,000 p.s.i. at 400-500°. CATALYSTS;COAL; HYDROGENATION;MOLYBDENUM;HIGH PRESSURE;HIGH TEMPERATURE
- 02947 COMPOSITION OF UDEX EXTRACT PRODUCED FROM HYDROGENATE OF COAL TAR LIGHT OIL. Kanayama, H.; Nakamura, S.; Ogawa, M. Coal Tar; 14: No. 5, 240-5(1962). (In Japanese).  
Solvent produced from hydrogenate of light oil and extracted by diethylene-glycol contains 30 to 40% aromatics, 60 to 70% hydrocarbons of paraffin and naphthene series and is practically free of olefins. COAL TAR OILS; HYDROGENATION;ORGANIC SOLVENTS;PRODUCTION; AROMATICS;ALKANES;CYCLOALKANES
- 02948 DEALKYLATION OF TAR OIL IN THE PRESENCE OF AN ALUMINA CATALYST. EFFECTS OF PRESSURE AND TEMPERATURE. Matsuda, S.; Kirkawa, S.; Uchida, A. Kogyo Kagaku Zasshi; 65: No. 4, 568-74, A39-40(1962). (In Japanese).  
Formation of benzene, toluene, xylene, and naphthalene by hydrodealkylation of methylnaphthalene fraction from tar oil in presence of Al oxide at 600 to 650°C and H pressure of 30 to 50 atm. COAL TAR OILS; ALUMINIUM OXIDES;CATALYSTS;HYDROGENATION;HIGH TEMPERATURE;MEDIUM PRESSURE;BENZENE;TOLUENE; XYLENES;NAPHTHALENE;METHANE;PRODUCTION;LIQUID PRODUCTS
- 02949 RESEARCH ON THE IMPROVEMENT OF CATALYSTS FOR HYDROGENATION OF TARS AND MEDIUM OILS. Muenzig, E.; Blume, H.; Pindur, E. Zeitschrift fuer Chemie; 2: No. 3, 76-83(1962). (In German).  
Brief history of development of hydrogenation catalysts; most of new catalysts are oxides. RESEARCH PROGRAMS;CATALYSTS;HYDROGENATION;OILS; TAR;CHEMICAL PREPARATION;OXIDES;REVIEWS
- 02950 LIQUID-PHASE HYDROGENATION OF MIKE COAL BY EXPERIMENTAL FLOW PLANT. EXPERIMENTAL RESULTS WITH CREOSOTE AS VEHICLE. Sakabe, T.; Ogo, Y.; Sassa, R.; Suzuki, M.; Horie, M.; Kambayashi, Y.; Ohisa, T.; Takahashi, M.; Hunaki, M. Kogyo Kagaku Zasshi; 65: No. 3, 297-303, A21(1962). (In Japanese).  
Pressure of 200 to 300 atm, temperature of 440 to 460°C, material feed of 6 kg/hr, and hydrogen feed of 5.5 Ncu m/hr. COAL;JAPAN; HYDROGENATION;HYDROGEN;HIGH PRESSURE;HIGH TEMPERATURE
- 02951 HYDROGENATION OF IRRADIATED COAL. Lewis, P.S.; Kawa, W.; Hiteshue, R.W. (U. S. Bur. of Mines, Pittsburgh, PA). U. S. Bur. Mines, Rept. Invest.; No. 6022, 12p.(1962).  
Irradiation with  $\gamma$  and x rays prior to hydrogenation; hydrogenation at 6000 p.s.i. at 400°. COAL;HYDROGENATION;IRRADIATION;X RADIATION;GAMMA RADIATION;COAL RANK
- 02952 SILICA-ALUMINA CATALYSTS FOR HIGH-PRESSURE HYDROGENATION. Lozovoi, A.V.; Muselevich, D.L.; Ravikovich, T.M.; Senyavin, S.A.; Titova, T.A.; Cherkasova, V.F. Trudy Inst. Goryuchikh Iskopaemykh AN SSSR; 17: 199-211(1962). (In Russian).  
Catalysts of silica-alumina-askanite activated by HF plus small amounts of oxides or sulfides of Cr, Mo, Ni, Fe, Zn, or W. HYDROGENATION;CATALYSTS;COAL TAR;VAPORS; CHROMIUM OXIDES;MOLYBDENUM OXIDES;NICKEL OXIDES; IRON OXIDES;ZINC OXIDES;TUNGSTEN OXIDES; CHROMIUM SULFIDES;MOLYBDENUM SULFIDES;NICKEL SULFIDES;IRON SULFIDES;ZINC SULFIDES;TUNGSTEN SULFIDES;CHEMICAL PREPARATION;ALUMINIUM OXIDES; SILICON OXIDES
- 02953 PRODUCTION OF CHEMICALS FROM THE ANTHRACENE FRACTION OF COAL TAR BY HIGH-TEMPERATURE HYDROGENATION. Borts, A.G.; Krichko, A.A.; Konyashina, R.A.; Lozovoi, A.V.;

- Lvova, L.N. Trudy Inst. Goryuchikh Iskopzemykh AN SSSR; 17: 250-61(1962). (In Russian).
- Study of hydrogenation in continuous plant of first anthracene fraction crystallized from coal tar; flow chart proposed for production of solvents, C<sub>6</sub> to C<sub>8</sub> aromatics, naphthalene and other products. HYDROGENATION; COAL TAR; FLOWSHEETS; ORGANIC SOLVENTS; AROMATICS; NAPHTHALENE; PRODUCTION
- 02954 TWO-STAGE PROCESS FOR PRODUCTION OF CHEMICALS BY HYDROGENATION OF CHEREMKHOVO COAL TAR. Lozovoi, A.V.; Muselevich, D.L.; Ravikovich, T.M.; Titova, T.A.; Cherkasova, V.F. Trudy Inst. Goryuchikh Iskopzemykh AN SSSR; 17: 174-81(1962). (In Russian).
- Two-stage (liquid and vapor phase) process yields 60 to 66% chemicals and intermediates (aromatics and C<sub>6</sub> to C<sub>8</sub> phenols, naphthalene, diluents, etc.) and 33 to 37% hydrocarbon gases (alkanes) at H expenditure of 5.7 to 6.0% of coal tar weight. COAL TAR; HYDROGENATION; AROMATICS; PRODUCTION; PHENOLS; NAPHTHALENE; ALKANES; HYDROCARBONS; GASEOUS PRODUCTS
- 02955 STUDIES ON COAL HYDROGENATION PROCESS. Takeya, G. Nenryo Kyokai-shi; 41: No. 421, 466-77(1962). (In Japanese).
- Use of autoclave that handles 8 liters/hr of coal paste to prepare aromatic compounds; study of kinetics of process. COAL; HYDROGENATION; AUTOCLAVES; COAL PASTES; CHEMICAL REACTION KINETICS; AROMATICS; PRODUCTION
- 02956 NEW ASPECTS IN COAL-TAR PROCESSING. Klimke, R.; Gondzik, J. Freiburger Forschungshefte, A; No. 221, 29-48(1962). (In German).
- Description of methods for conversion of brown coal into paraffins, phenols, pyridine, and electrode coke; most efficient method is hydrogenation at 40 atm and 330°C. COAL; COAL TAR; BROWN COAL; HYDROGENATION; ALKANES; PHENOLS; PYRIDINES; COKE; PRODUCTION
- 02957 COMPOSITION OF THE HYDROAROMATIZATE FROM CHEREMKHOVO SEMI-COKED COAL TAR. Blonskaya, A.I.; Lozovoi, A.V. Trudy Inst. Goryuchikh Iskopzemykh AN SSSR; 17: 187-98(1962). (In Russian).
- Production of aromatics, naphthene, normal alkanes, and isoalkanes. COAL TAR; HYDROGENATION; USSR; PRODUCTION; ALKANES; AROMATICS; CYCLOALKANES
- 02958 NEW CHEMICAL STRUCTURE FOR COAL. Hill, G.R.; Lyon, L.B. Ind. Eng. Chem.; 54: No. 6, 36-41(1962). (In English).
- Yield of liquids from coal distillation depends mainly on structure of coal, particularly functional groups, and process used to convert coal into liquids and coke. COAL; HYDROGENATION; LIQUID PRODUCTS; DISTILLATION
- 02959 METHOD OF HYDROGENATING HYDROCARBON-NONHYDROCARBON MIXTURE. Svajgl, G. CSSR; No. 103, 170(15 Mar 1962). (In Czech).
- Method for hydrogenating hydrocarbons mixed with nonhydrocarbon compounds, e.g., phenols, N bases, or S compounds; catalysts contain W and Ni sulfides and active alumina; all nonhydrocarbons and olefins are converted into saturated or aromatic hydrocarbons. HYDROGENATION; ALKENES; AROMATICS; ALKANES; PRODUCTION; HIGH TEMPERATURE; PHENOLS; ORGANIC NITROGEN COMPOUNDS; ORGANIC SULFUR COMPOUNDS; CATALYSTS; TUNGSTEN SULFIDES; NICKEL SULFIDES; ALUMINIUM OXIDES
- 02960 METHOD OF PROCESSING HIGH-BOILING COAL-TAR FRACTIONS. Katsobashvili, Y.R.; Garber, Y.N.; Elbert, E.I.; Belenko, Z.G.; Borts, A.G. USSR Patent 143,786. 21 Mar 1962. (In Russian).
- Processing of high-boiling coal tar fractions into low-boiling aromatic hydrocarbons; hydrocracking at 10 to 50 atm and 450 to 700°C in presence of Co-alumina catalysts. COAL TAR; FRACTIONATION; AROMATICS; HYDROGENATION; CRACKING; CATALYSTS; COBALT; ALUMINIUM OXIDES; PRODUCTION; HIGH TEMPERATURE; MEDIUM PRESSURE
- 02961 METHOD OF PROCESSING HIGH-BOILING COAL-TAR FRACTIONS. Katsobashvili, Y.R.; Garber, Y.N.; Elbert, E.I.; Belenko, Z.G. USSR Patent 145,561. 21 Mar 1962. (In Russian).
- Processing of high-boiling coal tar fractions into low-boiling aromatic hydrocarbons; hydrocracking at 10 to 50 atm and 300 to 350°C in presence of Co-alumina catalysts. COAL TAR; FRACTIONATION; AROMATICS; HYDROGENATION; CRACKING; CATALYSTS; COBALT; ALUMINIUM OXIDES; PRODUCTION; HIGH TEMPERATURE; MEDIUM PRESSURE
- 02962 HYDROGENATION OF COAL. Schroeder, W.C. US Patent 3,030,297. 17 Apr 1962. (In English).
- Production of predominantly single-ring aromatic hydrocarbons; ammonium molybdate catalyst used with coal dust and stream of H at 35 to 420 atm and 600 to 1000°C. COAL; HYDROGENATION; COAL FINES; AROMATICS; PRODUCTION; HYDROGEN; MEDIUM PRESSURE; HIGH PRESSURE; HIGH TEMPERATURE; VERY HIGH TEMPERATURE; AMMONIUM COMPOUNDS; MOLYBDATES; CATALYSTS
- 02963 COAL-TAR PROCESSING METHOD. Katsobashvili, Y.R.; Garber, Y.N.; Elbert, E.I.; Lukanin, A.A. USSR Patent 148,038. 21 Jun 1962. (In Russian).
- No-residue process for converting coal tar into aromatic and hydroaromatic hydrocarbons; fixed bed with highly active catalysts at 30 to 50 atm. COAL TAR; HYDROGENATION; CATALYSTS; MEDIUM PRESSURE; FRACTIONATION; AROMATICS; PRODUCTION
- 02964 (NYO-10184) EVALUATION OF BETA RADIATION AS A HYDROGENATION CATALYST. QUARTERLY TECHNICAL STATUS REPORT NO. 1, MARCH 1-MAY 31, 1962. Yavorsky, P.M.; Gorin, E. (Consolidation Coal Co., Library, Pa. (USA). Research Div.). 1 Jul 1962. Contract AT(30-1)-2978. 30p.
- Hydrocracking of coal derivatives. COAL; COAL EXTRACTS; BETA PARTICLES; RADIATION CHEMISTRY; CHEMICAL RADIATION EFFECTS; HYDROGENATION; HYDROCRACKING; LIQUID FUELS; CATALYSTS; BETA SOURCES; STRONTIUM 90; CATALYSIS; RESEARCH PROGRAMS
- 02965 HYDROGENATION OF COAL AND TAR. Donath, E.E. (Koppers Co. Inc., Pittsburgh, PA). Chem. Coal Util., Suppl. Vol.; 1963: 1041-80(1963).
- COAL; HYDROGENATION; COAL TAR
- 02966 TEST OF HYDROGENATION OF A COAL BY ATOMIC HYDROGEN. Letort, M.; Boyer, A.F.; Payen, P. Bull. Soc. Chim. Fr.; 1963: No. 8-9, 1589-93(1963).
- Reaction velocity increased by 3% H<sub>2</sub>O, but gaseous products were mainly methane and CO. HYDROGENATION; COAL; WATER; METHANE; CARBON MONOXIDE; PRODUCTION
- 02967 TECHNICAL DEVELOPMENTS IN THE USAEC PROCESS RADIATION DEVELOPMENT PROGRAM. Machurek, J.E.; Stein, M.H. (AEC, Washington, DC). pp 15-39 of Industrial uses of large radiation sources. Vol. I. Vienna; International Atomic Energy Agency (1963).
- Use of fission-product β radiation for hydrogenation of coal and coal products to produce liquid hydrocarbon fuels. BETA PARTICLES; HYDROGENATION; CHEMICAL RADIATION EFFECTS; COAL; FISSION PRODUCTS; BETA SOURCES;



- HYDROGENATION; COAL LIQUEFACTION; RESEARCH PROGRAMS; COAL EXTRACTS; HYDROCRACKING
- 02968 SPECTROSCOPIC INVESTIGATION OF ASPHALTENES FROM COAL HYDROGENATION. Egorova, O.I.; Markov, L.K.; Kasatochkin, V.I. *Khim. Tekhnol. Topliv Masel*; No. 5, 31-4(1963). (In Russian).  
X-ray and ir spectra of asphaltenes from hydrogenation of Cheremkhovo fancy coal; hydrogenation characterized as process of thermal decomposition, in presence of H, of side radicals of a polymer with release of structural units, e.g., asphaltene molecules; H helps prevent repolymerization of structural units. BITUMENS; COAL; HYDROGENATION; X-RAY SPECTRA; INFRARED SPECTRA
- 02969 1,1-DIPHENYLETHANE IN COAL HYDROGENATION PRODUCTS. Tanaka, S.; Matsui, T. *Sogo Shikensho Nempo*; 22: No. 1, 15-9(1963). (In Japanese).  
Neutral oil extracted from coal hydrogenation products contains compound with charo absorption band at 14.3 micrometers in ir spectrum identified as 1,1-diphenylethane. COAL; HYDROGENATION; SOLVENT EXTRACTION; AROMATICS; ALKANES; INFRARED SPECTRA; OILS
- 02970 CATALYTIC HYDROGENATION OF COAL-TAR COMPONENTS BY MOLYBDENUM SULFIDE. Shono, S.; Yamada, M. *Coal Tar*; 15: No. 9, 405-10(1963). (In Japanese).  
Good yields of benzene below 250°C; phenol, cresols, and ethylphenol reduced with yield up to 40%. CATALYSTS; MOLYBDENUM SULFIDES; HYDROGENATION; COAL TAR; BENZENE; PRODUCTION; CRESOLS; PHENOLS; REDUCTION; NAPHTHOLS; HIGH TEMPERATURE; HIGH PRESSURE; PYRIDINES; QUINOLINES; CARBAZOLES
- 02971 EXTRACTION OF PLASTIC MATERIALS AND BINDERS FROM COALS. Taits, E.M.; Bronovets, T.M.; Andreeva, I.A. *Khim. Tekhnol. Topliv Masel*; No. 2, 24(1963). (In Russian).  
Moderate-temperature hydrogenation process for preparation of products having valuable plastic and binding properties. COAL; SOLVENT EXTRACTION; HYDROGENATION; ORGANIC POLYMERS; BINDERS; PRODUCTION
- 02972 HIGH-PRESSURE LIQUID-PHASE HYDROGENOLYSIS OF COAL IN CONTINUOUS-TYPE EXPERIMENTAL APPARATUS. II. Sakabe, T. *Kagaku Kojo*; 8: No. 1, 102-4(1963). (In Japanese).  
COAL; HYDROGENATION; PYROLYSIS; LIQUIDS; EQUIPMENT
- 02973 HIGH-PRESSURE LIQUID-PHASE HYDROGENOLYSIS OF COAL IN CONTINUOUS-TYPE EXPERIMENTAL APPARATUS. I. Sakabe, T. *Kagaku Kojo*; 7: No. 13, 77-81(1963). (In Japanese).  
COAL; HYDROGENATION; PYROLYSIS; LIQUIDS; EQUIPMENT
- 02974 AGITATION IN LIQUID-PHASE COAL HYDROGENATION PROCESS AND ITS SCALE EFFECT. Sakabe, T.; Ogo, Y. *Kogyo Kagaku Zasshi*; 66: No. 12, 1875-80, A117(1963). (In Japanese).  
Pressure of 300 atm; temperatures of 445 to 465°C. COAL; HYDROGENATION; COAL PASTES; HYDROGEN; HIGH PRESSURE; HIGH TEMPERATURE; EQUIPMENT
- 02975 CHEMICAL CHARACTERISTICS AND STRUCTURAL-GROUP COMPOSITION OF SOLUBLE HYDROGENATES OF FUSAIN MICROCOMPONENTS. Zabrannyi, D.T.; Nasritdinov, C. *Izvestiya AN SSSR, Otd. Tekhn. Nauk., Energetika i Transport*; No. 2, 238-42(1963). (In Russian).  
COAL; HYDROGENATION
- 02976 STUDY OF COAL HYDROGENATION BY ATOMIC HYDROGEN. Letort, M.; Boyer, A.F.; Payen, P. *Bull. Soc. Chim. Fr.*; No. 8-9, 1589-93(1963). (In French).  
Atomic H produced by electric discharge; equipment. COAL; HYDROGENATION; ATOMS; ELECTRIC DISCHARGES; METHANE; ETHYLENE; CARBON MONOXIDE; PRODUCTION
- 02977 ACS SYMPOSIA SHOW COAL STILL HAS MANY USES. *Brit. Chem. Eng.*; 8: No. 6, 417-8(1963). (In English).  
Brief abstracts of papers on preparation of humic acids, manufacture of phthalic anhydride, hydrogenation of shale oil, upgrading of iron concentrate, etc.. COAL; OIL SHALES; HYDROGENATION; HUMIC ACIDS; PRODUCTION; ANHYDRIDES
- 02978 LIQUID-PHASE HYDROGENATION OF MIKE COAL BY EXPERIMENTAL FLOW PLANT. RESULTS OF RUNS WITH HEAVY OIL RECOVERED FROM PRODUCT AS VEHICLE. Sakabe, T.; Ogo, Y.; Sassa, R.; Horie, M. *Kogyo Kagaku Zasshi*; 66: No. 6, 735-46, A49(1963). (In Japanese).  
Hydrogenation at 300 atm with Bayer mass catalyst. COAL; HYDROGENATION; MATERIAL BALANCE; HYDROGEN
- 02979 HYDROGENATION, CHROMATOGRAPHY AND THERMODIFFUSION OF ELECTROSTATICALLY PURIFIED LOW-TEMPERATURE TAR. Landa, S.; Urban, M. *Brennst.-Chem.*; 44: No. 12, 377-82(1963). (In German).  
Primary tar extracted in electrostatic tar extractor during low-temperature carbonization in Lurgi ovens; autoclave hydrogenation at 180 to 350°C in presence of Mo sulfide catalyst. HYDROGENATION; COAL TAR; EQUIPMENT; AUTOCLAVES; CATALYSTS; MOLYBDENUM SULFIDES; LURGI PROCESS
- 02980 (NYO--10186) EVALUATION OF BETA RADIATION AS A HYDROGENATION CATALYST. INTERIM TECHNICAL STATUS REPORT NO. 3, SEPTEMBER 1--DECEMBER 31, 1962. Yavorsky, P.M.; Gorin, E. (Consolidation Coal Co., Library, Pa. (USA). Research Div.). 1 Feb 1963. Contract AT(30-1)-2978. 33p.  
Hydrocracking of coal derivatives. COAL; COAL EXTRACTS; BETA PARTICLES; CHEMICAL RADIATION EFFECTS; CATALYSTS; CATALYSIS; HYDROGENATION; BIPHENYL; AROMATICS; RADIATION CHEMISTRY; NITROGEN; OXYGEN; SULFUR; REMOVAL; RESEARCH PROGRAMS
- 02981 REFINING OF COAL HYDROGENATION PRODUCT. Overholt, D.C.; Roy, G.D.; Warren, R.R. US Patent 3,084,118. 2 Apr 1963. Filed date 10 Aug 1959. (In English).  
One hundred parts of hydrogenate combined with 50 to 100 parts aromatic hydrocarbon and 2 to 5 parts of coagulant, such as sulfuric acid; top and bottom layers processed separately. COAL; HYDROGENATION; AROMATICS; REFINING; LIQUID PRODUCTS
- 02982 COAL HYDROGENATION PROCESS. Howell, J.H.; Doughty, E.W.; Alspaugh, P.L. Australian Patent 242,754. 16 Oct 1963. Filed date 22 Oct 1959. (In English).  
Medium temperature and pressures in combination with low space velocities; use of coal pastes; H passed through paste at 175 to 840 atm and 490 to 560°C; equipment. EQUIPMENT; COAL; HYDROGENATION; COAL PASTES; HYDROGEN; HIGH PRESSURE; HIGH TEMPERATURE
- 02983 RECENT PROGRESS IN COAL CHEMISTRY. II. HYDROGENATION OF COAL AND UTILIZATION OF ITS PRODUCTS. Hirao, I.; Fujimoto, T. *Yuki Gosei Kagaku Kyokai Shi*; 22: No. 3, 177-88(1964).  
Review with 111 references. COAL; HYDROGENATION
- 02984 HYDROGENATION OF NEW MEXICO COAL AT SHORT RESIDENCE TIME AND HIGH TEMPERATURE.

- Friedman, S.; Hiteshue, R.W.; Schlesinger, M.D. (U. S. Bur. of Mines, Pittsburgh, Pa). U. S. Bur. Mines, Rept. Invest.; No. 6470, 28p. (1964).  
Study using bench-scale, semicontinuous unit at 500-6000 psig, 480-10000, and residence times less than 1 min. to 12 min.; NH<sub>3</sub>, heptamolybdate impregnated in coal. COAL; HYDROGENATION; MEDIUM PRESSURE; HIGH PRESSURE; HIGH TEMPERATURE; HYDROCARBONS; PRODUCTION
- 02985 UNCONVENTIONAL METHODS OF HYDROGENATING COAL. Kawa, W.; Hiteshue, R.W. (U. S. Bur. of Mines, Pittsburgh, Pa). U. S. Bur. Mines, Inform. Circ.; No. 8125, 29p. (1964).  
Report briefly abstracts 78 patents and papers with general discussion on advantages and disadvantages. COAL; HYDROGENATION
- 02986 HYDROGENOLYSIS AND STRUCTURE OF HOKKAIDO COALS. I. Nagai, H.; Akama, A. (Prefect. Chem. Ind. Res. Inst., Hokkaido, Japan). Kogyo Kagaku Zasshi; 67: No. 8, 1260-6 (1964).  
Use of Bayer catalyst; initial H pressure of 100 atm, temperatures of 425 and 450°; and contact time of 2 hr. HYDROGENATION; COAL; JAPAN; COAL PASTES; CATALYSTS; EQUIPMENT; HIGH PRESSURE; HIGH TEMPERATURE
- 02987 NORMAL ALKANES FROM COAL HYDROGENATION PRODUCTS. Shih, M.-J.; Yang, H.-J.; Peng, S.-I. K'c Hsueh T'ung Pao; 9: 808-10 (1964). (In Chinese).  
ALKANES; PRODUCTION; HYDROGENATION; COAL
- 02988 INVESTIGATIONS ON PRESSURE HYDROGENATION OF COAL TAR. III. STUDY OF MAJOR FACTORS AFFECTING THE PROCESS OF LIQUID-PHASE PRESSURE HYDROGENATION. He Hsueh-Lung; Ling Li-Hu; Wan Feng; Liu Cheng-Yui; Tsai Guan-Yui; Hsun Dai-Phu. Chung-Kuo K'c Hsueh-Yuan Hse-Hsueh Hu-Li Yang-Tsu-So Yang-Tsu Pao-Kao Tz'u-Kang; No. 1, 24-30 (1964). (In Chinese).  
COAL TAR; HYDROGENATION; LIQUIDS
- 02989 HYDROGENOLYSIS AND STRUCTURE OF HOKKAIDO COALS. Nagai, H.; Akama, A. Kogyo Kagaku Zasshi; 67: No. 8, 1266-70, A74 (1964). (In Japanese).  
Concluded that hydrogenolysis of coal begins with liberation of both tar acids and saturated hydrocarbons. COAL; HYDROGENATION; PYROLYSIS; ALKANES; AROMATICS; PRODUCTION; COAL TAR; CRACKING; COAL TAR OILS
- 02990 CORONA PROCESSING OF COAL. Didelius, N.R.; Fraser, J.C.; Kawahata, M.; Doyle, C.D. Chem. Eng. Progr.; 60: No. 6, 41-4 (1964). (In English).  
CORONA DISCHARGES; COAL; HYDROGEN; HYDROGENATION; EQUIPMENT; COAL FINES
- 02991 CATALYTIC DEHYDROGENATION OF COAL. II. REVERSIBILITY OF THE DEHYDROGENATION AND REDUCTION OF COAL. Reggel, L.; Wender, I.; Raymond, R. Fuel; 43: No. 3, 229-33 (1964). (In English).  
Coal reduced at 110°C with Li ethylenediamine and dehydrogenated at 347°C with Pd on Ca carbonate as catalyst and phenanthridine as vehicle; H removed from coal by dehydrogenation can be only partly restored by reduction although H added to coal by reduction can be completely removed by dehydrogenation. COAL; HYDROGENATION; DEHYDROGENATION; REDUCTION; MEDIUM TEMPERATURE; LITHIUM COMPOUNDS; PALLADIUM; CALCIUM CARBONATES
- 02992 RECENT PROGRESS OF COAL CHEMISTRY. Pt. II. HYDROGENATION OF COAL AND UTILIZATION OF ITS PRODUCTS. Hirao, I.; Fujimoto, T. Yuki Gosei Kagaku Kyokai Shi; 22: No. 3, 177-88 (1964). (In Japanese).
- Review of works on coal hydrogenation; mechanism of process; composition of products obtained; application to synthesis. REVIEWS; COAL; HYDROGENATION; CHEMICAL REACTION KINETICS; ORGANIC COMPOUNDS; PRODUCTION
- 02993 HYDROGENATION OF COAL EXTRACTS. Gorin, E. (to Consolidation Coal Co.). US Patent 3,117,921. 14 Jan 1964.  
Operation may be noncatalytic or in presence of H halide or its ammonium salt. COAL EXTRACTS; HYDROGENATION; CATALYSTS; HIGH PRESSURE; HIGH TEMPERATURE
- 02994 PRODUCTION OF HYDROGEN-ENRICHED FUELS FROM COAL. Gorin, E. US Patent 3,117,921. 14 Jan 1964. (In English).  
Suggested method of coal conversion into gasoline-type liquid fuel. COAL; SOLVENT EXTRACTION; GASOLINE; SYNTHETIC FUELS; PRODUCTION; COAL EXTRACTS; DISTILLATION; HYDROGENATION
- 02995 PROCESS AND PLANT FOR DISTILLATION OF COAL AND SIMILAR MATERIALS. Makhonine, J. French Patent 1,367,716. 24 Jul 1964.  
Simultaneous dry distillation and hydrogenation of coal using vertical cylindrical furnace. COAL; DISTILLATION; HYDROGENATION; EQUIPMENT; STEAM; HIGH TEMPERATURE
- 02996 PROCESS AND PLANT FOR DISTILLATION OF COAL AND SIMILAR MATERIALS. Makhonine, J. French Patent 1,367,716. 24 Jul 1964. Filed date 14 Jun 1963. (In French).  
Equipment with diagrams. COAL; INDUSTRIAL PLANTS; DISTILLATION; HYDROGENATION; CAST IRON; SILVER; LIQUID METALS; SOLVENTS; HYDROGEN; EQUIPMENT; DIAGRAMS; WATER VAPOR
- 02997 (NYO-2978-34) EVALUATION OF BETA RADIATION AS A HYDROGENATION CATALYST. INTERIM TECHNICAL STATUS REPORT, MARCH 1, 1962-OCT 31, 1963. Yavorsky, P.M.; Gorin, E. (Consolidation Coal Co., Library, Pa. (USA). Research Div.). 11 Sep 1964. Contract AT(30-1)-2978. 78p. Dep. mn; CFSTI, \$3.00 cy; \$0.75 mn.  
Effects on hydrotreating, removal of N and S from distillate oils derived from hydrogenated coal extract. BETA PARTICLES; RADIATION CHEMISTRY; CHEMICAL RADIATION EFFECTS; STRONTIUM 90; BETA SOURCES; HYDROGENATION; CATALYSIS; COAL; HYDROCRACKING; CATALYSIS; COAL EXTRACTS; CHEMICAL REACTION KINETICS; NITROGEN; SULFUR; REMOVAL; RESEARCH PROGRAMS
- 02998 HYDROGENATION OF COAL. Schroeder, W.C.; Stevenson, L.G.; Stephenson, T.G. US Patent 3,152,063. 6 Oct 1964. Filed date 21 Apr 1961. (In English).  
Production of liquid or gaseous hydrocarbons at 450 to 600°C and 35 to 420 atm using ammonium molybdate as catalyst. COAL; HYDROGENATION; LIQUID PRODUCTS; GASEOUS PRODUCTS; COAL FINES; LIGNITE; CHAR; EQUIPMENT; MEDIUM PRESSURE; HIGH PRESSURE; HIGH TEMPERATURE; CATALYSTS; AMMONIUM COMPOUNDS; MOLYBDATES
- 02999 PLANT FOR COAL HYDROCRACKING. Yamasaki, T. Japanese Patent 29,440. 18 Dec 1964. Filed date 24 Oct 1962. (In Japanese).  
COAL; HYDROGENATION; CRACKING; PYROLYSIS
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Red mud catalyst and S cocatalyst; autoclave at 400-500° and 230 kg/cm<sup>2</sup>. COAL; HYDROGENATION; JAPAN; AUTOCLAVES; CATALYSTS; HIGH TEMPERATURE;
- HIGH PRESSURE
- 03060 HYDROGENATION OF SOLID FUEL. CATALYSTS FOR HYDROGENATION OF A MIXTURE OF COAL AND PETROLEUM PRODUCTS. Krichko, A.A.; Konyashina, R.A.; Nikiforova, T.S.; Titova, T.A. (USSR). Tr. Inst. Goryuch. Iskop., Min. Ugol. Prom. SSSR; 25: No. 3, 123-8(1971). (In Russian).  
Catalyst containing 1% Fe and 0.2% Mo converted coal to 83% liquid products. HYDROGENATION; COAL; CATALYSTS; PETROLEUM; LIQUID PRODUCTS
- 03061 EFFECT OF FERRIC OXIDE ON THE HYDROGENATION OF OYUBARI COAL IN TETRALIN AS THE REACTION MEDIUM. Fujiwara, N.; Matsuo, A.; Demuratani, T.; Yoshima, F. (Univ. Osaka Prefect., Sakai, Japan). Nenryo Kyokai-shi; 50: No. 12, 910-18(1971). (In Japanese).  
Coals (<100 mesh) extracted at 50° with pyrodine and deashed, were hydrogenated for 168 hr. at 300-400° and 50 kg/cm<sup>2</sup>. IRON OXIDES; COAL; HYDROGENATION; TETRALIN; POWDERS; PYRIDINES; SOLVENT EXTRACTION; JAPAN; MEDIUM PRESSURE; HIGH TEMPERATURE
- 03062 STUDIES ON HIGH-PRESSURE HYDROGENOLYSIS OF COAL BY DIFFERENTIAL THERMAL ANALYSIS. Itoh, H.; Makino, K.; Umeda, N.; Takeya, G.; Ueda, S. (Hokkaido Univ., Sapporo, Japan). Nenryo Kyokai-shi; 50: No. 12, 919-29(1971). (In Japanese).  
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- 03063 KINETIC RELATION OF COAL HYDROGENATION, PYROLYSIS, AND DISSOLUTION. Wiser, W.H.; Anderson, L.L.; Qadar, S.A.; Hill, G.R. (Dep. Miner. Eng., Univ. Utah, Salt Lake City, Utah). J. Appl. Chem. Biotechnol.; 21: No. 3, 82-6(1971).  
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- 03064 HYDROGENATION-SOLVENT EXTRACTION OF COAL. Corey, R.S.; Gleim, W.K.T.; Riedl, F.J.; Sunagel, G.R. (to Universal Oil Products Co.). German(FRG) Patent 2,040,764. 18 Mar 1971. 33p.  
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- 03065 USE OF SPHERICAL CATALYST IN COAL EXTRACT HYDROGENATION. Sprow, F.B.; Harris, G.W. (to Esso Research and Engineering Co.). US Patent 3,575,847. 20 Apr 1971. 5p.  
Coal extracts hydrogenated in fixed bed downflow reactor; Co-molybdate catalyst; hydrogenation at 650-900°F and 1000-4000 psig. CATALYSTS; COAL EXTRACTS; HYDROGENATION; SLURRIES; EQUIPMENT; COBALT COMPOUNDS; MOLYBDATES; CATALYSTS
- 03066 HYDROGENATION OF COAL. Kirk, M.C., Jr. (to Sun Oil Co.). US Patent 3,594,305. 20 Jul 1971. 3p.  
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- 03067 LOW-PRESSURE HYDROGENATION OF COAL. Johnson, C.A.; Johanson, E.S.; Wolk, R.H. (to Hydrocarbon Research, Inc.). US Patent 3,607,719. 21 Sep 1971. 5p.

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- 03068 PRODUCTION OF ACETYLENE FROM LIQUID COAL-BASED FEEDSTOCKS USING A SUBMERGED ARC REACTOR. Ladner, W.R.; Wheatley, R. (Bcura Industrial Lab., Leatherhead, Surrey, England). Fuel; 50: No. 4, 443-52 (Oct 1971). COAL; HYDROGENATION; PRODUCTION; ACETYLENE
- 03069 COAL HYDROGENATION PROCESS EMPLOYING AN EXPANDED PARTICULATE SOLIDS BED. Wolk, R.H.; Johanson, E.S.; Alpert, S.B. (to Hydrocarbon Research, Inc.). US Patent 3,617,465. 2 Nov 1971. Operating conditions: 750-900°F and 500-3000 psig. COAL; HYDROGENATION; SLURRIES; EQUIPMENT; MEDIUM PRESSURE; HIGH PRESSURE; HIGH TEMPERATURE
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- 03073 CATALYTIC HYDROGENATION OF COAL EXTRACT. Surygala, J.; Rutkowski, A.; Rutkowski, M. (Nauk. Inst. Chem. Technol., Politech. Wroclaw, Wroclaw, Pol.). Pr. Nauk. Inst. Chem. Technol. Nafty Wegla Politech. Wroclaw.; 11: 3-13 (1972). (In Polish). Determination of effects of temperature (370-450°), H pressure (50-190 atm), and space velocity of raw materials (0.5-3.2 hr<sup>-1</sup>); catalyst contained CoO 1.55, MoO<sub>3</sub> 15.50, WO<sub>3</sub> 13.9, and Al<sub>2</sub>O<sub>3</sub> 69.05 parts; best results in 2-stage process with hydrogenation at 370-400°. COAL EXTRACTS; HYDROGENATION; CATALYSTS; MOLYBDENUM OXIDES; COBALT OXIDES; TUNGSTEN OXIDES; ALUMINIUM OXIDES
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- 03189 FIRST RESULTS IN THE FIELD OF UNDERGROUND GASIFICATION. Kirichenko, I.P. Ugol; No. 101, 99-101(1934).  
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- 03194 UNDERGROUND GASIFICATION OF COAL AS A BASIS FOR DIRECT REDUCTION OF IRON ORE. Trautman, L.O. Podzemnaya Gazifikatziya Uglei; No. 7-8, 18-23(1935).  
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- 03195 MORE ABOUT UNDERGROUND GASIFICATION OF COAL BY MEANS OF BORE-HOLES. Buyalov, S.I. Podzemnaya Gazifikatziya Uglei; 30: No. 6, 2-6(1935).  
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- 03197 FIRST GENERATOR GAS UNDER CONDITIONS OF UNDERGROUND GASIFICATION (OF COAL). Kolesnikov, P.T. Podzemnaya Gazifikatziya Uglei; No. 4, 39-41(1935).  
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- 03198 RESULTS OF EXPERIMENTS (ON UNDERGROUND GASIFICATION OF COAL) AT KRUTOV SHAFT. Manukyan, P.A. Podzemnaya Gazifikatziya Uglei; No. 4, 22-8(1935).  
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- 03202 ECONOMICS OF UNDERGROUND GASIFICATION OF COALS. Ovechnikov, T.V. Podzemnaya Gazifikatziya Uglei; No. 4, 34-9(1935).  
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- 03203 ECONOMIC BASIS FOR UNDERGROUND GASIFICATION OF COAL BY THE ZHURAVLEV METHOD. Ovechnikov, T.V. Podzemnaya Gazifikatziya Uglei; No. 2, 20-2(1935).  
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- 03207 RESULTS OF THE THIRD EXPERIMENT (ON UNDERGROUND GASIFICATION) OF MOSCOW DISTRICT COALS. Kolesnikov, P.T. Podzemnaya Gazifikatziya Uglei; No. 4, 29-34(1935).  
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- 03208 FURTHER EXPERIMENTS ON UNDERGROUND GASIFICATION OF MOSCOW COALS. Kolesnikov, P.T. Podzemnaya Gazifikatziya Uglei; No. 1, 15-20(1935).  
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- 03222 RESUME OF WORK ON UNDERGROUND GASIFICATION AT THE GORLOV STATION "PODZEMGAZ" AND FURTHER PERSPECTIVES. Stoilo, I.S. Podzemnaya Gazifikatziya Uglei;



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